Impacts of Sewage Effluent Disposal into Aquifers on Groundwater Quality - Phase 1: Review of Existing Practice

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This document summarises the findings of a survey of current Environment Agency practice for the control of sewage disposal to underground strata and includes a review of international practice for similar discharges.

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CONTENTS

GLOSSARY

Absorption	The incorporation of a chemical within a solid or liquid.
Adsorption	The attachment of a chemical to the surface of a solid or liquid.
Advection	Mass transport caused by the bulk movement of flowing groundwater.
Aquifer	A permeable geological stratum or formation that is cable of both storing and transmitting water in significant amounts.
Attenuation	Decrease in contaminant mass, concentration or flux by biological, chemical and physical processes.
Biodegradation	The breakdown of a substance by biological means.
Conservative pollutants	Substances that do not readily react or interact through the aquifer with little reaction with the rock matrix and show little or no attenuation.
Controlled waters	(as defined by Water Resources Act 1991, Part III, Section 104). All rivers, canals, lakes, groundwaters, estuaries and coastal waters to three nautical miles from the shore.
Diffusion	Migration of substances in a fluid by natural movement of their particles.
Dilution	Decrease in concentration brought about by the addition of water.
Effective rainfall	The amount of rain available for recharge to the aquifer after evapotranspiration (length units).
Groundwater	The mass of water in the ground below the water table (saturated zone) occupying the total pore space in the rock and moving slowly down the hydraulic gradient where permeability allows.
Groundwater Protection Zone (GPZ)	An area designated around a groundwater source.
Hydraulic conductivity	A coefficient of proportionality describing the rate at which water can move through a permeable medium.
Hydraulic gradient	The change in total head with a change in distance in a given direction.
Intergranular	Occurring between the grains of a rock or soil.
Partition coefficient	In a heterogeneous system of two or more phases in equilibrium, the ratio of the activities (or less accurately the concentrations) of a molecular species in the phases is a constant at constant temperature. This constant is termed the partition coefficient.
Partitioning	The process by which a contaminant, originally in one phase (e.g. adsorbed to soil grains), becomes distributed between other phases (i.e. vapour and dissolved phase).
Pathway	A route along which a particle of water, substance or contaminant moves through the environment.
Permeability	Measure of the ability to transmit water.
Pollution	Pollution of the environment due to or from any process of substances which are capable of causing harm to man or any

	other living organism supported by the environment. (Environmental Protection Act 1990)
Pollution	(of groundwater, as defined in Groundwater Directive) The discharge by man, directly or indirectly, of substances or energy into groundwater, the results of which are such as to endanger human health or water supplies, harm living resources and the aquatic ecosystem or interfere with other legitimate uses of water.
Pore water	Any free water (that is, not adsorbed within the matrix of a soil or rock and incapable of participating in contaminant movement) contained within the primary pore space or within fissures in either the unsaturated or the saturated zone.
Porosity	The ratio of the volume of void spaces in a rock or sediment to the total volume of the rock or sediment.
Receptor	An entity/organism or a controlled water that is being or could be harmed by a potential pollutant.
Recharge	The amount of water that reaches a water source such as an aquifer, which is calculated as rainfall less runoff, evapotranspiration and soil storage.
Retardation	The decrease in solute velocity relative to the velocity of the advecting groundwater.
Saturated zone	The zone in which the voids of the rock or soil are filled with water at a pressure greater than atmospheric. The water table is the top of the saturated zone in an unconfined aquifer.
Unsaturated zone	The zone between the land surface and the water table. It includes the root zone, intermediate zone and capillary fringe. The pore spaces contain water at less than atmospheric pressure, as well as air and other gases. Saturated bodies, such as perched groundwater, may exist in the unsaturated zone. Also called zone of aeration and vadose zone.

EXECUTIVE SUMMARY

Sewage disposal to ground is undertaken either where there is no available connection to mains sewerage or by disposal of sewage works effluent where no suitable receiving watercourse exists. There are several such disposals from large treatment works into the Chalk.

Over 95% of the UK population is connected to some form of mains sewerage (Payne and Butler, 1993). In rural areas connection of isolated dwellings to a main sewer may be difficult for reasons of both cost and practicality. In these areas some form of non-mains sewerage is required. Non-mains sewerage consists of cesspools, septic tank systems or package treatment plants (PTPs). Septic tank systems consist of a tank in which physical separation of solid and liquid components of waste water occurs. The liquid effluent is then directed to some form of soakaway. PTPs are small-scale sewage treatment works that provide primary and secondary treatment of waste water.

The regulation of new septic tank systems and PTPs occurs at the planning stage at the time of application. Applications for non-mains sewerage are identified during this stage as the Environment Agency is a statutory consultee in the planning process. An applicant can also apply directly to the Environment Agency for a discharge consent. The construction of the septic tank itself, but not the associated drainage field, fall within the remit of local authority building control.

In general, recommendations will be made to the Planning Authority by the Agency where a discharge consent is required. Discharge consents are required for all discharges of greater than 5 m^3/d, but the requirement for discharge consents for smaller discharges depends upon regional practice. Small discharges are set qualitative discharge consent conditions, whilst larger PTP discharges are set quantitative consent conditions in terms of suspended solids and BOD, and sometimes ammonia.

There are notable regional differences in practice in the Agency, particularly regarding the processing of smaller discharges for septic tanks, which are not consented in some regions, but are in others.

Septic tanks for single dwellings are specifically excluded from the Groundwater Regulations (1998), except where they lie within Zone I of a source protection zone (SPZ). All other discharges to ground require an authorisation under the Regulations. A discharge consent is considered to be an authorisation. Current practice within some Environment Agency Regions misses, in particular, small discharges (below 5 m^3/d) for multiple dwellings. The identification of pre-existing septic tanks which require an authorisation (i.e. multiple house septic tanks and those in Zone I) has yet to begin.

Records of older septic tanks are very poor and in many cases non existent, however, the number of septic tanks already in an area is likely to be a significant factor in determining whether additional discharges can be tolerated.

The regional variations highlight the need for consistent good practice within the Agency to ensure that the system used is both fair and appropriate. However, there is a lack of knowledge of the risks posed by septic tanks and further research is required to determine these.

A review of international practice has found that significantly stricter controls on non-mains sewerage are practised in some parts of the USA and Australia and increasingly strict controls are being applied in Ireland. These controls capture all new systems and ensure that:

- designs meet strict criteria
- there is ongoing monitoring, inspection and record keeping.

Whilst these countries have a much larger proportion of non-mains drainage than the UK and therefore might be expected to have a greater need for strict regulation, they have also investigated the impact of septic tanks to a greater extent and their investigations have pointed them in the direction of stricter regulation. The strict regulations applied in the US and Australia are therefore likely to be the product of experience rather than unnecessary red tape.

1. INTRODUCTION

1.1 Sewage Effluent Disposal to Underground Strata

Sewage disposal to ground is practised for a number of reasons. Principally it occurs where there is no available connection to mains sewerage. Over 95% of the UK population is connected to some form of mains sewerage (Payne and Butler, 1993). In rural areas, however, connection of isolated dwellings to a main sewer may be difficult for reasons of both cost and practicality. In these areas some form of non-mains sewerage is required. Non-mains sewerage consists of cesspools, septic tanks or package treatment plants (PTPs). PTPs are small-scale sewage treatment works.

Septic tanks have been in use for approximately 100 years. It is estimated that there are around 750 000 septic tanks and small PTPs in the UK and that a further 7 000 are installed each year (Payne and Butler, 1993). Many septic tank systems are relatively old and often little is known about their construction.

Large-scale disposal of sewage effluent to ground also occurs at a small number of locations. The use of large-scale disposal occurs where there is little scope for alternative disposal routes, either because there is no available surface watercourse, or because the surface water courses in an area would be adversely impacted, e.g. at Winchester, the local watercourse, the River Test, is a high quality river, and the addition of Winchester's treated sewage effluent would result in unacceptable degradation of river water quality.

1.2 Septic Tanks Systems

Septic tanks consist of one or more water-tight chambers to which waste water is directed. Within the tanks solids settle out and floating material rises to form a scum layer. Liquid effluent is directed from the tank to a drainage field (often known as a sub-surface irrigation system) where it soaks into the ground. During the passage through the drainage field and the unsaturated zone important chemical changes occur which reduce the impact of the effluent on the receiving groundwater. These changes have been reviewed in detail in a previous report (P2-229 Literature review).

Due to the important changes which occur within the drainage field and unsaturated zone it is appropriate to consider septic tank systems, consisting of the tank, the drainage field and the unsaturated zone beneath the drainage field, rather than just the tank in isolation.

1.3 Package Treatment Plants

PTPs are, in effect, small scale sewage treatment works and can produce effluent of a similar standard to full scale works. PTPs produce an effluent discharge which is either directed to a surface watercourse, to ground, or to both (as a seasonal soakaway) depending upon location. PTPs can serve individual houses up to communities of 1000 people (population equivalents) or larger. PTPs require regular and frequent maintenance to ensure that they perform correctly.

1.4 Regulation of Septic Tanks and PTPs Discharging to Ground

Septic tanks and PTPs, collectively described as non-mains sewerage, are regulated via the planning process at the time of construction. Applications for non-mains sewerage are made as part of seeking planning permission. The Environment Agency is a statutory consultee in the process. The applicant can also apply directly to the Environment Agency for a discharge consent if this is recommended by the planning authority.

Existing septic tanks are not subject to formal regulation unless they become a source of complaint or pollution and come to the attention of the Environment Agency or Environmental Health Officers.

PTPs may be set a quantitative discharge consent, usually in terms of suspended solids, BOD and ammonia concentrations. The decision to set such a consent will depend upon the size of the PTP and the receiving medium.

For sites for which a quantitative discharge consent has been issued, compliance with the discharge consent conditions is assessed on a regular basis.

1.5 Previous Work

Payne and Butler (1993) reviewed the planning process and the role of the National Rivers Authority (now the Environment Agency) in that process. They also conducted a survey of practice circa 1992 within selected planning authorities and the NRA regions. Payne and Butler (1993) also made recommendations for improvements in practice. The report is discussed in more detail in Section 3.4.10.

2. THE PLANNING PROCESS

2.1 Legislation and Guidance

2.1.1 Planning Guidance

A formal review of planning legislation is beyond the scope of the current project. Payne and Butler (1993) undertook such a review of the then current planning legislation with respect to septic tanks and small PTPs and that document should be consulted for further information. There has been no new planning legislation since that time which affects non-mains sewerage, however, since 1993 a number of guidance documents have been issued, of particular relevance is Planning Circular 3/99.

Guidance to planners was issued, by the Department of the Environment, Transport and the Regions (DETR) in Planning Circular 3/99 'Planning Requirements in Respect of the Use of Non-Mains Sewerage Incorporating Septic Tank in New Development'. A copy of Planning Circular 3/99 is included as Appendix A.

Planning Circular 3/99 contains a presumption against the use of non-mains sewerage, unless it can be demonstrated by the applicant that connection to a mains sewer would entail either excessive cost or difficulty. The Circular also gives a hierarchy of preferences, with PTPs being preferred to septic tanks. The Circular indicates that septic tanks should be used only where the development is of too small a size to justify the use of a PTP, although the cut-off sizes are not explicitly stated.

Planning Circular 3/99 requires that the applicant provide an assessment of the use of septic tanks and suggests a series of circumstances in which septic tanks should not be considered, these include:

- Contravention of recognised practice;
- Adverse effect on water sources/resources;
- Health hazard or nuisance;
- Damage to controlled water;
- Damage to the environment and amenity;
- Overloading the existing capacity of the area;
- Absence of suitable outlets/insufficient land area;
- Unsuitable soakage characteristics;
- High water table;
- Rising groundwater levels;
- Flooding.

The Circular indicates that proof of suitability of any proposed system rests with the applicant. It also highlights that planning permission should be granted with the views of the Environment Agency taken into account.

2.1.2 Legislation

Discharge consents for septic tanks and PTPs are issued under Section 88 of the Water Resources Act (1991). Discharges less than 5 m^3/d do not normally require a consent, but a consent offers protection from prosecution under Section 85 of that Act.

Septic tanks for single dwellings are specifically excluded from the Groundwater Regulations (1998), except where they lie within Zone I of a source protection zone (SPZ). All other discharges to ground require an authorisation under the Regulations. The Regulations state the need for all authorisations to satisfy the requirements for 'Prior Investigation' and 'Requisite Surveillance' although these requirements are not explicitly stated in the Regulations. The intention of the regulations is to ensure that pollution of groundwater within the zone of saturation does not occur. Discharge consents are authorisations under the Groundwater Regulations (1998).

The legal basis for the regulation of septic tank and PTP discharges is not considered further.

2.1.3 Existing Environment Agency Guidance

A number of guidance documents are available for the use of regulators, developers and owners of non-mains sewerage.

PPG4

Pollution Prevention Guideline 4 'Disposal of Sewage Where no Mains Drainage is Available' (1997) is a joint publication of the Environment Agency, the Scottish Environment Protection Agency (SEPA) and the Northern Ireland Environment and Heritage Service (NIEHS). PPG4 sets out basic requirements for non-mains sewerage.

CIRIA (1998)

CIRIA (1998) produced a series of pamphlets to explain the use of non-mains sewerage to developers, owners and regulators. The pamphlets explain the types of system available (*On-site Sewage Disposal: Options*) and discuss the selection process. The design requirements and the installation of septic tank systems are described (*Septic Tank Systems: Design and Installation*) and the care of the system is also detailed (*Septic Tank Systems: a Users Guide*). A guide for regulators, including planners, building control and the Environment Agency was also produced (*Septic Tank Systems: a Regulators Guide*)

The regulators guide is of particular relevance here. It sets out the role of planning, building control and the Environment Agency.

BS6297: 1983 Design and Installation of small sewage treatment works and cesspools

This document describes standards for the design and installation of septic tanks, small PTPs and cesspools. In a recent review of available test methodologies for conducting percolation tests, Mulqueen et al, (1998) concluded that BS6297:1983 no longer represented good practice.

The advice contained in the Standard states that where the subsoil is of sufficient permeability then a soakaway pit may be used, and subsurface irrigation is only required for lower permeability soils. This advice ignores the improved treatment available in a subsurface irrigation system and may no longer represent good practice. BS6297:1983 is still referred to in CIRIA (1998) and PPG4.

2.2 Planning Permission for Septic Tanks and Small PTPs

CIRIA (1998) guidance states that planning permission has to be sought for all new septic tanks and PTP installations, with the exception for septic tanks that serve a single dwelling, and are within the property's boundaries, and are less than 10 m^3 capacity and are not installed between the house and a highway (or if so, are more than 20 m from the highway).

Applications which meet all of these requirements are likely to be limited in number. Generally applications for septic tanks are part of a development and the above situation is only likely to arise where an existing tank is replaced.

All other non-mains sewerage requires formal planning permission.

The construction of septic tanks is regulated by Local Authority Building Control. A peculiar aspect of the regulation of the construction is that Building Control have no powers of enforcement over the construction of the drainage field. Payne and Butler (1993) give details of the legal case which set the precedent for the current situation (*Chesterton RDC v. Ralph Thomson Ltd*).

2.3 The Powers of the Environment Agency

The Environment Agency is a statutory consultee on all planning applications. The planning application proposal is passed to the Environment Agency for assessment. The Environment Agency will at this stage identify whether a discharge consent is required and either contact the applicant directly or comment to the local authority identifying the requirement for a discharge consent. Once a discharge consent has been applied for it falls outside the planning process. For small discharges the Environment Agency may choose to waive the need for a consent.

Once the assessment process is complete, the application will be passed back to the Planning Authority who will decide whether to grant or decline permission. The decision of the Planning Authority is based on the findings of the Environment Agency and those of Building Control. New septic tank systems that do not require planning permission will not be brought to the attention of the Environment Agency through the planning process and so there is no assessment of pollution implications or requirement for registration with the Environment Agency.

Applications for a discharge consent are evaluated on the basis of the information provided with the application, together with any additional data that the Environment Agency may have available (groundwater vulnerability maps, geology maps, location of source protection zones, location of groundwater abstractions, location of other septic tanks etc.). The evaluation is based upon the volume of effluent to be discharged, and upon the potential risk to groundwater. Risk to groundwater is assessed based on the nature of drift and solid geology and on the thickness of the unsaturated zone. Additional information taken into account also includes the location of tank with respect to receptors such as licensed abstractions and surface watercourses.

The role of the Agency is formalised in PPG4 (Environment Agency, 1997).

As a result of these assessments the Environment Agency will do one of the following:

- Grant an unconditional consent;
- Issue a qualitative or quantitative consent with conditions or recommendations, to be attached to the planning permission
- Make recommendations for consideration by the Planning Authority;
- Issue a conditional prohibition notice;
- Issue an absolute prohibition notice;

The Groundwater Regulations require that all new and existing discharges to ground have an authorisation, with the exception of septic tanks for isolated dwellings. A discharge consent is classified as an authorisation.

3. CURRENT PRACTICE WITHIN THE ENVIRONMENT AGENCY

3.1 Introduction

The Environment Agency was contacted in early 2001 at Regional level to determine the current practice with respect to the processing of applications for new septic tanks. The findings of the review are given here. The general approach is given in Section 3.3 and then regional differences are highlighted in Section 3.4.

In addition, regulators in Scotland (Scottish Environment Protection Agency - SEPA) and Northern Ireland (Northern Ireland Environment and Heritage Service - NIEHS) were also contacted.

3.2 Survey Approach

In determining current practice for septic tanks and package treatment plants representatives from all Environment Agency Regional offices and at some Area offices were contacted by telephone. Initial contact was made at regional level but in many cases members of the regional teams were unable to answer all of the questions and referred to their colleagues at Area offices who deal with planning applications on a day-to-day basis. Differences within regions, such as differences between Area offices, or differences between individual practices, were not fully explored, although it is clear that such differences exist.

The Environment Agency staff contacted during the survey, their region and their area of responsibility are listed in Table 3.1.

Table 3.1 Contact Details

Contact	Title/ Responsibility	Region	Office
Donny Morrison	Senior Consultant	SEPA	Stirling
George Harper	Higher Scientific Officer	NIEHS	Belfast
Mark Morton (Regional)	Regional Groundwater Resources Officer	North East	Leeds
Nicky Ion	Hydrogeologist	North West	Warrington
Majella Fegan (Area)	Hydrogeologist	North East	Leeds
Chris Thomas (Regional)	Regional Groundwater and Contaminated Land Manager	Midlands	Solihull
Tony Jenkins (Area)	Hydrogeologist	Midlands	Shrewsbury
Ian Edwards (Area)	Environment Protection team	Midlands	Shrewsbury
Paul Hart (Regional)	Principal Groundwater Quality Officer	Anglian	Peterborough
Wayne Davies (Regional)	Principal Hydrogeologist	Wales	Cardiff
Roger Cawte (Area)	Water Quality Consenting Officer	Thames	Wallingford
Maxine Elliott (Area)	Groundwater Protection Officer, Tactical Planning	Southern	Winchester
Nigel Thomas (Area)	Water Quality Consenting Officer	Southern	Winchester
Roger Saxon (Regional)	Principal Officer Environment Protection	South West	Exeter

The survey was not based on a formal questionnaire but the list of questions below illustrates the line of questioning:

i) How much information do you receive with planning applications / discharge consents?
ii) Do you receive planning applications or do you look through planning lists?
iii) Do you require consents for all septic tanks or just >5m^3/d? or just those in sensitive areas?
iv) Do you ensure that percolation tests are carried out?
v) Do you look at potential receptors (>50 m from a borehole, >10m from watercourses)?
vi) Do you look at the site situation with respect to drainage and proximity to houses?
vii) Do you set conditions for de-sludging frequency and maintenance?
viii) Do you consider type of septic tank / adequacy for the size of development i.e. the number of houses per septic tank?
ix) Do you ask for information on depth of unsaturated zone?
x) Do planners pay heed to recommendations, and do you get any feedback from planners and local authorities?
xi) What are grounds for refusal of a consent?-: geology/depth of unsaturated zone/ proximity of receptors/ lack of information.
xii) Do you reassess old septic tanks - require consents from them?
xiii) How do you deal with applications differently if it was for a package treatment plant (PTP) rather than a septic tank?

xiv) Do you record all planning applications for non-mains sewerage, whether consented or not?
xv) Do you use a scoring system to assess the suitability of a site?
xvi) Do you set quality standards for package treatment plants?
xvii) Would you consider alternative systems such as reed beds?

The responses were then compared to determine regional differences within the Environment Agency.

3.3 General Practice

General Environment Agency practice is described in this section. Regional and other variations are described in Section 3.4.

3.3.1 New Applications

An applicant can either apply directly to the Environment Agency for a discharge consent; or the requirement for a discharge consent will be identified via the planning process and the applicant advised accordingly. An application for a discharge consent sent directly to the Agency is more likely to be assessed as there is no filtering of applications at any stage in the process.

Planners send the Agency planning applications which include septic tanks with little supporting information attached. At a minimum the information included may just include a site map and proposed location of the septic tank.

Planning applications are sent to the Agency's Planning Liaison team who often filter out applications with discharges which are likely to be under 5 m^3/d and those in non-sensitive areas, although this is at the discretion of the Planning Liaison team (note, in Southern Region, this filtering is carried out in consultation with groundwater staff). Sensitive areas are determined from aquifer vulnerability, depth to groundwater, location of watercourses, public supply boreholes, proximity to SSSIs and conservation areas. Those applications which are filtered out at this stage are given a response in a standard format. The response includes recommendations on the requirement to maintain (empty) the tank at least once per year, and advice on carrying out a standard percolation test. An example of standard responses is given in Appendix C. These standard recommendations are attached to all planning applications and include the minimum distances to receptors: greater than 10 m from a watercourse and 50 m from a groundwater supply. A similar procedure is undertaken by SEPA. Those applications below 5 m^3/d, and outside sensitive areas, are generally not required to have a consent and there is no follow up after the planning correspondence unless the applicant wishes to do so. These sites are then granted or declined planning permission by the Local Authority. There is generally no check by the Agency on the compliance of the applicant with any of the conditions.

For planning applications where a discharge consent is likely to be necessary, then recommendations are made to the Planning Authority that a discharge consent is sought directly, although there is often no system for ensuring that a discharge consent application is made following recommendations to the Planning Authority.

Discharge consents are evaluated on the basis of their risk to groundwater and other controlled waters, a consent is subsequently either issued or declined. The applicant is, in general, only required to supply an address and the size of discharge, although where there is insufficient information the Environment Agency may require additional details e.g. in areas where infiltration may be a problem a percolation test will be required. Generally, a consent will be issued with strict conditions rather than a consent being refused. In extreme cases such as the siting of a septic tank in a Zone 1 of a Source Protection Zone, absolute prohibition notices may be served to prevent any discharge from the site. Sites proposed in Zone II or Zone III of a Source Protection Zone will be considered on a site specific basis and will be subject to a more thorough risk assessment than sites proposed outside a source protection zone. The results of the assessment are used to advise the Planning Authority. The planners will take into account the advice of the Agency in their final decision on whether to grant planning permission. However, the Environment Agency does not receive decision notices and so has no feedback as to whether their advice has been adhered to, and so there is no knowledge as to whether the recommendations have been taken into account when granting planning permission.

Where an applicant applies directly for a discharge consent for a proposed septic tank this filtering of applications does not take place and all applications are assessed. This consideration is based upon risk to groundwater in the same way as a consent would be assessed in the planning route. **These two different routes mean that the same tank may be required to have a consent if a consent is applied for and not required to have a consent if the planning route is taken.** It therefore depends on the advice that the local authority's planners give to the applicant as to which route is taken.

CIRIA (1998) suggest that there is an upper limit of 25 m^3/d for discharge to ground, applications for this size of discharge are rare and are likely to be dealt with on a case-by-case basis.

Under the Groundwater Regulations (1998), an authorisation is required for all discharges to ground, with the exception of septic tanks serving a single dwelling outside of a source protection zone 1. Strictly interpreting these regulations means that all multiple dwelling applications require a consent, irrespective of the size of discharge. It is not clear from the survey that the 5 m^3/d cut-off used in many regions effectively catches multiple dwelling applications.

3.3.2 Existing Septic Tanks

Many existing septic tanks (those serving single, isolated dwellings) are not required to have discharge consents and are not formally inspected by the Environment Agency unless there is a pollution incident. The Environmental Health Department of the Local Authority may be called in where a septic tank is causing odour problems or is deemed a health hazard. Existing septic tanks may be subject to a consent where the use of the building changes or further development of the site is proposed and planning permission is required. Such applications are dealt with in the same way as new applications. Authorisation of existing tanks in Zone I of a source protection zone, or serving multiple dwellings, as required under the Groundwater Regulations (1998) has yet to commence.

Where an existing discharge is causing a problem, the Environment Agency has the powers, under the Water Resources Act 1991, to prosecute owners of existing septic tanks; to serve a prohibition notice or to impose consent conditions. The Agency can also serve an

Enforcement or Works notice (Works notice - section 161, WRA) under Schedule 22 of the Environment Act 1995.

Records of existing septic tanks which have passed through the planning and consenting process have been kept for many years in some areas, but not in others. These records, kept as databases or paper records, are not typically updated following e.g. change of ownership. In the records seen in compiling this report, address details of the applicant are often those of a developer or architect, rather than the occupier. There is also no information on the type of soakaway used.

3.4 Regional Variations in Practice

3.4.1 General

The survey found that there are regional variations in the current practice undertaken by the Environment Agency with regards to applications for septic tanks and PTPs. These are detailed in Table 3.2. The differences are likely to reflect the relative importance of these discharges in comparison to other discharges in the region and the importance and vulnerability of groundwater within a region. In different regions, different departments become involved in the processing of discharge consent applications. There was some confusion amongst the staff surveyed as to who was involved and at what stage and this remains unclear. The following groups within the Agency may become involved: planning liaison, water quality, water resources, consenting, and groundwater protection.

As a result of different practices both between regions and within regions, the survey cannot be regarded as being representative of all Environment Agency practices. In particular the survey will not have picked up intra-regional differences in practice and the results should be viewed in that context. References to the practice in a particular region are based on consultation with the staff members identified at the start of this section only.

3.4.2 Receipt of Planning Applications

It is up to the relevant Planning Authority to ensure that the Agency is consulted on planning applications. Anglian Region, however, sends members of their Planning Liaison team to the Local Authority offices where all planning applications are reviewed and decisions made as to whether the application involves high risk or high volume discharges. These are then brought back for assessment by the Agency. The Anglian approach probably results in fewer applications being missed and a more comprehensive knowledge of any new installations. The Southern and Welsh Regions use a database to record all planning applications in the area to determine whether there are any proposed installations that require consent by the Agency. The filtering of applications is at the discretion of the Planning Liaison team in most regions, although Southern and South West require consents for all applications and so no filtering occurs. In the Thames Region a decision matrix enables the Planning Liaison team to decide whether a planning application requires further investigation. Northwest Region also use a GIS screening process to filter out applications in non-sensitive areas at the Planning Liaison stage.

3.4.3 Requirements for Consents

There is a discrepancy between Regions as to the size of discharge which requires a consent. The majority view is that discharges in sensitive areas or over $5m^3/d$ need a consent and that

septic tanks with smaller discharges do not. The Southern and South West Regions require a consent for all new septic tanks that the Agency is aware of and the North East Region consents all tanks where they serve more than a single dwelling. NIEHS requires that a consent is issued for all new septic tanks. The North West Region looks at all discharge consent applications but septic tank applications from planners without a discharge consent application are filtered by Planning Liaison. It therefore very much depends on the advice the planners give to the applicant as to whether they should apply for a discharge consent or whether they should just apply for planning permission. The Thames Region either consents all applications that pass through the planning filter or grants conditional prohibition notices. These conditional prohibition notices cover the site during installation but do not allow any continuing control.
In the past (1994 to 1999) the Hampshire Area of Southern Region has used conditional prohibition notices in place of discharge consents for new applications.

3.4.4 Assessment of Site Suitability

The assessment of the site suitability is generally based upon the geology, hydrogeology, depth to unsaturated zone and the proximity of any known receptors. The depth to water table is often requested from the applicant but trial pits would only be used if there were an anticipated problem. The Environment Agency Area offices will also use their local knowledge to estimate the depth to groundwater. Assessment of the sites is undertaken using a scoring system in the Southern Region which is based around the criteria set out in PPG4 (Environment Agency, 1997). The Midlands Region also have a similar scoring system, which is reproduced in Appendix D, but this is reported as being used infrequently. All other regions surveyed do not use a scoring system to assess the sites. EA Wales may ask for developers to augment the data depending on the size of the development and also take into account the density of septic tanks in the area. All regions also ask for percolation (or permeability) tests but whether these are a requirement or whether they are carried out is frequently unknown, although Southern would not issue a discharge consent without one. Thames Region requires that soakaway tests are carried out on sites where there is insufficient knowledge of the geology. They also consider that a consent will be more likely to be required for an applicant who has had pollution problems in the past than an applicant with no previous history of problems. The Midlands Region, when assessing site suitability take into consideration the adequacy of the type of installation for the type of usage, they would, for instance, not recommend a package treatment plant for a seasonally-used site (such as holiday homes) because the bacteria require a steady supply of effluent and so a PTP would not be efficient.

3.4.5 Sizing

Other factors taken into account in some regions are the number of houses using a septic tank and whether the tank is suitable for the size of the development. Ideally Midlands Region would prefer only one house per tank because if there is a pollution problem it is easier to pinpoint who has caused it. Midlands Region also suggests that more than 2 to 3 houses would require a package treatment plant. SEPA stated that they would grant an absolute prohibition notice if septic tanks were proposed to serve more than 15 people or greater than 5 households. The South West Region would consider the soakaway design to ensure even distribution of effluent. There is quite a lot of confusion as to the role of the Environment Agency in these areas which may be seen as an issue for the developers or Building Control. Most regions do consider but do not advise on the size of the tank, type of soakaway or drainage field, and site situation with respect to housing and drainage as this is felt to be

outside the Agency's remit. The Hampshire Area of Southern Region, require the results of a percolation test before a consent is granted. Thames and Southern Region however would try to persuade an applicant to adopt a different design if the proposed design was thought to be inadequate and they would prefer shallow (less than 1 m depth) subsurface irrigation systems over simple soakage pits.

3.4.6 Reasons for Refusal

Declined consents are generally based on an assessment of site suitability and risk to groundwater.

3.4.7 Inspections

No regions consent or inspect existing septic tanks at present unless there is a pollution incident. Hampshire Area (Southern Region), however, pass details of all discharge consents to Environmental Protection for information. In Northern Ireland, NIEHS does not inspect or consent any existing septic tanks unless there is an incident. NIEHS also leaves any existing installations close to abstractions up to the water service concerned and only where they receive a complaint would the NIEHS investigate.

3.4.8 Package Treatment Plants

The use of package treatment plants (PTP) instead of septic tanks is also viewed differently depending on which region is carrying out the assessment. Most regions would recommend a PTP where a large discharge was proposed or for a discharge in a sensitive area. The preference for PTPs is because the effluent is regarded as being of higher quality than that from a septic tank. A PTP in many cases would be assessed in the same way as a septic tank but in order to comply with the Groundwater Regulations 1998 a PTP would require a more rigorous risk assessment. The Midlands Region suggests that, from experience, PTPs actually pose a greater risk to groundwater because they require greater maintenance and are likely to fail when maintenance is not carried out.

Generally, and across all regions, quantitative standards are set for PTPs, to ensure good operation and maintenance of the system. These typically include BOD, suspended solids, ammonia and also any other determinands that may be thought to be a potential problem. Routine monitoring is carried out on large PTPs (discharges greater than 10 m^3/d) in the Anglian and South West Regions but smaller discharges are not routinely monitored. In Hampshire (Southern Region), quantitative discharge consents are set for discharges greater than 5 m^3/d. In Wales there is a requirement for monitoring but this is normally undertaken by the owner and very few sites are monitored by the Agency .

3.4.9 Data Recording

Most regions record all planning applications for non-mains sewerage received but SEPA and Anglian Region only record consented discharges. South West Region kept records of planning applications for only 5 years. NIEHS have a record of all consented discharges, which includes all new tanks since 1972. The Hampshire Area of Southern Region have a record of discharge consents going back to 1974. Examination of the Southern Region database reveals that details are not updated. In a re-registration exercise in the mid 1990s over 1000 discharge consents were not re-registered in addition, many of the addresses held are for unnamed plots of land, or in the name of a developer. Ownership is likely to have changed since the initial application.

3.4.10 Comparison with Previous Surveys

The findings of the survey have been compared to a survey of the National Rivers Authority regions described in Payne and Butler (1993). The current practice seems to be as varied as that described in 1993. There is still a discrepancy in how new installations are identified at the planning stage, whether from planning lists or by planning applications sent to the regulator and on the size of discharge requiring a consent. Anglian Region actively visits local authority offices whilst all the other regions surveyed relied on the information from the Planning Authority. Payne and Butler (1993) note that in some regions NRA officers scanned planning lists whilst in others the NRA relied on the planning authorities to notify them. It also seems that in 1993 and in the current survey there is little communication between the Environmental Regulator (Environment Agency, SEPA and NIEHS) and the planning authority.

There is little knowledge of the locations of existing septic tanks except where a problem arises, and again this is true for both the 1993 and recent survey. The recent survey, does however, indicate greater agreement between regions on which discharge applications are subject to a consent i.e., discharges over 5 m^3/d and those in sensitive or vulnerable areas.

Table 3.2 Responses Showing Regional Variation when Consenting Non-Mains Sewerage Systems

	Contact	Information received with planning applications /discharge consents?	How do you receive planning applications?	What is consented?	Are soakaway (percolation) tests carried out?	Do you look at the proximity to receptors?		Do you set maintenance conditions and de-sludging?	Do you consider the sizing of tank and if it is adequate?	Do you ask for depth to the unsaturated zone?	Do planners take your recommendations? Do you get any feedback?	What are the grounds for refusal of a consent?	Do you reassess old tanks?	How do you deal differently with Package Treatment Plants?	Record of Applications received?	Do you use a scoring system for assessment?	Do you set quality standards for PTPs, do you monitor?	Do you consider alternative designs to septic tanks, such as reed beds?	Other
North West	Nicky Ion (Area)	Site plan, percolation tests if available	As received, not actively gathered	all > $5m^3/d$ or in SPZ	Yes	Require more information from developers for very large discharges, asses all on site-specific basis	Not drainage - surface water.	No	Only for discharge consents	Yes	Unsure	Based on risk, distance to receptors/ water table. Would not refuse on lack of information would require more.	No, only if changes to existing system but assessment is the same as with a new system but deal in a more lenient way because existing and therefore cannot do 'prior investigation' and 'requisite surveillance'	None only look at if ground can take volume and the quality. Larger volumes do require secondary treatment.	Some information kept	No but planning liaison use a filter system based on GIS.	Yes	Yes	
North East	Mark Morton (Regional)	Very little	See below	Only if serious risk otherwise not	Should be undertaken by the planners, sometimes ask for it to be done but not always adhered to.	Look in much more detail if potentially problematic	Do not look at drainage/houses. The Environmental Protection team will serve prohibition notices if problematic	Do not set conditions for desludging ,but do for general main-tenance.	No	We ask if the data is available. If potentially problematic we may get more information and use local knowledge.	Do not see decision notices, do not have time and planners do not provide them. Developers may not adhere to the planners anyway.	Geology/depth unsaturated zone/proximity of receptors	Not unless a problem.	Same but less concerned, sometimes suggest PTPs instead of septic tanks.	-	No	-	-	
North-East	Majella Fegan (Area)	Very little	As received, not actively gathered	If more than a single dwelling	Asked for on form.	Yes: Licensed abstraction, surface water, springs, groundwater levels	Consider whether the drainage proposed is acceptable and adequate for develop-ment	No	Yes, consider whether drainage they are proposing is adequate	-	No automatic feedback but do find out info at planning liaison meetings	Potential to cause pollution, if insufficient information may object.	No. Even if there is an incident it is hard to trace back to a single source. Do look at if redevelopment of a site with existing septic tanks	Consider septic tank discharge is of a lesser quality. Initially treat assessment in same way. In sensitive sites may request a PTP instead of a septic tank	Yes, everything that is received is recorded. Planning liaison put it onto computer for relevant departments to make comments, so held on file and computer	No		Yes, assess them on their merits, quality of effluent, ground conditions, size of unit etc.	

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Midlands	Chris Thomas (Regional)	-	-	Only over $5m^3/d$ unless e.g. Zone 1.	Not always, if the EA can assess geology and soils it can be estimated.	Yes, always	Yes, more houses on septic tank therefore more risk. Look at density	No.	Would encourage a PTP if 2-3 houses. Would consider a hotel very carefully	We check our own records	Depends on authority	Risk to groundwater, only object if in Zone 1/2.	Not routinely, groundwater regulations near Public water supplies may consent	Technical assessment is the same but PTPs are more risky because of poor maintenance	-	-	-	-	
Midlands	Tony Jenkins (Area)	Building details, location of soakaway, tank	As received, not actively gathered	Just over $5m^3/d$ unless sensitive e.g. Zone 1.	Routine response to include percolation tests	Zone 1, no septic tanks but elsewhere assess risk	Drainage considered by Environmental Protection Dept.	Environmental Protection deals with maintenance.	Limit on houses, ideally 1 tank per house as then know who has caused the pollution. As low as possible Max:3/4	Yes and groundwater vulnerability	No feedback but would like follow up	Well< 50m but liaise with applicant rather than refuse	Not proactive, only incident or part of a planning application.	Can be better chemically but problems with seasonal fluctuations. 'Bugs' need a steady supply of effluent.	A record of all planning applications is held with the planning liaison team.	One is available but is not used often	Yes. They are monitored.	Yes, if we have a problem with septic tanks reed beds would be considered but often they are not appropriate for large discharges.	
Anglian	Paul Hart (Regional)	Varies-percolation if available	Planning liaison visit Local Authorities and filter applications	Just over $5m^3/d$ unless sensitive e.g. Zone 1.	Use percolation data if available. Expect applicant to provide details	Yes, always	-	Dealt with in standard response sent to applicants	If large, suggest PTPs but should have been done at pre-planning stage. New regulations EA are statutory consultees		No feedback	Risk, and not enough info. Generally would not serve prohibition notice as should have been sorted at pre-planning stage.	No. groundwater regulations - policy to authorize all single dwellings in zone 1-have not embarked on enforcement.	Expect more rigorous risk assessment to comply with Groundwater regulations for PTP. R&D P20 methodology applied.	Only consented discharges*	No*	Yes, descriptive standards for small tanks. Program of EA inspection for large tanks >5m3/d and >10m3/d*	Yes as a tertiary polishing treatment *	
Wales	Wayne Davies (Regional)	Basic information	As received, not actively gathered	Only high risk areas	Not really, required by LA. There are inconsistencies within region	If have info, also use local knowledge. If large, developers may need to augment data	Yes, we are concerned whether the design is adequate for the size of development	No. Environmental Health may be concerned but not a problem to ground-water.	-	May dig trial pits with sensitive sites or put down piezometers. Limited sensitive sites in Wales though. Issue a condition shallow subsurface irrigation no more them 1 m depth.	No, and no feedback.	Sensitivity of receptor, density of applications. Adopt precautionary principle and therefore object.	Not unless incident, surface water problem or environment. Health deal with it.	Same approach. Higher NH3 conc. in tanks; for larger discharges recommend PTPs	Every planning application is recorded is recorded on the DPs database and includes grid refernce, address and type of foul drainage.	No	Yes. Mainly TOC and ammonia. There is a requirement for monitoring but this is normally self regulation	Would not dismiss it, look at what sustainable options are available.	

Table 3.2 Responses Showing Regional Variation when Consenting Non-Mains Sewerage Systems

	Contact	Information received with planning applications /discharge consents?	How do you receive planning applications?	What is consented?	Are soakaway (percolation) tests carried out?	Do you look at the proximity to receptors?		Do you set maintenance conditions and de-sludging?	Do you consider the sizing of tank and if it is adequate?	Do you ask for depth to the unsaturated zone?	Do planners take your recommendations? Do you get any feedback?	What are the grounds for refusal of a consent?	Do you reassess old tanks?	How do you deal differently with Package Treatment Plants?	Record of Applications received?	Do you use a scoring system for assessment?	Do you set quality standards for PTPs, do you monitor?	Do you consider alternative designs to septic tanks, such as reed beds?	Other
Thames	Roger Cawte (Area)	Not much, filtered by Planning Liaison using a matrix	As received, not actively gathered	Only greater than $5m^3/d$ and sensitive areas	Routinely ask for them and do require them where insufficient knowledge of geology	Yes	This is really Building Control/ planning concern. Would try and persuade applicant if design would not work. We prefer shallow sub-surface drainage field	No	No this is a matter for Building Control	Yes, we ask in all cases but do not always receive the data. Trial pits will be used if there is an expected problem. Subsurface irrigation no more than 1 m depth	Depends on LA, no feedback	Adverse effect to groundwater	No	Higher quality effluent. Do monitor BOD and SS. More likely to allow deeper soakaways or even boreholes	List of all valid applications received and conditional prohibition notices received.	No, a matrix is used for filtering by the Planning liaison team but assessment is undertaken for a sites individual merits	-	-	
Southern	Nigel Thomas (Area)	Limited	As received, DPS database	Just over $5m^3/d$ unless sensitive e.g. Zone 1.	Routine response to include percolation tests attended by LA.	Throw out on policy if zone 1, otherwise take into account receptors		Standard conditions - maintenance regularly	No. Purely concerned with quantity and quality of effluent	Looked into	Not much feedback	-	Only if incident	Same procedure in assessment but PTP produces better quality effluent.	Yes on database	Yes, based upon criteria put forward in PPG4 (EA, 1997)**	-	-	
Southern	Maxine Elliot (Area)	limited		Conditional prohibition notices may be issued where there are no down-gradient receptors	Always	Yes: internal consulation with water resources / groundwater protection	Use BS6297		Yes	No	Occasionally	Lack of information, proximity to receptors, geology	Only if incident	Set quantitative conditions for BOD and SS		yes STANK algorithm	Set quantitative conditions for BOD and SS		
South West	Roger Saxon (Regional)	Limited	Varies, depends upon agreements with Local Authorities	Require consents for all tanks that are aware of.	Routine response to include percolation tests	Yes, >50m boreholes, >10m watercourses, chance of flooding	Look at soakaway design to ensure even distribution and prevent ponding. Will refuse consent if there is a 'reason-able alternat-ive' to tank which is not necessarily the cheapest option	General require-ment for de-sludging.			Unsure, sometimes get feedback but depends on planner and authority.	Unsuitable it may cause pollution and serve a prohibition notice to prevent it going ahead.	If rebuilding/ resiting soakaway. Exemption Order 1986 exempts from statutory control those in place before 1974.	Only PTP if septic tanks are unsuitable especially if bigger discharge.	All applications are registered on public register and kept for 5 years, this includes whether consents have been refused or accepted	No. Use a set of standard criteria, distance to boreholes, watercourses and percolation data. If sufficient issue consent quickly otherwise need more detail	Yes. BOD, Suspended solids, and ammonia. If medium to large they are monitored. Single dwellings are not monitored unless there is an incident	Yes. We consider whatever has been applied for. Deal with each one in a case-by-case basis.	

Table 3.2 Responses Showing Regional Variation when Consenting Non-Mains Sewerage Systems

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SEPA	Donny Morrison	Planning application form, detail depends on level of planning, outline or full.	Look through planning lists and receive planning applications	Over $5m^3/d$. Others receive conditional prohibition notices	SEPA require evidence from the applicant/agent that BS6297 has been complied with	Yes, >50m boreholes, >10m watercourses. Case by case-geology and groundwater protection strategy	If over 5 houses or 15 people serve absolute prohibition otherwise conditional. Proximity to houses is an issue for the LA.	Yes as a condition – maintenance	No. But prohibit if > 5 houses/15 people. Mainly issues for LA Building Control Depts	Indirectly as part of the percolation test	Yes SEPA is a statutory consultee	Inner Source protection zone. SEPA cannot withhold consent unreasonably. Refuse on the basis of proximity to receptors or on the level of treatment proposed	Yes when it is being sold or redeveloped (when it would be picked up as part of the planning process)	This is a site specific consideration	Only consented discharges	No. We use the document SEPA Policy 1	Yes, and these are monitored by SEPA	Yes	Recommend adherance to CIRIA (1998) and PPG4
NIEHS	George Harper	Very little	Some planning offices send the applications, others do not. It is a bit hit and miss	Every septic tank	No	Carry out site visit and may in some cases (5%) carry out a trial hole and percolation test.	Assume developers should be policed by Building Control so do not look into.	Suggest desluging once per year	No	No	Hopefully they do take the comments on board	Ground unsuitable for the volume of effluent. Size of stream too small if discharge to stream. In NI consent is a legal requirement	No. Unless there is a pollution incident. If in Zone 1 leave it up to the Water Service	No differently as long as subsurface irrigation system is suitable	Yes, all consented tanks are recorded, and this includes all new tanks since 1972	All septic tanks are consented. No scoring system is used.	Yes, and all tanks are monitored by the NIEHS by effluent samples		Yes on their individual merit
					**Maxine Elliot from Southern region (Winchester office) anwered these questions							* John Cocker and Gary Egan from Anglian region answered these questions							

4. INTERNATIONAL PRACTICE

4.1 Introduction

A brief internet search was conducted of European, North American, and Australian websites to locate information regarding the regulatory practice in connection with the licensing of septic tanks and PTPs. Information on European practice was extremely limited and a different approach may be required to identify policy and practice within European countries. Such a process falls outside the scope of this project. In addition, any information gained may not be of sufficient use to justify the investment in time and effort required to obtain it.

4.2 European Practice

4.2.1 Approach

The starting point for searching of European sites was the European Environment Agency website (www.eea.eu.int), which permits a multilingual search and hence allows suitable search terms to be identified in different languages. The following search terms were identified:

Table 4.1 Search Terms for European Sites

Country	Domestic Sewage	Septic Tank	Organisation	Web Sites Address
France	Eau usée domestique	Fosse septique	Institut Français de L'Environment	ifen-fr.ifen.fr
Germany	Haushaltsabwasser	Abwassertank, faulgruβe	Federal Environment Agency (umweltbundesamt)	www.umweltbundesamt.de
Netherlands	Houshoudelijk Afvalwater /	Septische pot	Dutch National Institute of Public Health and the Environment (RIVM)	www.rivm.nl www.minvrom.nl
			Dutch Ministry of Housing Spatial Planning and Environment (VROM)	
Norway	Husholdningsavlopsvar	Septiktank	Pollution Control Authority	www.sft.no
Sweden	Spillvatten fran hushall	Septisk tank	Swedish Environmental Protection Agency	www.environ.se
Italy	Acqua rifiuto domestica	Fossa settica	Ministry of the Environment	www.minambiente.it
Spain	Agua residuale domésticas	Tangue septico	Ministerio de Medio Ambiente	www.mma.es
Portugal	Aguas residuais domesticas		Direcção Geral do Media Ambiente	www.dga.min-amb.pt
Ireland			Irish Environmental Protection Agency	www.epa.ie

4.2.2 Results

General

With the exception of Ireland and some information on France the search failed to turn up any references to licensing of septic tanks and sewage disposal to ground in English, Spanish, or Portuguese. References in other languages (German, Dutch, Swedish and Norwegian) may have been missed by a lack of expertise in these languages. It is worth noting that the searches used identified the Environment Agency's guidance (PPG4 and other PPG documents) and so confidence in the appropriateness of the search methodology was obtained.

Another potential problem is the devolution of licensing powers to regional government: the 16 Länder in Germany; the 17 autonomous regions in Spain and the regional governments in Belgium which make the locating of particular guidance / practice difficult. The evidence from France suggests that licensing powers may be further devolved to local government.

France

From the information obtained, the responsible authority for non-mains sewerage systems used to be the DDASS (Direction Départmentale des Affaires Sanitaires et Sociales) and each of the 90 Départments had such an authority. At present however, non-mains sewerage systems are the responsibility of the département with decisions on licensing devolved to the local mayor. After 2005 decisions will be made at a local level by the mayor of the village or town with supporting technical expertise at national or departmental level.

The relevant French laws are non-prescriptive and simply state that non-mains sewerage systems have to be planned and maintained to avoid water pollution, particularly of water used for human consumption. It also explains that assessments of the hydrogeology and the soils have to be undertaken and that the system must be at least 35 m from wells used for public supply, 5 m from dwellings, 3 m from boundaries and 3 m from trees. It also states that the system has to be maintained regularly. The Agence de L'Eau et Conseil Général define source protection zones and vulnerability using hydrogeological assessment criteria. These zones are used to determine the location and use of septic tanks at each site.

Ireland

In Ireland, recent work by the Irish Environment Protection Agency (IEPA) has produced a guidance document on non-mains sewerage treatment systems for single houses (IEPA, 2000). The guidance details the responsibilities of the applicant in determining the suitability of the site for the installation of a septic tanks by undertaking site characterisation. The site characterisation includes both a desk study and a small-scale site investigation with a percolation test and a trial hole. During the development of the guidance document the IEPA consulted widely to ensure all parties were aware of their role in the supply of information and granting of planning permission.

The IEPA document is currently used as guidance to assess the impact of septic tanks. It is set out in four sections which detail:

- A desk study to determine soil and aquifer type;
- A visual assessment of the site in terms of proximity to receptors, slope and vegetation type;
- The use and practicality of digging a trial hole;
- How to undertake a percolation test and assess the results.

The responsibility for undertaking the evaluation of the site rests with the applicant. A standard report is produced by filling in an attached form (Appendix D) which needs to contain verification signed by the local authority. The verification confirms that a representative from the local authority has attended the site and inspected the trial hole and percolation test holes.

The site inspection report is used by the Environment Protection Agency to determine the degree of control and conditions that will be applied to a particular site. It is planned that the IEPA will use a response matrix as a preliminary evaluation of the site. (Table 4.2) These responses may be altered depending on the results from the on-site assessment. It is not yet clear from the documentation whether further inspections of the site are required after completion of the sewerage system.

This guidance is only for use with new non-mains sewerage systems and is not retrospective, i.e. it does not cover assessment of existing systems.

Table 4.2 IEPA Proposed Response Matrix for the Assessing the Location of Septic Tanks (Draft)

Vulnerability Rating	**Source Protection Area**		**Resource Protection Area Aquifer Category**					
			Regionally Imp. (R)		**Locally Imp. (L)**		**Poor Aquifers (P)**	
	Inner (SI)	***Outer (SO)***	***Rk***	***Rf/Rg***	***Lm/ Lg***	***Ll***	***Pl***	***Pu***
Extreme (E)	R3[2]	R3[1]	R2[2]	R2[2]	R2[1]	R2[1]	R2[1]	R2[1]
High (H)	R2[4]	R2[3]	R2[1]	R1	R1	R1	R1	R1
Moderate (M)	R2[4]	R2[3]	R1	R1	R1	R1	R1	R1
Low (L)	R2[4]	R1	R1	R1	R1	R1	R1	R1

Note: Rk is karstic, Rf is fractured, Rg is sand and gravel, Lm is moderately productive, Lg is sand and gravel, Ll is locally moderately productive, Pl is generally unproductive except small areas, Pu is unproductive.

Standard IEPA Responses

R1 Acceptable subject to normal good practice in accordance with IEPA (2000)

R2[1] As above plus: If domestic water supplies are located nearby particular attention should be give to the depth of subsoil over bedrock such that minimum depths required are met and that likelihood of microbial pollution is minimised

R2[2] Acceptable subject to normal good practice in accordance with IEPA (2000) plus: Minimum thickness of 2 m unsaturated soil/subsoil beneath the invert of the percolation trench of a conventional septic tank system OR an intermittent filter, constructed wetlands or a mechanical aeration system with a polishing filter, as described in IEPA (2000) must be used

R2[3] As in R2[2] plus the authority must be satisfied that, on the evidence of the groundwater quality of the source and the number of existing houses, the accumulation of significant nitrate and/or microbiological contamination is unlikely.

R2[4] As R2[3] plus no on-site treatment system should be located within 60 m of the water supply source.

R3[1] Not generally acceptable unless: all the above conditions R2[1] to R2[4] are complied with plus: if a non-conventional septic tank system is installed it must have a minimum thickness of 1.2 m unsaturated soil/subsoil beneath the invert of the polishing filter, all tanks must have a management and maintenance agreement completed with the systems supplier.

R3[2] Not generally acceptable unless: all the above conditions R2[1] to R2[4] are complied with plus a system other than a conventional septic tank is used with a minimum thickness of 2 m unsaturated soil/subsoil beneath the invert of the polishing filter.

4.3 United States of America

4.3.1 Introduction

Septic tank systems are far more common in the USA than in Europe. Some 25% of the population is not served by mains sewerage, compared to less than 5% in Northern Europe (Payne and Butler, 1993). Septic tanks and other non-mains sewerage are generally termed on-site sewerage systems.

There appears to be strong advocacy of septic tank systems in the USA, despite the reported problems. In the USA planning powers are administered at county or municipality level, although legislation is set at national and state level.

The quality of information available for different states is variable. To minimise the amount of searching, only four states were examined in detail. The broad rationale was to select a state from the east coast, Midwest and west coast. Within this criteria states were, to some extent self-selecting, as only those states where the information was readily available were reviewed. Despite the small size of the sample some common traits emerged and therefore it is unlikely that further searching would have been effective in identifying additional information.

The best gateway to state-by-state legislation is found at the National Small Flows Clearinghouse (www.estd.wvu.edu/nsfc). This website, partly sponsored by the USEPA, is aimed at small communities, and deals both with private abstractions and small on-site sewage disposal. Of particular use is a compilation of links to various state legislatures, which include the majority of US states, although not all. Through this portal, a number of state websites were visited. Those assessed in detail provided sufficient detail to enable an assessment to be made. The states selected were:

- North Carolina
- New Jersey
- Oregon
- Illinois

The legislation regarding non-mains sewerage systems in the US is highly prescriptive and regulated. Variations were found to exist between the states surveyed but many similarities were also noted. North Carolina has been used as the principal example, in other states the procedures and information requested are similar. Variations in procedures between North Carolina and the other states examined in detail have been noted.

4.3.2 North Carolina

The applicant first must apply to the local health department for an Improvement Permit, mark out the boundaries of the property and ensure access to the site. The information provided with the application must include:

- Property's owner, mailing address and phone number;
- Location of the property;
- Information to determine the waste water flow and characteristics;
- Type of water supply, including location of existing or proposed wells;
- Signature of owner or legal representative;
- the location of nearby wetlands;
- information on waste water other than sewage that will be generated;
- information on whether the site is subject to approval by other agencies;

The State will then issue an Improvement Permit, after determining that the site is suitable, or provisionally suitable for an on-site system. The Improvement Permit may specify modifications required to make the site suitable. The local health department will carry out a site evaluation to characterise the site in terms of the following:

- Topography and Landscape Position;
- Soil characteristics (morphology) - texture, structure, clay mineralogy, organic soils;
- Soil wetness conditions;
- Soil depth;
- Restrictive horizons;
- Available space - location of wells, waste water flows, utilities, drives and parking and artificial drainage.

Once the conditions set out in the Improvement Permit have been met and the site inspected, an Authorisation to Construct will be issued which will include: system type, layout, location and installation requirements. Only with the Permit and Authorisation may construction take place.

The septic tank system design can be chosen from an approved list provided by the State but may depend on the site evaluation. Once a design has been chosen and a detailed plan of the site has been provided an Improvement Permit is issued. This plan must include a description of the facility to be served, waste water system and location, design waste water flow and characteristics.

The construction must be inspected by an Environmental Health Specialist to determine compliance with the permits. Once the system has been constructed to the standards set out in the Authorisation an Operation Permit is issued. This is to contain system type, performance, operation and maintenance and any further monitoring or reporting if applicable. Details of the Operating Permit are decided on a site specific basis. For larger facilities (greater than

480 US gallons (1.800 m^3) per day) a minimum inspection frequency may be specified. The frequency of inspections increases with the increasing size and complexity of a facility.

4.3.3 New Jersey

Rules for septic tanks are developed by the New Jersey Department of Environmental Protection: Division of Water Quality under the Realty Improvement Sewerage and Facilities Act (NJSA 58:11-23 et seq) and Standards for Individual Subsurface Sewage Disposal Systems (NJAC 7:9A). For individual or small scale septic tanks with a flow of less than 2000 US gallons per day (7.6 m^3/d), authorisation is obtained from the local Board of Health. This assessment is achieved based on much the same information as required by North Carolina.

Larger systems however are assessed by the New Jersey Department of Environmental Protection (NJDEP). In addition, smaller applications in certain settings are also assessed by the NJDEP, these are:

- Where the water table is too high;
- Where the available land area is too small;
- Where non-standard equipment is proposed.

On-site systems are approved only where it can be demonstrated that no suitable nearby sewer is available, or that connection to a sewer would cause excessive disruption. With the exception of single dwellings, all applications require a Treatment Works Approval.

Larger applications (greater than 7.6 m^3/d) fall under the 'Discharge to Groundwater Regulations' and require a New Jersey Pollutant Discharge Elimination System Permit (NJPDES). These larger applications would include 5 two-bedroom residential dwellings using the same sewerage system as these would be expected to exceed the 7.6 m^3/d. To apply for a NJPDES the applicant must supply details of the site which include:

- Soils description
- Percolation test results
- Distance to receptors (watercourses and dwellings). Type of septic tank proposed (and manufacturer's certificate)

The soils and percolation test information must be provided by a suitably qualified person (a state registered engineer or similar) and must have been collected since 1990. Data from pre-1990 is inadmissible. Distance setbacks required by the NJPDES are 50 ft (16 m) from watercourses, 25 ft (8 m) from a occupied building and 10 ft (3 m) from a property boundary. Old systems which have not been re-assessed since 1990 require a permit as do any substantial alterations.

The 'Discharges to Groundwater' requirements do not include single family residential subsurface sewage disposal systems that comply with the Realty Improvement Sewerage and Facilities Act (those already permitted by the local Board of Health) or those requiring a NJPDES. A Ground Water Protection Program (GWPP) is required for all of the NJPDES discharges and includes:

- Monitoring wells (3 minimum of proven adequacy);

- Effluent quality monitoring;
- Testing of treatment works;
- Groundwater contaminants to be monitored;
- Analytical schedule;
- Leak detection;
- Attenuation program.

Detailed site information: location, nature of discharge, ownership details, geological details; hydrogeological details; engineering drawings.

Sewage effluent disposal is a Class V underground injection system (UIC) and must demonstrate that it will not adversely affect the health of any persons.

4.3.4 Oregon

In Oregon, non-mains sewerage systems are divided into those requiring a Water Pollution Control Facilities Permit (WPCF) and those not requiring a WPCF. A WPCF is required if the discharge exceeds 2 500 US gallons per day (9.5 m^3/d), or where the effluent is greater than residential-strength waste water. The operational WPCF permit is renewable after 5 years.

Existing systems are not required to have a WPCF unless they propose a system repair or alteration. Sites not requiring a WPCF permit are granted a general permit and site evaluations, plan reviews, permits and inspections are conducted by local government. Regulation of all other sites is undertaken by the Department of Environmental Quality. All sites to have a new sewage installation are required to have a site evaluation, pre-cover inspections, and a certificate of satisfactory completion. The site evaluation is based upon criteria similar to that outlined in the North Carolina legislation, with similar separation distances to watercourses as used in New Jersey.

4.3.5 Illinois

The administration of non-mains sewerage systems in Illinois is carried out by the Illinois Department of Public Health. All septic tanks manufactured or sold in Illinois must be subject to the Septic Tank Approval and all purchases must be recorded. This Approval is subject to stringent testing requirements and design criteria.

A new private sewerage disposal system or alteration to an existing system must receive plan approval from the Department of Health or local authority. The assessment information required is similar to that required in North Carolina prior to the site investigation. Soil classifications must be carried out, alongside a percolation test (minimum 3 tests) during an on-site evaluation in the presence of a Illinois licensed professional engineer. A National Pollutant Discharge Elimination System permit is required from the Illinois Environment Protection Agency to authorise effluent from a private sewage disposal system of over 1500 gallons per day (5.7 m^3/d). Where a discharge does not exceed this threshold then it must not discharge within 1 mile of a public water supply intake, public bathing beach, or any public use area, and requires a permit from the local authority. Infiltration systems must be to a prescribed standard.

4.4 Canada

4.4.1 British Columbia

Septic tanks require a sewage disposal permit issued under the British Columbia Sewage disposal regulation 411/85. Guidance on filling out the application form is available on-line, but the regulations which it enforces are not.

Septic tanks are inspected by the local Public Health Inspector (PHI) or Environmental Health Officer (EHO). The guidance sets out a series of criteria which must be met to obtain a 'Permit to Construct' following an inspection by the PHI or EHO.

The applicant must:

- Identify land ownership and conditions (covenants which pertain to that land);
- Conduct a site investigation to determine field conditions (soil type and condition, percolation test, height of water table);
- Provide a scale drawing of the plot;
- Mark area to enable inspection;
- Pay an application fee.

The regulations require that the system is located at a certain distance from buildings, water courses, site boundaries, drains, wells etc. Steep slopes will not be permitted. The septic tank must also be of an appropriate size for the property.

Any contractors who wish to install a sewage system must be licensed. Once construction has been completed a final inspection by the PHI/EHO is necessary and a written 'Authorisation to Operate a Sewage Disposal System' will be granted. It is illegal to put into use a sewage disposal system without written authorisation. There is no indication of continued inspections once this authorisation has been obtained.

4.5 Australia

4.5.1 New South Wales

An example of Australian policy and practice has been taken from New South Wales (www.nsw.gov.au). New Zealand and Australia have a joint strategy, the National Water Quality Management Strategy (NWQMS), of two Ministerial Councils: the Australian and New Zealand Environment and Conservation Council (ANZECC) and the Agricultural and Resource Management Council of Australia and New Zealand (ARMCANZ). The strategy is implemented via state governments in Australia through the Australian Environment Protection Agency (AEPA) and the Department of Local Government.

The literature from New South Wales promotes the role that local councils have in the local administration of these principles. Council approval is required for the installation, construction, or alteration of a 'human waste treatment device'. From 1 July 1998 local council approval is also required for the ongoing operation of a non-mains sewerage system. Approvals specify the maximum number of inspections that may be required by the council each year and may include a clause to charge for each inspection. The septic tank design must

also be licensed by Standards Australia and certified by NSW Health, part of the state government.

The local council is responsible for site assessment and for ensuring the system complies with relevant performance standards. Councils must register all approved sites with the address, details of the system, and conditions attached to the approval. These must be collated in an annual 'State of the Environment' report. All councils must also prepare and adhere to a on-site sewage management system (OSMS).

Despite these tight regulations it is still the responsibility of the owner or occupier of the site to ensure the system is not causing pollution or risk to health. It also requires a person to connect to a local sewer if it is within 75 m of the premises.

A desk study will be undertaken by the local council in determining an OSMS but individual sites will have the site evaluated by a suitably qualified soil scientist at the request of the developer or landowner. The site evaluation is normally carried out on a subdivision prior to dividing it into smaller single plots and is based on the OSMS desk study. This evaluation entails three soil pits (per plot) to a depth of 1.2 m to assess:

- Depth to bedrock/hardpan,
- Depth to seasonally high water table,
- Soil permeability,
- Cation exchange capacity,
- Soil pH,
- Electrical conductivity.

Site features and proximity to receptors are also taken into account, such as:

- Flood potential,
- Slope,
- Site drainage,
- Buffer distances are recommended as: greater than 250 m to wells, greater than 100 m to permanent watercourses, greater than 40 m to intermittent watercourses, greater than 5 m if upgradient but greater than 3 m where downgradient to site boundaries and driveways, greater than 15 m to dwellings and greater than 6 m to swimming pools. In addition, consideration should be given to the distance to nearby sensitive environments (estuaries, wetlands, groundwater extraction areas and areas with poor tidal flushing).

Australia's on-site sewage management system (OSMS) is developed regionally, and is based on aquifer vulnerability. An area may be deemed unsuitable for on-site sewage management (non-mains sewerage system) and in this case an alternative partial on-site or total off-site management must be undertaken and a non-mains sewerage system would not be approved.

4.6 Summary of International Practice

The degree of regulation of any discharges in both the United States of America and Canada is much greater than that seen in the United Kingdom. There seems to be little information available from Europe and this could be due to lack of national regulatory bodies or simply less information being widely published from Europe compared to North America and Australia.

In the US, the states have combined powers of the local authority, or local government with that of the state department of the environment to create a comprehensive system to ensure all new septic tanks are licensed.

The new publication produced by the Irish Environment Protection Agency (2000) is less prescriptive but still manages to assess each site on a site-specific basis. The site is also inspected by a representative from the local authority to ensure the guidelines have been followed, which would entail a single site visit rather than several as is needed in several of the US states. This is a strategy that would be easier to accommodate within the United Kingdom because much of the structure is already in place. The Environment Agency already sends out standard responses to planning applications but at present these are generally sent to all discharges not exceeding 5 m^3/d irrespective to the site vulnerability. The most striking feature of the Irish, US, Australian and Canadian legislation is the quantity of information that is required prior to any decision-making. This information it seems is a prerequisite to any consent or licence that may be issued by the relevant authority.

There is also a requirement for on-going monitoring and keeping of records for septic tank systems in the USA and Australia.

Irish practice is moving towards the systems used in the USA, from where they appear to have taken most of their guidance.

It is noted that in North America, where there is a better knowledge of septic tank systems due to the large number of investigations carried out there, regulations are generally much stricter than in the UK. There may be some correlation between knowledge and regulation. Similarly, the Irish have moved to stricter regulation, having first investigated septic tanks, and having concluded that a problem exists.

The assessment of international practice is based on published, public access documents and has not considered how regulations are enforced. As can be seen from the variations within the Environment Agency, there may be differences between guidance and practice.

5. CONCLUSIONS

5.1 Current Practice

Present policy in the UK is that all discharges to ground in excess of 5 m^3/d require a discharge consent. There are significant differences between Environment Agency Regions (and possibly within regions) with regard to the need for discharge consents for those discharges below 5 m^3/d. Several regions do not require consents for small discharges, except where they lie within a sensitive area, whilst some regions require even small discharges to have a discharge consent.

There is a clear need for a standardised and simplified practice across the Environment Agency to ensure a consistency of approach by all staff in all offices. A formalised, standard approach would also aid Agency staff to process applications by giving clear guidance.

The UK shows particular variations when factors such as the design of the drainage field and adequacy of installation for use and size of development are concerned. If the design is inadequate, environmental problems could result but the Agency has no clear policy on these issues, as they are considered a matter for Building Control or the Planners. The role of the Agency should be to supplement the knowledge of the Planners, Building Control and the Local Authorities to give an environmental viewpoint and ensure that there is minimal risk to ground and surface water and the local environment.

The processing of applications for septic tank systems and package treatment plants is not sufficiently integrated to ensure adequate control of all aspects of design, siting and construction due to a lack of communication routes between the various parties involved.

It is also clear that applications are dealt with in different ways depending on whether a discharge consent has been applied for or whether a planning application has been submitted to the local authority and again a national procedure is necessary to prevent installations that require consents being missed via the planning route.

This lack of a coherent practice is highlighted by the comparison of the UK with the US, Canada and Australia where highly prescriptive legislation and controls are in place. The Irish Environmental Protection Agency is also moving in the direction of tighter controls. It is not known, however, to what extent these prescriptive controls are actually implemented. In these countries there is also a greater requirement placed on applicants to provide appropriate information to support their application than is the case in the UK.

The Groundwater Regulations (1998) require that all discharges to ground are authorised, with the exception of septic tanks serving single dwellings outside Zone I of an SPZ. A discharge consent is an authorisation. The use of a volumetric cut-off for deciding which discharges are consented may not comply with the regulations as it may exclude septic tanks and small PTPs serving multiple dwellings. There has not been, as yet, a concerted attempt to identify those older discharges which require an authorisation under the Groundwater Regulations (1998).

5.2 Old Septic Tanks

There are approximately 750 000 septic tanks and small PTPs in the UK (Payne and Butler, 1993). There is little, or no, effective regulation of existing septic tanks, once installed, unless a problem is detected. The knowledge of the location and density of older septic tanks is variable, with some regions having relatively good records, but other with very limited records and is in general rather limited. However, it is apparent that there are a number of problem areas, where the density of septic tanks is considered to be a contributory factor to known pollution problems.

From discussions with Agency officers and owners of septic tanks it is apparent that maintenance is often carried out only when a problem arises, or when the tank is nearly full.

6. RECOMMENDATIONS

6.1 Recommended Good Practice

This section outlines recommended good practice to be undertaken by all parties involved in the planning and approval of a non-mains sewerage system:

- Consultation with the Environment Agency at the pre-planning stage should be carried out by the applicant to determine the information that is required and whether the planning application is likely to be successful or refused at an early stage. Where it is likely to be refused the applicant should be advised of an appropriate course of action. Planners are likely to be the initial point of contact and should be given sufficient information to be in a position to advise applicants. Planners should also have a sufficient supply of relevant Agency leaflets for issue to applicants.
- All planning applications with a proposed effluent disposal must be passed to the Environment Agency as it is a statutory consultee To ensure that all applications are sent to the Agency for scrutiny, visits to the Local Authority will be necessary to confirm the process is working. In regions where this is not currently practised, additional resources will be required to undertake this exercise.
- Planning Circular 3/99 should be used as strict guidance for planners. The planners may require the help of the Environment Agency in this assessment to provide data but it should not be left to the Environment Agency to carry out the entire assessment.
- Standardisation of installations requiring consents should be undertaken nationally.
- Those sites not requiring a discharge consent (isolated single dwellings outside Zone I of an SPZ) should have standard conditions imposed to include construction and maintenance. These conditions should be standardised nationally and apply to certain installations on a national basis. They should include the requirement to design and construct the system to at least the requirements of BS6297:1983 (but see Section 6.4). Recommendations made, and conditions imposed, by the Environment Agency should be taken into full account when planning permission is considered.
- All applications, whether consented or not, should be recorded to create a national database of non-mains sewerage systems for future reference (and to enable the Agency to manage the cumulative load imposed by small discharges).
- A system of inspection to ensure that site owners comply with conditions set for discharge consents is required, although it is noted that the resources to undertake inspections do not presently exist either within the Agency or Local Authority Building Control.
- The entire septic tank system, including the drainage field, should be inspected by the Local Authority Building Control during construction, and before it is covered. Additional training may be necessary for building control officers to enable them to carry out such inspections.

6.2 The Planning and Licensing Process

There is a need for all roles within the planning and regulation process to be clearly defined and for improved communications between all parties. In particular the role and responsibilities of the Planning Authority, Building Control and the Environment Agency need to be more clearly defined to avoid both duplication of effort and gaps in the system.

The critical area, where there appears to be a lack of control, is in the design of the drainage field. Current standards, as given in BS6297: 1983 suggest that soakage pits can be considered in some circumstances, however, there is no literature on the use of soakage pits. The higher hydraulic loading which will occur at soakage pits, and the bypassing of the soil zone, could lead to a significant reduction in the amount of attenuation which occurs in the unsaturated zone. The use of drainage fields is to be strongly preferred as they make better use of the attenuation capabilities of the unsaturated zone, although even for these systems, the literature suggests that failure is common.

There is a case for issuing, or declining, consents for all applications, thus giving the Agency a degree of control. Consents could be issued on a time-limited basis, requiring the applicant to, as a minimum, maintain the septic tank by undertaking desludging on an annual basis. There is scope to implement such conditions as Code of Practice under the Groundwater Regulations (although such conditions would be consented under the Water Resources Act (1991) rather than the Groundwater Regulations (1998)).

A decision to grant a consent, or to carry out an assessment of the suitability of a septic tank application, or other application for discharge of treated sewage effluent to ground, should be made only after as much of the following information has been provided as is practicable:

- Site map, including ownership boundaries, the location of septic tank and national grid reference;
- Full postal address of the site;
- Site ownership details and proposed use;
- Minimum and maximum number of persons that the non-mains sewerage system is to be designed for;
- Any predicted seasonal and temporal fluctuations in usage and number of persons;
- Groundwater level and fluctuations (depth of unsaturated zone);
- Proposed design of the drainage field;
- System design and exact location;

Proximity to surface features: >50 m from springs and boreholes, >10 m from dwellings, >10 m from watercourses, wetlands and SSSIs;

- Geology of the site, including information on soils and underlying rock;
- Results of percolation test;
- Soil type and depth;
- Source of water supply to the property, i.e., mains, well or private borehole,
- Results of the investigation carried out at the planning stage.

A national template procedure for decision-making based on this information should be drawn up with extensive communication between regions to ensure standardisation and transparency. This could be based on a simple scoring system (Environment Agency, 1998). The National Rivers Authority Severn-Trent and Southern Regions developed a scoring system which assesses the site proposed for the soakaway (Appendix D). The scoring system was used to determine the impact of the proposed tank on groundwater. Where the final score is over 30 then the proposed scheme is judged not to be a potential source of contamination. The system is used in part of Southern Region and is available but infrequently used in Midlands Region.

No other regions use a scoring system at present. Decisions could also be based on a response matrix, such as that used by IEPA.

A copy of decision notices from the Local Authority should be passed to the Environment Agency in order to get feedback on their recommendations and conditions. Local Authorities should be requested to clarify any situation in which they do not follow the recommendations of the Environment Agency.

Any existing tank brought to the attention of the Agency should be recorded alongside those not consented if discharges are to be continued from that site.

At present, contractors who empty septic tanks are not required to be licensed. Some form of licensing and record keeping would enable an assessment of the number of septic tanks and the frequency at which they are emptied and is therefore recommended.

Any existing tanks in Zone I of a Source Protection Zone should be investigated (as outlined above) and granted or declined consent on the basis of those findings. Where a consent is declined a prohibition notice should be served to prevent any future discharges from the site.

Desk and site investigation should be carried out for all septic tank systems requiring consent. This is to include a walkover survey, a percolation test and a trial pit to determine soil type and to ensure the site does not have a shallow water table. The investigation should be carried out for the applicant by a suitably qualified, or trained person. It is recommended that the Local Authority confirm that this has been carried out by site visits as they have to visit the site to inspect foundations.

During and after construction, those sites granted a discharge consent should be inspected, probably by LA Building Control to determine whether conditions imposed have been adhered to. This will require liaison between the Agency and Building Control. Some form of inspection is necessary to ensure that conditions of a discharge consent are adhered to.

6.3 Building Control

The lack of control over drainage field design limits the degree of control over septic tank systems. The robustness of the judgement in the case which gives rise to this situation (*Chesterton RDC v. Ralph Thomson Ltd*) should be examined to determine its applicability.

6.4 BS6297: 1983

The British Standard is dated in some aspects and should not be used without consideration as to whether the advice contained within it represents good practice. Areas where BS6297:1983 is likely to require updating are in drainage field design, where insufficient consideration is given to the treatment aspect of the pit, the aim is principally to ensure that infiltration can be achieved. The standard states that soakage pits can be considered suitable in porous subsoil '…such as gravel, sand or Chalk'. The use of soakage pits is unlikely to represent good practice. The standard also lacks information on design of alternative drainage fields such as sand filters, in areas where conventional designs are not appropriate. The design information on package treatment plants was noted by Payne and Butler (1993) seven years ago to have been overtaken by technical developments.

A new European standard to replace BS6297:1983 will shortly be issued for consultation. The Agency should take an active part in the consultation process, to ensure that groundwater protection measures are adequately specified.

6.5 Existing Septic tanks

There is little regulation of existing septic tanks. Septic tanks come to the attention of regulators only when a problem develops. As a result there is little incentive for owners to maintain their septic tank systems properly.

It is recommended that the location of existing septic tanks should be determined to permit assessment of septic tank density. Initial estimates of septic tank density could be made by locating areas not served by non-mains sewerage using sewerage undertakers information. Census data, or electoral rolls could be used to determine population density and household size. Initial efforts could be concentrated on areas where problems are already known to occur and areas which are likely to be sensitive to septic tank density.

A requirement for desludging contractors to keep records, possibly through a licensing scheme, would help to identify the location and ownership of septic tanks, and also serve as a check on the frequency of desludging.

Criteria should be drawn up for determining when density is too high, and a process for converting areas of high density to other forms of sewage treatment initiated. The development of such criteria will require a scientific basis to ensure robustness and therefore may need to be postponed until the studies proposed for Phase 2 of this project are available. However, such a process is likely to prove unpopular - a septic tank is often considered a low cost option, particularly where maintenance is not carried out.

The Agency has considerable powers to prevent pollution from septic tank systems and PTPs, exercise of these powers over poorly maintained septic tank systems could be used as a reminder to owners of their duties to prevent pollution through correct maintenance.

The development of a zoning system, based on soil and aquifer type, could be used to identify areas in which septic tanks are not desirable either because of sensitivity, high water table or lack of infiltration capacity (low permeability soils). The groundwater vulnerability maps incorporate much of this information, but have a somewhat different focus. For instance, an area of low vulnerability, due to extensive cover of low permeability drift, may not be suitable for a conventional septic tank system due to problems with infiltration.

6.6 Summary of Recommendations and Research Needs

Under the system in place at present the Environment Agency does not have sufficient information to determine on a rational basis where on-site sewerage is acceptable, or not acceptable. There are wide variations between and within Environment Agency regions in the way in which discharges to ground are assessed and controlled. There is a clear need for nationally agreed criteria for assessing and processing applications for new on-site sewerage systems. However, there is at present no UK-specific research on the impacts of sewage disposal to ground from small on-site systems which could be used as the basis for a rational assessment system. There is a need, therefore, for additional research of such systems to determine the impacts, and to identify appropriate assessment tools.

Environment Agency records of existing on-site sewerage systems are either non existent, or are not kept up to date. In assessing new applications, the density of existing on-site sewerage systems is likely to be an important factor. In addition, the Groundwater Regulations (1998) require all on-site systems to be authorised, with the exception of septic tanks serving single, isolated dwellings. Authorisation of existing on-site sewerage systems requires a knowledge of their location. There is therefore a need to identify the location of all existing on-site sewerage systems.

7. REFERENCES

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Appendix A
Planning Circular 3/99

5 Pages

Appendix B
Irish EPA Site Assessment Procedure

6 Pages

Appendix C
Standard Environment Agency Responses

4 Pages

The responses detailed in this section are standard Environment Agency (Midlands Region) responses to planning applications including septic tank systems.

Conditions

QC01 (Drainage works to be agreed)

CONDITION: No development approved by this permission shall be commenced until a scheme for the provision and implementation of foul drainage works has been approved by and implemented to the reasonable satisfaction of the Local Planning Authority.

REASON: To prevent pollution of the water environment.

USER NOTE: In this condition, "foul drainage works" is defined as all means for the conveyance and disposal of foul water within the control of the applicant, and includes all matters such as the proximity of, septic tank soakaways to watercourses etc.

The Local Planning Authority will look for compliance with normal standards, e.g. British Standard Codes of Practice, or the Building Regulations, in being "reasonably satisfied". If the Agency requires more onerous standards, e.g. where a foul drain is laid in the outcrop of an aquifer used for public water supply, the standards in the DoE/WSA "Sewers for Adoption" might be required. Provided that higher standards can be justified on appeal, they can and should be specified by the Agency in planning conditions requested.

QC08 (No discharge to Groundwater or surface water)

CONDITION: There shall be no discharge of foul or contaminated drainage from the site into either groundwater or any surface waters, whether direct or via soakaways.

REASON: To prevent pollution of the water environment.

QC10 (Drainage to cesspool)

CONDITION: All foul drainage shall be contained within a sealed and watertight cesspool, fitted with a level warning device to indicate when the tank needs emptying.

REASON: To prevent pollution of groundwater.

QC11 (Approval of disposal of foul and surface water)

CONDITION: No development approved by this permission shall be commenced until a scheme for the disposal of foul and surface waters has been approved by and implemented to the reasonable satisfaction of the Local Planning Authority.

REASON: To prevent pollution of the water environment.

QC12 (Foul drainage to private treatment plant)

CONDITION No development approved by this permission shall be commenced until a scheme for the conveyance of foul drainage to a private treatment plant has been submitted to and approved by the Local Planning Authority. No part of the development shall be brought into use until such treatment plant has been constructed.

REASON: To prevent pollution of the water environment.

USER NOTE: Use paragraph when public sewer connection is not possible. Consider adding paragraph Q115 and/or discussing the application with the sewerage undertaker. Use this Condition with caution as it may commit us to issuing a discharge consent. Consider adding QI04.

QC19 (Septic tank and soakaway)

CONDITION: The foul drainage from the proposed development shall be discharged to a septic tank and soakaway system which meets the requirements of British Standard BS 6297: 1983 and which complies with the following:

(a) there is no connection to any watercourse or land drainage system and no part of the soakaway system is situated within 10 metres of any ditch or watercourse.
(b) porosity (not permeability or soakage?) tests are carried out to the satisfaction of the Local Planning Authority to demonstrate that suitable subsoil and adequate land area is available for the soakaway (BS 6296: 1983 refers).

****QC19 is no longer used and has been superseded by QC01 and MUT002**

WATER QUALITY

Informatives

QI05 (Soakaway porosity)

The applicant should ensure that the land proposed for the soakaway has adequate permeability in accordance with BS 6297: 1983.

QI06 (Foul drainage location)

The foul drainage system should be sited so as not to cause pollution of any watercourse, well, borehole, spring or groundwater.

QI07 (Soakaway location)

It is suggested that the soakaway is sited not less than ****** (6) metres from the nearest watercourse, ****** (6) metres from any other foul soakaway area, and ****** (6) metres from the nearest source of potable water supply.

USER NOTE: Insert appropriate distances in the spaces provided. They may be varied at Consent Application stage due to volume, ground conditions, location etc).

QI08 (Existing septic tank suitability)

The applicant should ensure that the existing septic tank is in a good state of repair, regularly desludged and of sufficient capacity to deal with any potential increase in flow and loading which may occur as a result of this proposal.

QI11 (Separate septic tanks)

Each dwelling should be served by a separate septic tank and soakaway system.

QI12 (Septic tanks domestic sewage)

Only domestic sewage should be discharged to the septic tank.

QI13 (Package plant preferred)

Establishments of this nature can cause problems when connected to a septic tank. The applicant would be advised to consider the use of a package sewage treatment plant for preference.

QI14 (No trade effluent to septic tank)

Trade effluent shall not be discharged to a septic tank.

QI15 (Drainage no foul sewer)

The Agency's comments on private drainage systems are made only on the understanding that no public foul sewer is available to serve the development.

MUT002

We note that the planning application form indicates that foul sewage will be discharged to a septic tank.

Circular 3/99 (Planning Requirements in respect of Non-Mains Sewerage incorporating Septic Tanks in New Development) advises in Annex B, paragraph 5, that where septic tanks are proposed, the planning application should be accompanied by a full and detailed consideration of the eleven environmental, amenity and public health factors referred to in paragraph 6 of Annex A.

In carrying out the above assessment the Agency would advise that the septic tank and soakaway system is designed to meet the requirements of BS6297:1983, and:

(a) there is no connection to any watercourse or land drainage system and no part of the soakaway system is situated within 10 m of any ditch or watercourse; and,

(b) porosity tests are carried out to the satisfaction of the Local Planning Authority to demonstrate that suitable subsoil and adequate land area is available for the soakaway (BS6297:1983)

Provided the assessment shows that the proposal will not lead to a significant environmental problem, then the Agency would have no objections to the proposals.

Appendix D
Scoring System

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Point Scoring System for Septic Tank Soakaway Assessment (Midlands Region)

Distance of soakaway from abstraction

Distance	Points
<50	-40
50-100	-20
101-150	-10
151-200	0
201-300	10
301-400	20
401-600	30
601-800	40
>800	50

Strata

Type	Points
Carboniferous/Jurassic/Magnesian Limestone	-10
Namurain Sandstones (or other fissured sandstones)	0
Triassic Sandstones Gravel/sands	20
Boulder Clay/Drift	25
Marl/clay/shale	40

Unsaturated Zone

Depth	Points
<5 or unknown	0
5.-10	2
11-15.	4
16-20	6
21-25	8
26-30	10
>30	12

For significantly fissured strata score 0

Abstraction Rate

Rate m^3/d	Points
>4500	0
1000-4500	5
100-999	8
10-99.	10
<10	40

Depth of solid beneath septic tank outlet

Depth	Points
0 or unknown	0
Some	5
2.00	10

Position relative to Abstraction position

Position	Points
Up groundwater gradient	-5
Adjacent or unknown	0
Down groundwater gradient	5

Quantity of effluent discharge Assess score according to above system and multiply total by factor:

Dwelling Equivalent	Factor
1-2.	1
3-5.	0.8
6-10	0.6
10	0.5