

GPP 4: Treatment and disposal of wastewater where there is no connection to the public foul sewer

Guidance for Pollution Prevention (GPPs) are produced by Natural Resources Wales (NRW), the Northern Ireland Environment Agency (NIEA) and the Scottish Environment Protection Agency (SEPA). Contact details are available at the end of the document.


GPP 4 provides guidance on environmental best practice. For Northern Ireland, Scotland and Wales, it also provides guidance on your legal environmental obligations.

GPP4 is not endorsed by the Environment Agency in England. For official up-to-date guidance on environmental regulations in England, go to www.gov.uk or contact the Environment Agency.

If you make unauthorised discharges of effluent to the environment, or you cause pollution or allow it to occur, you may be committing a criminal offence. Following these guidelines will help you comply with the law and reduce the chances of a pollution incident. If one does occur, call the Incident/ Pollution Hotline number immediately: in Northern Ireland, Scotland and England 0800 80 70 60, and in Wales 0300 065 3000 (press 1 for 24 hour service).

Acknowledgements

We thank the following organisations, and the individual contributors within them, for their valued assistance in producing these guidelines. In alphabetical order:

- [British Water](#) 
- [Scottish Government](#) (Building Standards Division, Planning and Architectural Division, Flooding and Drainage teams)
- [Scottish Water](#) and [Scottish Water Horizons](#)
- [Welsh Government](#)

We also thank the valuable assistance of colleagues within our agencies, **NIEA**, **NRW** and **SEPA**, and of [NetRegs](#).

Who is this guidance for?

This guide is aimed at **developers** and **owners** of property - either domestic property or non-domestic property generating domestic-like wastewater - that is not connected to the public foul sewer.

It will help you if you are:

- buying a property or site that has or might have a private wastewater treatment system, or
- planning to replace or upgrade your existing private wastewater treatment system, or
- starting to plan for the wastewater treatment needs of a new development.

It explains what to have in mind when choosing a wastewater treatment system for your site, who to contact and your legal obligations.

For owners of existing wastewater treatment systems, it explains what your operation and maintenance obligations are.

In this GPP:

- Where the term 'must' is used, this refers to your mandatory, legal obligations under environmental regulations.
- Words in italics the first time they are used in the GPP, are covered in the Glossary.

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1. Introduction – how to navigate this guidance

It is illegal to discharge untreated or insufficiently treated *wastewater* (in glossary) from your site or property to the environment. You must have an appropriate public or private system in place to transport and treat your wastewater (see '*public foul sewer*' and '*private wastewater treatment system*' in glossary). Connection to the public foul sewer is the preferred option.

Checklists A and B summarise what you need to do and where to go in this GPP. The flowchart summarises the treatment and disposal options covered in this document.

Checklist A- Your circumstances regarding wastewater treatment

<p>Existing properties – If you are the owner of property with a private wastewater treatment and disposal system you are responsible for ensuring this system is appropriate and is maintained properly, whether you have had it installed yourself or bought a property with private wastewater system.</p>	
<p>Are you planning to buy a property that isn't connected to the public foul sewer? <i>There are a few things to have in mind.</i></p>	<p>See section 2.1. <input type="checkbox"/></p>
<p>Do you own property and are not sure what type of <i>sewerage</i> (in glossary) it has? <i>Find out.</i></p>	<p>See section 2.2. <input type="checkbox"/></p>
<p>Do you own a property with a private wastewater system? <i>Keep it in good working order.</i></p>	<p>See section 4.8. <input type="checkbox"/></p>
<p>Does your private wastewater system need replacing? <i>Consider connecting to the public foul sewer.</i></p>	<p>See checklist B <input type="checkbox"/> and section 3. <input type="checkbox"/></p>
<p>New developments - Property developers are responsible for ensuring that new developments are supplied with appropriate and legally compliant wastewater treatment systems. See checklist B <input type="checkbox"/>, and section 3 <input type="checkbox"/></p>	

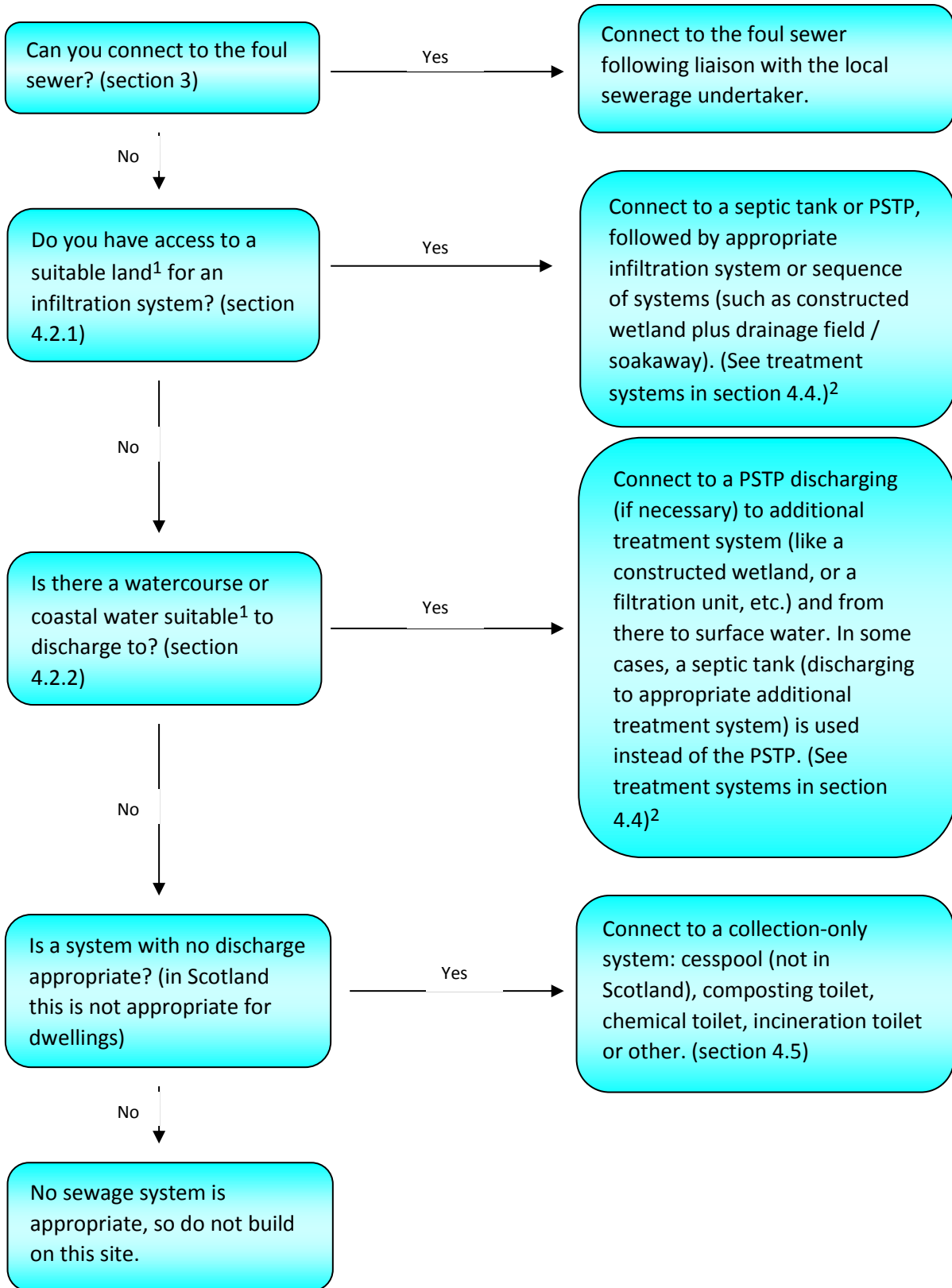
Checklist B – Choosing the right wastewater treatment and disposal option

For new developments or when replacing an existing private treatment system:

1. Can you connect to public foul sewer? <i>If that is feasible, get connected.</i>	Yes – See section 3. <input type="checkbox"/>
	No – Follow the rest of the checklist.
2. If you cannot connect to public foul sewer:	
a. Where could you install a treatment system and discharge the treated effluent to? Do you have access to suitable land, watercourse or coastal water? <i>In Northern Ireland, Scotland and Wales, discharging to land is generally favoured. Contact your environmental regulator and your local planning and building standards/ building control authority, for initial advice.</i>	See section 4.1 <input type="checkbox"/> and section 4.2. <input type="checkbox"/>
b. What are your wastewater treatment needs? <i>Assess what composition and volume of wastewater you need to deal with and if the amounts stay the same (steady flow) or vary over time (variable or erratic flow).</i>	See section 4.3. <input type="checkbox"/>
c. Choose the type of wastewater treatment system that best meets your needs and legal requirements. <i>This depends on what wastewater, amounts and flow you need to treat and where you can discharge the treated effluent to.</i>	See section 4.4. <input type="checkbox"/>
d. Obtain all required legal permissions for your private wastewater system. <i>Do this before you buy or commission any wastewater treatment system.</i>	See section 4.6. <input type="checkbox"/>
e. Use a competent professional designer or contractor to design and build, or install your system.	See section 4.7. <input type="checkbox"/>
f. Operate your wastewater treatment system correctly. Inspect and maintain it regularly.	See section 4.8. <input type="checkbox"/>

Flowchart – Summary of your wastewater treatment and discharge options

For new developments or when replacing an existing private treatment and disposal system, in general:



¹ Suitability of a land will depend on the geography features and geology/sensitivity of the location, and on the available land's area and percolation value; suitability of a surface water body will depend on dilution.

²What types of treatment systems to install will depend on the characteristics of the wastewater, and of the land (such as geology and percolation value) or watercourse (dilution).

2. Existing property with private wastewater treatment system

2.1 If you are buying a property

Before you buy a property that isn't connected to the public foul sewer:

- find out what private treatment systems are in place to deal with its wastewater and how to look after them;
- you must obtain from the seller, proof of permission (or exemption) by the environmental regulator of the private effluent discharge (of the treated wastewater);
- you should check that the system was installed according to that environmental permission – request any evidence available and have your surveyor carry out any feasible checks; is a good idea also to confirm with the manufacturer's installation instructions, if there are any;
- you should request and obtain evidence and details of maintenance carried out - such as invoices for electrical and mechanical repair and maintenance, *waste transfer notes*, *WTNs* (see glossary) for the desludging, and diary/ log book of works done. In Wales it is a legal requirement to obtain the maintenance records, and the WTN of the past five years;
- you /your surveyor should visually check the discharge or infiltration system for signs of pollution.

Badly designed and poorly installed and maintained wastewater treatment systems damage the environment, are non-compliant, cost money in repairs and are expensive to replace. So, get this right from the start.

2.2 If you own a property

If you own a property and don't know where your wastewater goes, find this out. You can make some simple checks:

- Do you pay for sewerage on your water bill? If so, you are likely to be on the public foul sewer system.
- Ask the previous owner, or your neighbours.
- Is there a metal, plastic or concrete lid or railway sleeper cover, either on your property or on a neighbour's property (see example in figure 1)? This may be the hatch for a package wastewater treatment plant, septic tank or other private sewerage facility – do not lift these covers as a release of toxic gases could occur.
- Check the title deeds to your property.
- Ask a suitably-qualified contractor to find out.

If you know or come to the conclusion that you are connected to a private wastewater treatment system you must make sure:

- you hold or obtain the corresponding legal permissions – see section 4.6,
- it is operating correctly and regular appropriate maintenance is carried out – see section 4.8.

If you then find out that your system does not treat your waste to the legally required standard, or needs replacing, reassess your options: connect to the public foul sewer or use another private treatment system – see section 3.



Figure 1. Private domestic sewerage system covers (photo kindly provided by Hutchinson Environmental Solutions).

3. Can you connect to the public foul sewer?

Either if you are building a new development or thinking of replacing your private wastewater treatment system, the option you must consider first is that of connecting to the public foul sewer. This will deliver the wastewater to the local sewerage undertaker where it will be treated to a standard complying with the regulations. Your local sewerage undertaker will be responsible for achieving the required environmental standards – which minimises the developer’s or property owner’s obligations.

If connection to foul sewer is feasible and reasonably practical, then that is the option you must follow. Connection might not be feasible or reasonably practical for example if it is too costly or there are land access issues.

Unless you demonstrate that it is not reasonably practical to connect to public foul sewer, in Scotland you will not be allowed to install a private wastewater treatment system; in Northern Ireland, Wales and England this applies if you are within 30 metres of the public foul sewer. For guidance on level of evidence you need to provide to demonstrate that the connection to the sewer is not reasonably practical, in Wales, see reference 1 and seek advice from your environmental regulator.

3.1 Connecting to the public foul sewer

1) Contact your local sewerage undertaker to check if in your circumstances you may connect to public foul sewer. Find your sewerage undertaker’s contact details in references 2 to 4. Their websites provide useful guidance on pre-application enquiries for connecting to public foul

sewer, the application process and standards required for the connection, for the areas they cover – see references 5 to 7, for Northern Ireland and Scotland.

- 2) If the advice received is that connection may be possible, contact your local authority's planning and building standards/control department, to find out if you must obtain planning and/or building control/standards permissions for the connection. You can find the contact details for your local planning authority/ council in references 8 to 11
- 3) Make a formal application to the local sewerage undertaker for permission to make the connection to the public foul sewer, and make a formal application for planning and/or building control/standards permission, if one is required.
- 4) You must also obtain permission from any landowner whose land your connection to the sewer will cross – obtain written permission. If an excavation is required in the public road, you must obtain permission from the relevant roads/ highway authority.

Employ a qualified consulting engineer to design and establish the connection to the public foul sewer. In Scotland, to find approved designers and installers of building work that may certify that work is according to the building standards, use Scottish Government's online Certification Register (reference 12). The connection to foul sewer must meet the standards required by the local wastewater undertaker. The wastewater undertaker is likely to send an engineer to site to check that the work meets the standards.

4. Private wastewater treatment and disposal system - when you cannot connect to the public sewer

If connection to public foul sewer is not feasible, you need to:

- connect to an existing one – for example, to a community-run multiple property private drain and wastewater treatment facility, or
- build or install a private wastewater treatment and disposal system.

To be considered for private wastewater treatment and disposal system, a site will be:

- a land, or watercourse, or coastal water, that is suitable for discharging the privately treated effluent to (see section 4.2 to learn how you find out)
- with adequate access for vehicles, for carrying out installation, or maintenance and repairs, of the system - in particular tankers for desludging (section 4.8.1).

The treatment system (or combination of treatment systems) that you choose to install on your site will have to be such that it will treat your wastewater to a level the environmental regulator will establish. Depending on type of system, it can provide:

- Primary treatment of wastewater – which removes solids that will either settle or float.
- Secondary or biological treatment of wastewater – which, by the action of microorganisms, removes organic materials that will not settle or which are dissolved in the wastewater.
- Tertiary treatment of wastewater - which achieves further refinement of the effluent by either mechanical, chemical or biological means.

You will need to obtain a number of permissions (section 4.6) to install a system. Depending on your circumstances permissions are not always given.

4.1 Pre-application advice

First, seek pre-application advice:

- 1) Start by contacting your environmental regulator (contact details in references 13 to 16, early on. If you are a developer, do this before you purchase a site for a new development – as the advice you will receive will influence your decision on whether to develop, and which type of system to install.
- 2) Next, contact your local authority's building controls/standards and planning department (contact details in references 8 to 11).

The advice you receive is not guaranteed to be the same as that of the final formal applications decisions, as the information you are initially providing won't be detailed enough. But you may be able to find out:

- whether your site is likely to be acceptable for private sewerage or not,
- whether you should consider a system discharging to land or to surface water,
- in some cases, the standard of treated effluent that the environmental regulator will likely authorise you to discharge,
- in some cases, which treatment and disposal options will be most appropriate,
- what the building regulations requirements are for your case, and
- what type of permissions you must obtain.

With this advice in mind, proceed to obtain more information you will require. Choose to work with a reliable contractor or professional designer, experienced in carrying out assessment of a site, and in designing and installing private wastewater treatment solutions:

- to assess the characteristics of your site and your requirements, and
- once you have the relevant permissions, to design a suitable system of the right size or help you choose the appropriate system, and install it.

The regulators do not endorse any specific contractor.

4.2 Where your system will be installed and where it will discharge to

You must decide where your wastewater treatment system is going to discharge to. This can be:

- “to land” also referred to as “to ground” or “to groundwater” (see example in figure 2), or
- “to surface water” - a watercourse or other inland water feature, a coastal water, or, except for Scotland, a *surface water sewer* (glossary). In Scotland, do not discharge to a surface water sewer.

Discharge to land is usually the best environmental option and favoured by the regulators.

4.2.1 Can you discharge to land?

You must not discharge wastewater effluent to *boreholes* (in glossary), deep *soakage pits* (in glossary) or *soakaway crates* (in glossary) as they are not designed for wastewater treatment and you could cause pollution.

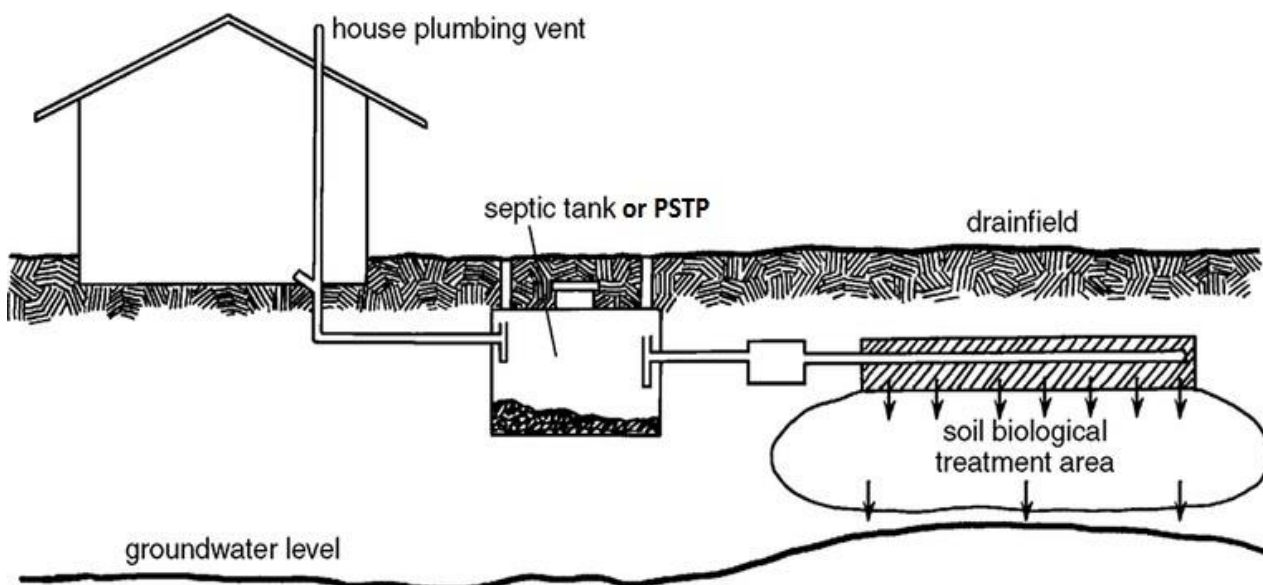


Figure 2. Example of wastewater treatment system discharging to land (adapted from “Individual home sewage treatment systems - AE892 (Revised)” – see reference a.).

To discharge treated effluent to the ground, you must have access to a suitable area of land.

To determine if your land is suitable and large enough, you must follow the guidance in the nation-specific references 17 to 21 (all free, online) and the British Standard BS 6297:2007 (or any future issues of that Standard), reference 22. What you must do includes carrying out:

- a preliminary ground assessment,
- trial pits, to determine the seasonally highest level of the water table and type of soil, and
- percolation testing (see Appendix A for details, also covered in the above references), to determine the percolation value of the ground, how large an area of land will be needed, and from that the type of infiltration system that will be suitable.

Use an independent competent professional to carry out the procedures, provide a certificate according to these standards, and ensure building regulations are complied with.

A suitable land, among other requirements, should not be on a steep slope or be prone to waterlogging, and should be at specified distances away from watercourses, wells, boreholes and houses.

Officials from the NIEA in Northern Ireland or in Scotland from your local council’s building standards/control department may wish to observe or assess the ground tests you carry out; and the planning authority may wish to see the results demonstrating that the site is capable of being drained.

If the land is in a *Source Protected Zone 1* (in glossary) and the effluent discharge is to be over a certain volume, you also need to carry out a groundwater risk assessment.

4.2.2 Can you discharge to surface water?

In Northern Ireland, Scotland and Wales, investigate first whether you could discharge to a suitable area of land. In Northern Ireland and Scotland normally your environmental regulator will only give permission for discharge to surface water if the applicant has demonstrated that discharge to land is not feasible (in Scotland, find criteria in reference 19). In Wales discharging to

land is also generally favoured, except in some cases such as when you are in a Source Protection Zone 1.

To be allowed to discharge to surface water you need access to a suitable surface water body:

A surface water body with a regular large enough flow is likely to be suitable for receiving effluent that has undergone secondary treatment (see levels of treatment of wastewater at start of section 4.), as the flow will disperse the effluent.

Ponds, lakes, ditches that are sometimes dry, and streams that have very low or no flow for periods of the year, are not suitable for receiving secondary level treated effluent. They may be suitable for effluents from systems with tertiary level of treatment; but in some cases no drainage solution can be found and no effluent discharge will be allowed.

4.2.3 When discharging to the environment is not appropriate

If the available land or watercourse/ coastal water is unsuitable to discharge privately treated wastewater to, you should consider whether to go ahead with the development.

You may be able to install a collection-only system for temporary use, pending a permanent solution.

4.3 Determining what your wastewater treatment needs are

Once you have decided where you are going to discharge, you and your contractor/designer need to choose the type of system and its size. In order to do that:

- Your environmental regulator might be able to tell you the likely standard of effluent your system will be required to achieve. In Scotland, discuss treatment options with SEPA. In Wales, instead, NRW may highlight sensitive features to have in mind when deciding the level of treatment of wastewater to achieve, and then it is up to you to demonstrate through the application process that the level of treatment is sufficient to protect those features.
- Follow the British Water's latest version of the "Code of practice on flows and loads" (reference 23, online, free) to determine:
 - the composition/ *strength* (in glossary) of the wastewater from your site,
 - the volume generated and
 - characteristics of the *flow* – if it is *steady* or *variable* (see under 'flow' in glossary).

Strength, volume and variability of the wastewater flow depend on the numbers of occupants of the site and their activities - for example if it is a main domestic dwelling, a school, a restaurant, etc. Domestic flow is considered standard; variable flow would be, for example, that of a pub that is especially busy with food on Sunday lunchtimes. Domestic flow is calculated based on potential occupancy (for example number of bed spaces), rather than actual occupancy.

Choose a system at least large enough to deal with your maximum wastewater flow. You may decide to install a system that is oversized, to allow for future changes of your site. However, the system should not be too oversized, as then it might not treat the wastewater well enough.

Exclude rainwater and storm water flows from calculations for volume and variability of the wastewater effluent, unless they are going to be allowed into the treatment system – which is very strongly discouraged and not allowed in Northern Ireland and Scotland.

4.4 Types of wastewater treatment systems

There are various types and designs of private wastewater treatment systems – some are listed below. Some systems, or parts of a system, are bought ready to install on your site by a competent contractor; others systems can be designed by a professional specialist designer specifically for your circumstances.

Two (or more) types of system are often used together, one downstream of the other, to achieve the quality of effluent legally required for a site.

There are restrictions on how close a private treatment system may be to certain features, such as springs, wells and boreholes used as a source of drinking water, buildings, roads, rails, watercourses, permeable drains, etc.

4.4.1 Package sewage treatment plants (PSTP)

PSTPs are made of prefabricated components that can be installed underground, with minimal work, on your site. There are various designs of PSTPs – see an example in figure 3. All provide secondary treatment of the wastewater; some designs also provide primary treatment, and some tertiary treatment. PSTPs might be the most suitable choice of system where the environment to discharge to is vulnerable, or where there are commercial premises or multiple houses.

PSTPs are appropriate for incoming wastewater with a steady flow. If the flow is variable, an additional balancing system is required. They usually require a power supply to operate. While the system operates, sludge accumulates in it. The site where a PSTP is installed must allow access by tanker, to regularly remove excess sludge (section 4.8.1).

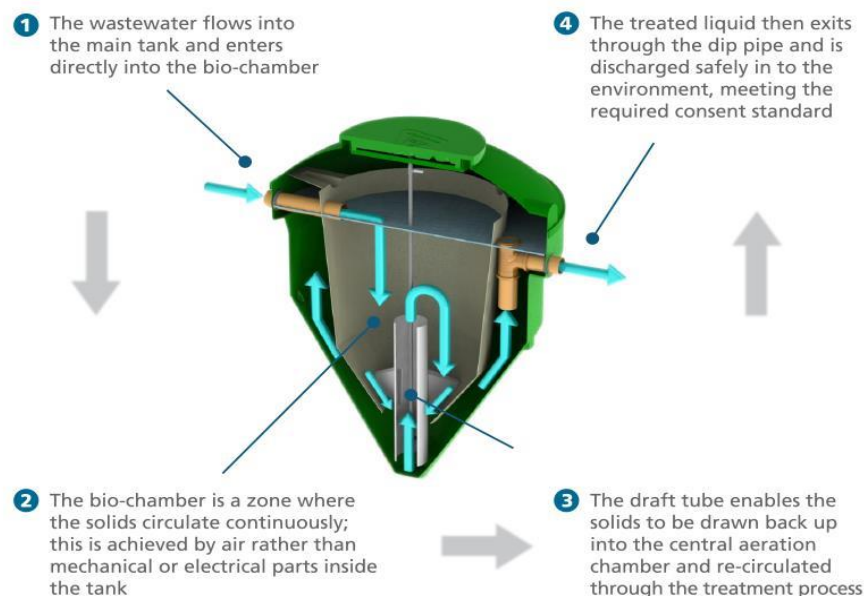


Figure 3. One of several PSTP designs (picture kindly provided by WPL Ltd).

Depending on your specific conditions, a PSTP will discharge the treated effluent to:

- a piped infiltration system (see 'drainage field/ soakaway' and 'drainage mound/ mound soakaway' further in this section) and from there to land; or
- a watercourse or coastal water, either directly or indirectly - to an additional system such as a reed-bed, wetland system, disinfection system, filtration system or settlement system, and from there to the watercourse.

Use a PSTP that complies with Standard EN12566-3. See requirements for PSTPs in references 24, 22, 17 (Northern Ireland), 18 (Scotland), 20 (Wales) and 21 (England).

British Water provides a list of some certified PSTPs that conform to the relevant British Standard (see reference 25).

4.4.2 Septic tanks

A septic tank is a watertight underground settlement tank, with inlet and outlet pipe and two or more chambers, which provide primary treatment of the wastewater (see example in figure 4).

A septic tank treats both steady and variable wastewater flows, and does not require power supply. Septic tanks may be a good choice where flows vary through the week, such as in caravan sites and holiday homes; because they do not have electric components, they may be the best option for properties at risk of flooding - as long as the manhole covers are bolted down. They may be a suitable choice for small developments or single houses.

A septic tank may be installed to discharge (indirectly) to ground: its treated effluent going to an infiltration system and from there to ground

It may be considered for discharging (in most cases indirectly) to a watercourse or coastal water: via an additional system like a reed bed, gravel filter or even a PSTP, and from there to surface water.

While the system operates sludge accumulates in it. The site where the septic tank is must allow access by tanker, to regularly remove excess sludge (section 4.8.1).

See general guidance on septic tanks, for Northern Ireland and Scotland, online, free, on the NetRegs website (reference 26).

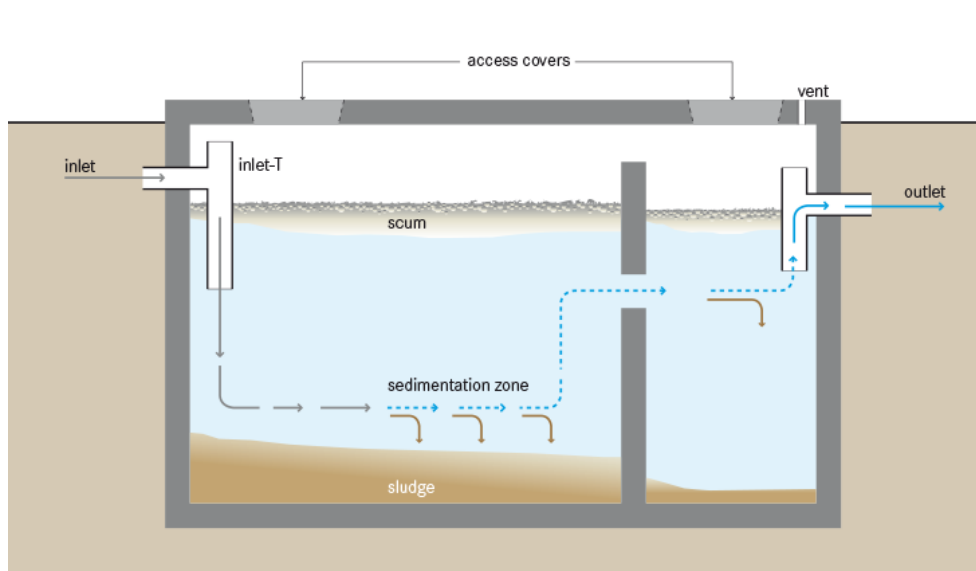


Figure 4. Example of septic tank (from “eCompendium - The online compendium of sanitation systems and technologies” – see reference b.).

Septic tanks have to comply with Standard EN12566-1 (reference 27) for prefabricated septic tanks, and EN 12566-4 (reference 28) for septic tanks assembled at your site from prefabricated kits. See also requirements in references 22 (UK), 17 (Northern Ireland), 18 (Scotland), 20 (Wales) and 21 (England).

British Water provides a list of some certified septic tanks that conform to the relevant British Standard (see reference 25).

4.4.3 Infiltration systems

Infiltration systems are used in conjunction with usually septic tanks or PSTPs: the infiltration system receives the effluent treated by a PSTP or septic tank, provides further secondary treatment to it, and distributes and discharges this treated effluent to an area of land or in some cases to a surface water body. There are different types and designs of infiltration systems appropriate for discharge to different types of ground. Examples are: drainage fields/ soakaways (usually called in Scotland “soakaways” and in the rest of the UK “drainage fields”), drainage mounds/ soakaway mounds (usually called “mound soakaways” in Scotland, and “drainage mounds” in the rest of the UK), constructed wetlands, and partial drainage fields / partial soakaways (referred to as “partial drainage soakaways” in Scotland and as “partial drainage fields” in the rest of the UK). “Soakaway” has also another meaning that is not used in this guidance, but is widely used elsewhere. To avoid confusion, see “soakaway” in the glossary. Drainage fields/ soakaways

Drainage fields/ soakaways

These are piped infiltration systems of various designs consisting usually of a series of perforated pipes buried underground in trenches filled with clean gravel or broken stone, on a slight gradient away from the inlet. They discharge to an area of land, such as a field or large garden, and may be appropriate when the subsoil drains well and there is no flooding or waterlogging throughout the year.

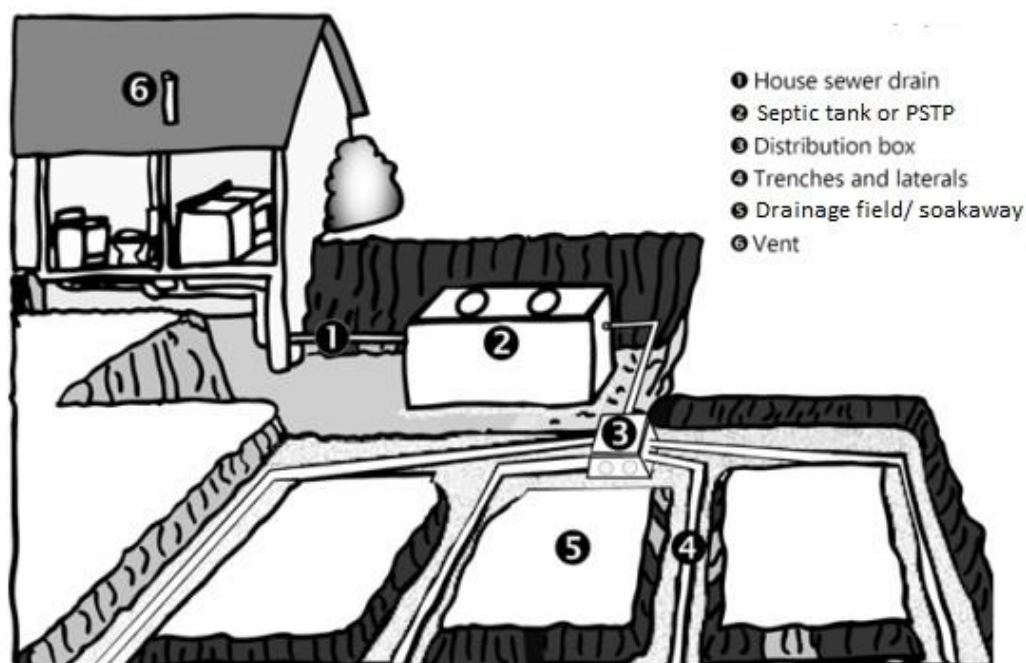
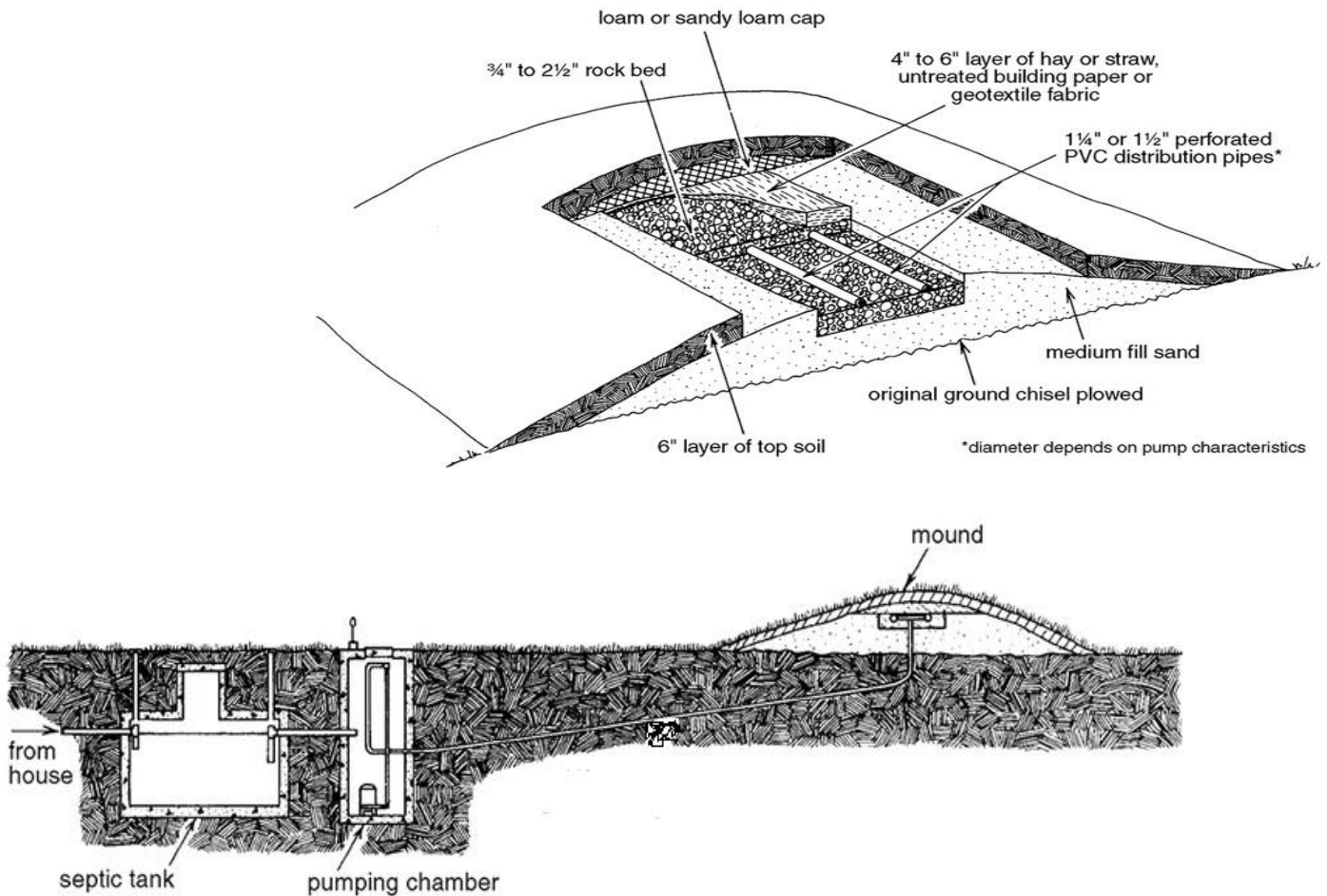


Figure 5. View of the underground structure of an example of wastewater treatment system that includes a drainage field/ soakaway (adapted from “Septic system operation and maintenance” – see reference c.).

Drainage mounds/ mound soakaways

These are perforated piped systems like those of drainage fields/soakaways but installed within elevated mounds of earth (see example in figures 6). They are used for discharging to land, where the subsoil drains well but is occasionally waterlogged.

Figures 6. Example of sewage treatment system that includes a septic tank and a drainage mound/ mound soakaway, discharging to land (bottom diagram), with detail of the drainage mound /mound soakaway (top diagram) - from "Individual Home Sewage Treatment Systems - AE892 (Revised)", reference a.



Constructed wetlands

These, also known as "wetland systems", "soil infiltration beds" or "treatment wetlands" are sustainable wastewater treatment options that can provide a habitat for wildlife. There are different designs of constructed wetlands but all include specific vegetation (with appropriate properties such that can treat effluent) on a filter bed made of sand and gravel that usually has an impermeable base (see example in figure 7). Depending on the design, incoming effluent is applied either at one end or over the whole surface of the system, and leaves from the other end or by a series of drainage pipes at the bottom. They may not require a power supply. When the plants used are the common reed, the wetland is called "reed bed" or "reed bed system". Other construction wetlands are "willow filters" and "grass plots". Constructed wetlands can be used in combination with a number of other systems (a PSTP septic tank or settlement tank upstream; a drainage field/soakaway or drainage mound/ mound soakaway downstream), depending on the site, to discharge to ground or to surface water.

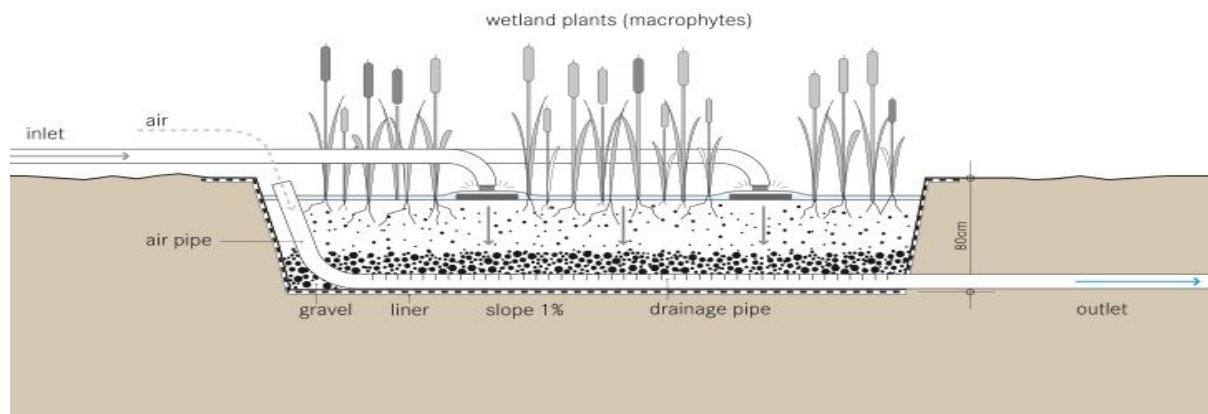


Figure 7. Example of a constructed wetland – here, the effluent flows through pipes on the subsurface of the ground through the root zone, to the ground (from “eCompendium - The online compendium of sanitation systems and technologies”, 2nd edition - see reference b.).

Partial drainage fields/ partial soakaways

Systems called in Northern Ireland, Wales and England ‘partial drainage fields’ and called in Scotland ‘partial soakaways’ have an overflow to watercourse from the highest point of the drainage field/soakaway; so, they discharge to watercourse when the level of the water table is high and the watercourse has a level high enough to provide sufficient dilution, and discharge to ground through drainage field/soakaway when the water table level is low and the ground can accept and treat the wastewater. They may be used in Scotland, in some specific cases, for discharge from septic tank. In Wales you should not use these systems. In England they may only be used for discharges from PSTP and even then only in very limited circumstances

Infiltration systems references

For all infiltration fields, see procedures and standards in BS 6297:2007, references 22 (UK wide) and the nation-specific guidance 17, 18, 20 and 21; for drainage mounds/ mound soakaways see also reference 29; for reed beds see also reference 30. Other types of constructed wetlands should be designed and constructed by specialists.

4.4.4 Composting toilets

Composting toilets may be useful at remote sites, such as nature reserves. They use natural processes to convert waste matter into compost. They may require maintenance and the addition of materials such as sawdust to aid the composting process. No effluent from composting toilets should be discharged to a watercourse. The liquid part of the effluent should drain to an infiltration system; the solid part must be removed (see section 4.8.1). You should not use the waste from composting toilets directly on land being used for growing crops (of vegetable or some types of fruit) for human consumption, or where people or animals have access to, such as residential gardens. If legal requirements are met, in some circumstances concentrated fluid fertiliser or dry compost produced may be applied to land – contact your environmental regulator and see references 31 to 34.

4.4.5 Other treatment systems

Other wastewater treatment options that may be used in conjunction with a PSTP or with a septic tank, to provide further treatment, before discharge to grounds with different characteristics, or in discharges to water include:

- other filtration systems of various designs not mentioned above (for example gravel beds, sand filters, drum filters, membrane filters and microfilters) - They take up a smaller area of land than some other options, but require ongoing maintenance and usually need a power supply.
- conversion units for septic tanks - that are installed in addition to an existing septic tank to 'convert it into a sewage treatment system', providing the same level of treatment as a PSTP.
- stabilisation ponds – that are artificial ponds of different types that can be located downstream of a PSTP, and where the effluent is kept for some time and treated by natural processes; it is then discharged to watercourse or to drainage field/ soakaway. They can be an attractive natural habitat for plants and some animals.
- disinfection systems – may provide tertiary level of treatment of effluent that has already been treated by other systems and is already of sufficiently good quality. Disinfection, is achieved by different methods. Effluent directly from septic tank, without further treatment, won't be appropriate for going to a disinfection system. Disinfection is appropriate for effluent discharges into watercourses that lead to bathing waters, other recreational waters and shellfish waters.

Standard BS 6297: 2007, reference 22, contains information on the design and construction considerations relating to some of these treatment systems.

4.5 Collection-only systems

Collection only systems don't treat wastewater, only collect it, and you then you must have it removed in accordance with the law (see section 4.8.1). Examples include:

- composting toilets - See section 4.4 for details. When the liquid component of the effluent is not discharged to an infiltration system, these toilets are collection-only systems.
- incinerator toilets – In these, all liquid and solid waste, including the toilet paper, are incinerated, and turned into sterile ash and vapour.
- waterless chemical toilets – These use chemicals to control odours, and are often installed at campsites, construction sites, and the site of large festivals. Wastewater from chemical toilets must not be discharged to the environment.
- cesspools (also called cesspits) – These are not allowed in Scotland; in Northern Ireland and Wales they are considered as a last resort. They are underground tanks without an outlet, which store wastewater, and that are connected to the site that generates wastewater by a series of drains. They should include an alarm to indicate when they are nearly full. They need regular emptying and so the site must allow tanker access. See references 35 (Northern Ireland), 20 (Wales) and 21 (England).

4.6 Permissions

In this guidance 'permission' means a 'formal official authorisation' - which can be an "authorisation", "consent", "permit", etc. - issued by a regulators or entity in one of the UK nations. Permissions can take some months to obtain. You mustn't make any discharge to ground or surface water before receiving all necessary permissions. In some cases, you may be refused permission.

4.6.1 Permission from your environmental regulator

Discharges of wastewater effluent to the environment (land or surface water) always require permission from your environmental regulator. This does not apply to discharges to the public sewer, not covered in this guidance – in that case, seek separate advice. The type of permission you need depends on which UK nation you are in, the specifics of your wastewater treatment and disposal choice, and your site location. As a summary:

- In Northern Ireland, for any private wastewater treatment discharges to ground or to water, you will need a Consent to Discharge from the NIEA. Find out more details online, in references 36 and 37. To discuss your discharge case, contact the Water Regulation Unit of the NIEA, reference 13.
- In Scotland, for discharges from private wastewater treatment systems to ground or water, you need a written permission from SEPA. Depending on the volume of the discharge, typically the permission will be a registration (for smaller discharges) or a licence (for larger discharges). Find details about registering, in online reference 38 and on SEPA internal guidance references 19 for discharges to ground and 39 for discharges to surface water bodies and make sure you consult SEPA to discuss treatment options before submitting your application – see reference 14 for contact details.
- In Wales, to discharge from a private wastewater system to ground or water, you need a written authorisation from NRW. This may be via an exemption or via an environmental permit. Find more details and application forms in online reference 40. See also NRW's Environmental Toolkits (reference 41). Find NRW contact details in reference 15.
- In England, depending on your case you must either abide by the General Binding Rules for Small Sewage Discharges or obtain a permit. Check which case on the official guidance for England in GOV.UK website – see reference 42. Contact the EA to find out more (reference 16).

It may take you some time to gather the information needed for your application – for example to find the seasonally highest water table in ground assessments.

4.6.2 Planning and building standards/ building controls permissions

You may need permission from your local authority's Building Standards department (in Scotland) or Building Control department (in Northern Ireland, Wales and England) for the constructing and installing your private wastewater treatment system or for replacing it. See guidance in references 35 (Northern Ireland), 18 (Scotland), 20 (Wales) and 21 (England).

Through the planning process, specific solutions may be required for drainage, where a developer may need to improve the discharge from existing neighbouring houses, to allow his own to proceed. This is the case for example for discharge into the catchments of lakes with high phosphorus.

Building developers can find online the free relevant information, about the planning considerations of the local planning authorities when they are considering private sewerage proposals: in Northern Ireland see references 43 to 45, in Scotland, see references 46 to 49; in Wales see reference 50; in England, see reference 51.

Regarding collection-only systems, contact the local authority building standards/ control departments (references 8 to 11) for advice and permission.

4.6.3 Other permissions

- You need permission from the owners of the lands that your connections will cross or where the system will be installed. If excavations are required in the public road, you need permission from the relevant roads authority, under the Road Scotland Act or the New Roads and Street Works Act.
- You need authorisation from a riparian owner (the person who has the rights to manage the watercourse), British Waterways or the drainage board, to discharge to surface water.
- You may need permission to create a new pipe outfall (the place where the effluent flows out of the system) into the surface water. Your environmental regulator can advise you.
- If you wish to discharge your wastewater effluent to a surface water sewer (outside of Scotland); in Scotland do not discharge to surface water sewer), you need to first obtain the agreement of the local sewerage undertaker or other owner. In Scotland do not discharge to surface water sewer.

If the private wastewater system will serve more than one property, consider forming a separate legal entity to share the responsibility for the system and for complying with the permissions that apply. This will help avoid legal problems in the future, particularly if properties are sold to new owners.

4.7 Designing, and building or installing the system

Your designer/ contractor should install pipes and all parts of your treatment and disposal system according to the designer's or manufacturer's instructions, the requirements of the Building Regulations and British Standards/ Control, and all other associated legal permissions – such as environmental and planning authorisations.

See British Water Code of Practice “Guide to the installation of small sewage treatment systems”, reference 52, available free online for the key points you and your contractor should have in mind before the installation.

For restaurants and catering venues, due to the higher fat content of their wastewater, you should install fat traps on the sewer between the restaurant and your wastewater treatment system.

Build separate drainage systems for foul/ wastewater and for surface water; direct rainwater and snow/ ice melt runoff to the surface water drains or *storm drains* (in glossary), or to ground. Make sure your wastewater treatment system will not receive any rainwater or snow/ ice melt runoff, for example runoff from the roof or paved ground surface - in Northern Ireland this is a legal requirement. Having separate wastewater drainage and surface water drainage will also make it easier the upgrading works when at some point in the future it becomes possible to connect your site to public foul sewer: then you will be asked to have the wastewater drainage separate from surface water drainage.

If your treated wastewater effluent is to be discharged to a surface water body, you could still connect the pipe for treated wastewater with the surface water pipe downstream of the wastewater treatment system; but if you choose to do that, you must make sure there is a point between the treatment system and that connection where samples of treated effluent coming from the wastewater treatment system can feasibly be obtained by the regulator, whenever required.

If your system is for discharging to ground, identify the area of your infiltration system clearly, and protect the infiltration system from access - to prevent anyone in the future digging it up, driving over it with a tractor, covering it over, etc.

Failure of pipework, infiltration systems and other wastewater treatment systems is often caused by tree roots growing and penetrating into the system, obstructing it. Make sure there are no tree roots near the distribution pipes of a drainage field / soakaway; make sure all other pipework is solid, continuous and unperforated.

4.8 Operation and maintenance of the system

Operate your system correctly, make sure it has regular maintenance servicing and that emergency maintenance provision procedures are in place. This way you will:

- avoid polluting the environment with your discharge
- save money – as your system will use less energy, have a longer working life, and need fewer repairs or replacement.

See reference 53 for advice on good operation and maintenance of private wastewater treatment systems, with mention of regulations in England.

4.8.1 Correct operation, servicing and preventative maintenance of the system

Follow the operating instructions from the manufacturer's manual of your system, if there is one. Follow the British Water's Code of Practice "Guide for users of small wastewater treatment plants" (ref 54, online, free download). Check also, for septic tanks only, the guides in references 55 and 56 (both free, online). Good operation of your private sewage treatment system includes restricting what you put down the drain and attention to how you do the washing up, operate washing machines and dispose of foods, etc.

Find out what the maintenance requirements are for your own system, from the manufacturer's manual, from the specialists who designed and built the system or from a competent independent specialist (see reference 57 for British Water's list of accredited service engineers). Mark down the date of the next servicing required.

Use a suitably competent maintenance contractor to carry out the maintenance. Some maintenance providers offer annual agreements and will remind you a few weeks in advance when routine, preventative maintenance is due.

In Northern Ireland, Scotland and Wales, it is a legal requirement that you maintain the system appropriately – so that it is operating according to the conditions of the authorisation at all times; failure to do this could be a criminal offence. In England you must have your treatment system repaired or replaced if it isn't in good working order, as if it causes pollution you may be prosecuted.

Make sure you keep the area around any pipework clear of tree roots and trees.

If you carry out building works at your property (for example building an extension), or if there is a change in the use of the property, this may change the volumes of wastewater generated. Carry out checks on your private wastewater treatment system, to make sure it is still adequate and operating properly.

Desludging

For septic tanks and PSTPs, a part of the maintenance process is removing the excess sludge that builds up (desludging), before the system is full (see reference 58, online, free). Composting toilets, and collection-only systems, also have to be regularly emptied.

The de-sludge contractor you select to de-sludge your treatment system or to empty your collection-only system, and to move the sludge and waste off site must be registered with your environmental regulator as a registered waste carrier. Before you decide on a contractor, ask them to show you proof that they are registered with your environmental regulator, or check this directly on the environmental regulator's registers, online (in references 59 to 62).

The sludge (and waste from collection-only systems) must be taken to an authorised waste reception site or an authorised wastewater treatment works (for further treatment), and it is your responsibility to make sure that this happens. Alternatively, the sludge, the compost and waste from composting toilets, and the waste from some collection-only systems, such as cesspools, may be legally applied to land, if legal requirements are met (see requirements in references 31 to 34, all online and free)

Find out where your registered waste carrier will take your sludge to – to confirm that this is an authorised site - and make a note of it. You will receive a waste transfer note from your registered waste carrier, specifying quantity and type of waste they are taking away. You must retain waste transfer notes for at least two years in Northern Ireland and Scotland, and five years in Wales, and pass them on if the property is sold. See details about your waste duty of care obligations, per nation, in references 63 to 65 (all online, free).

To find an accredited maintenance contractor, see the database on the British Water website (reference 57). Also, some sewerage treatment providers make available a desludging service for private treatment systems: in Northern Ireland for free, for domestic septic tanks, wastewater treatment plants and cesspools (see details in reference 66) and in Scotland for domestic and business septic tanks (see details in reference 67). Your system's manufacturer will also be able to direct you to a maintenance company, or you can find a number of them advertised on the internet and phone book. The regulators do not endorse any particular company.

4.8.2 Simple checks

Between services you should regularly carry out some simple visual checks, around your PSTP or septic tank, infiltration system (if discharging to ground) or outfall (if discharging to water). For restaurants and other similar venues, put in place a written programme of checks for nominated staff to follow. These checks may help you identify and remedy any problems quickly.

If your wastewater is particularly hard to treat, such as kitchen waste from a restaurant, the inspections should be more frequent (especially the inspection of the grease separator or grease trap), even daily.

In the next table, see problems you might encounter during checks, and some possible causes.

What you might see	What might be causing the problem
Your household drains are slow to clear or your toilets are backing up.	Your pipes may be blocked with sanitary items, grease or tree roots. The system's tank may be full and need desludging. Your infiltration system pipes may be blocked or waterlogged.
Odour from the tank or house vent pipe.	Your tank cover doesn't fit well. Your system is becoming obstructed. The tank needs to be desludged. A component, such as an air pump or drive motor, has failed and the treatment process is failing in turn.
Drainage field/ soakaway or other infiltration system is smelly, swampy or has excessive or markedly different grass growth.	Your infiltration system pipes may be clogged. Your tank or infiltration system may be undersized for your requirements, not draining away, and so not treating effluent properly. Treatment in septic tank/PSTP before entering infiltration system is failing, for another reason – for example if there is damage to the micro-organisms in the system, by having received wastewater with wrong composition. Have you put any chemicals in the systems which have killed them, such as solvents, disinfectants, bleaches? A component such as an air blower, pump or drive motor may have failed.
In discharge outfall to water, final effluent is cloudy and/or smelly or contains visible solids.	Your system is failing – the microorganisms may have died. Have you put any chemicals in the systems which have killed them, such as solvents, disinfectants, bleaches? The tank may be full and need desludging. Rainwater is getting into the system, making effluent pass through faster without having chance to be treated.
Tank needs emptying very often.	Non-wastewater items are being put into the system, which don't break down in the tank. Build up of grease, fats and oils solidifying in the tank and causing floating scum to build up faster. If this is because a lot of water is going through the tank, this may indicate that: <ul style="list-style-type: none"> - surface water is connected to the tank, - the tank, drains or covers are damaged and allowing groundwater or surface water to get into the tank, or - groundwater is so high that it is draining to the tank from the soakaway.
In discharge outfall to water, grey slime or furry growth on the bottom of the pipe or bed of the watercourse. This indicates possible "sewage fungus" growth.	Effluent is not being treated properly.

If all is operating correctly:

- there should be little or no odour around your system.
- in discharges to water, the secondary treated effluent from the outfall should be a clear liquid with little or no odour; immediately downstream of the outfall there should not be any sludge or discoloration at the bottom of the watercourse.
- in discharges to land, the land around the infiltration system should not be 'boggy' or waterlogged; the water should not be grey or smelly; and there should be no excessive or markedly different vegetation growth.

Wastewater treatment systems contain toxic and potentially explosive gases, and often deep wastewater. These may seriously harm your health. Follow all health and safety procedures when carrying out checks.

4.8.3 Keeping records

Keep records of anything that helps you to manage your private wastewater treatment system. This includes: operating manual, legal permissions, contact details of contractors and waste companies, checks you make, servicing, desludging and repairs carried out, all waste transfer paperwork (with a record of where your waste is being taken), sample results from service engineers, etc.

In Northern Ireland and Wales it is a legal requirement, as part of the conditions of any permission to discharge, that you keep the relevant information. You must provide it to the environmental regulator if requested. In Wales you must keep all records of maintenance and of waste removal for 5 years.

You should transfer these records to any new owners, as a service history of the system.

4.8.4 Replacing your private wastewater system

If your private wastewater system can no longer treat your wastewater appropriately – because your wastewater requirements have changed, or the system has reached the end of its life and needs replacing – consider first if you can connect to the public foul sewer (see section 3).

5. Glossary

Borehole – very deep narrow vertical hole in the ground; to extract water or to investigate the underground material.

Flow – This is the volume of wastewater going through the treatment system in a given time, usually over 24 hours. 'Steady flow' means the volume of wastewater remains at a more or less constant rate over time - that is, usually, day to day. 'Variable flow' mean that the volume of wastewater will vary over time, for example from one day or week to the next, or seasonally.

Private wastewater treatment system – This is a privately owned system for treating wastewater from one or more houses or a development.

Public foul sewer– Private drains convey the wastewater (sewage) from private sites, where it is produced, to the public foul sewer. The public foul sewer is a public system of drains and tools that

move the wastewater from there to a public wastewater treatment and disposal system. Public wastewater treatment systems are owned and managed by the local sewerage undertakers.

Sewerage – This means:

- 1) the infrastructure that moves wastewater from where it is produced, to treatment and disposal (meaning used in Checklist A); and
- 2) the removal of the wastewater by means of that infrastructure (meaning used in section 2.2).

Soakage pit – This is a pit designed for surface water/ rainwater drainage (the same as meaning 2) of ‘soakaway’).

Soakaway –

- 1) (the only meaning of the word used in this GPP) ‘Soakaway’ is the Scottish designation for a class of infiltration systems that is mostly called “drainage field” elsewhere in the UK; these infiltration systems are in this guidance referred to as “drainage field/ soakaway”, to cover the whole of the UK. Similarly “mound soakaway” (in Scotland) means the same as “drainage mounds” (the more frequently used term in the rest of the UK), and “partial soakaway” (in Scotland) means the same as “partial drainage field” (the more frequently used term in the rest of the UK)
- 2) (meaning not used in this GPP): ‘Soakaway’ is a hole in the ground, to collect high flows of rainwater and hold them until they can soak away; no treatment is applied to this water.

Soakaway crate – This is a water storage cell used to deal with storm water

Source Protected Zone 1 (SPZ 1) – SPZs are areas defined in England, Northern Ireland and Wales, to indicate their level of risk of contamination of groundwater and of water quality at an abstraction, as a result of activities on or in the ground. SPZ 1 are the zones with the highest risk of pollution. <https://www.groundsure.com/news/groundwater-abstraction-source-protection-zones>

Storm drain – This is a drain built to carry away excess water in times of heavy rain.

Strength of sewage/wastewater – This is the concentration of dissolved and suspended matter in sewage (indicated by biochemical oxygen demand or suspended solids).

Surface water sewer – This is a system of drains and tools that move uncontaminated rain water directly to a local river, stream or other surface water body.

Waste transfer note (WTN) – This is a document that details the transfer of waste from one person to another. You must ensure every load of waste you receive or pass to others is covered by a WTN.

Wastewater – This term is used in this guidance instead of the term “sewage”, to include effluent from toilets, showers, washing machines, dishwashers, etc, as well as some commercial and business discharges.

6. References

1. In Wales: NRW's Guidance for environmental permit applications: Part B6.5 available from Application forms webpage, <https://naturalresources.wales/permits-and-permissions/water-discharges/discharges-to-surface-water-and-groundwater/apply-for-a-new-bespoke-permit/?lang=en>. Direct link at the time of issuing: https://naturalresources.wales/media/680974/part-b65_guidance-v3_final.pdf.

Local sewerage undertakers (also known as ‘local/municipal wastewater/sewerage treatment providers’)

2. Northern Ireland Water.
Website - <https://www.niwater.com/>; Waterline - 03457 440088;
Email: waterline@niwater.com; Post: PO Box 1026, Belfast BT1 9DJ
3. Scottish Water.
Website <http://www.scottishwater.co.uk> ; Customer Helpline: 0800 0778 778;
Email: customer.services@scottishwater.co.uk ;
Post: Castle House, 6 Castle Drive, Carnegie Campus, Dunfermline, KY11 8GG
4. In Wales and England, who your sewerage undertaker is depends on your location. Find out on the OFWAT website, <http://www.ofwat.gov.uk>. Direct link at the time of issuing: <https://www.ofwat.gov.uk/households/your-water-company/map/>

Guidance on process to connect to public sewer:

5. In Northern Ireland, guidance in ‘Services for developers – Sewers’ section of the Northern Ireland Water website, <https://www.niwater.com/>. Direct link at the time of publishing: <https://www.niwater.com/sewers.aspx>.
6. In Scotland, guidance in Scottish Water website, <http://www.scottishwater.co.uk/>. The application process to connect to public sewer may be different for a single house, a development of two or more properties, or when the developer wishes Scottish Water to vest the new sewerage infrastructure. Check the appropriate part of the website for your case. Direct links at the time of issuing: for domestic costumers <http://www.scottishwater.co.uk/you-and-your-home/connecting-your-property/planning-your-development>; for business customers/ developers <http://www.scottishwater.co.uk/business/connections/connecting-your-property/waste-water-connections>.
7. “Sewers for Scotland”, Scottish Water, 3rd edition - Includes the standards required to connect to a public sewer. Free, on Scottish Water’s website <http://www.scottishwater.co.uk/>. Direct link at the time of issuing: <http://www.scottishwater.co.uk/business/connections/connecting-your-property/sewers-for-scotland-and-suds/sewers-for-scotland-v3>

Local authorities’ planning and building standards/ building control departments

8. In Northern Ireland, find contact details of your local council’s planning department, and planning information, on the Northern Irish Planning Portal, <https://www.planningni.gov.uk>. Direct link at the time of issuing: http://www.planningni.gov.uk/index/my_council.htm
In Northern Ireland, find contact details of your local council’s building controls department on the Building Control Northern Ireland’s website, <http://www.buildingcontrol-ni.com/> .
9. In Scotland find contact details of the planning and building standards department of your local authority in the Planning section of the Scottish Government’s website <http://www.gov.scot> . Direct link at the time of issuing: <http://www.gov.scot/Topics/Built-Environment/planning/Roles/Planning-Authorities/Information>.
10. In Wales, find your local council’s contact details in the Planning Portal for Wales website, https://www.planningportal.co.uk/wales_en/ , where you can search by postcode. Here you can also find information on planning and building control.
11. In England, find your local council’s contact details from the Planning Portal (England section), <https://www.planningportal.co.uk/> where you can search by postcode. Here you can also find information on planning and building control.

Certified contractors to establish connection to public foul

12. In Scotland: Certification Register, <http://www.certificationregister.co.uk/>, from the Scottish Government Building Standards Division. It lists approved designers and installers that may certify that the design of building structures and the construction of drainage, and of heating and plumbing installations is according to the building regulations’.

Environment regulators’ contact details for enquiries about private wastewater treatment

13. Northern Ireland Environment Agency (NIEA), Department of Agriculture, Environment and Rural Affairs, <https://www.daera-ni.gov.uk> . Contact the Water Regulation Unit: at the time of issuing at <https://www.daera-ni.gov.uk/contacts/water-management-unit>, phone 0300 200 7850.
14. Scottish Environment Protection Agency (SEPA), <http://www.sepa.org.uk/>. Call SEPA’s Customer Enquiries phone number, 03000 99 66 99; or email SEPA by visiting the Contact Us webpage (at the time of issuing: <http://www.sepa.org.uk/contact/contact-us-via-email/>), or find the contact details of your local SEPA office on <http://www.sepa.org.uk/contact/office-locations/list/>.

15. Natural Resources Wales (NRW), <https://naturalresources.wales/?lang=en>. Call NRW's Customer Contact Centre phone number, 03000 65 3000, and ask to be transferred to the Natural Resources Management Team for your area.
16. Environment Agency (EA). Contact the EA's general enquiries phone number, 03708 506 506, or email enquiries@environment-agency.gov.uk; for other contact details see the Contact Us webpage (at the time of issuing <http://apps.environment-agency.gov.uk/contact/>).

Standards for treatment systems, ground assessments and tests, criteria for discharging to land and water

17. In Northern Ireland, the guidance for 'Domestic consents', in the 'Regulating water discharges' webpage of the Department of Agriculture, Environment and Rural Affairs, Northern Ireland. Direct link at the time of issuing: <https://www.daera-ni.gov.uk/articles/regulating-water-discharges>. In there, description of percolation test is found in "Guidance for completion of single domestic dwelling consent application form WO2", at the time of publishing at <https://www.daera-ni.gov.uk/publications/guidance-completion-single-domestic-dwelling-consent-application-form-wo2>.
18. In Scotland, Section 3, Environment, of "Building Standards Technical Handbooks (Domestic and Non Domestic Handbooks)". Choose 'domestic' or 'non-domestic' depending on if you are a household or a business. Free, online, on Scottish Government's website, www.gov.scot. Direct link at time of issuing: <http://www.gov.scot/Topics/Built-Environment/Building/Building-standards/publications/pubtech>. Provides guidance on how to comply with The Building (Scotland) Regulations 2004. Section 3.8 on PSTPs and septic tanks, section 3.9 on ground assessments, percolation testing and infiltration systems; includes standards to comply with.
19. In Scotland, "Regulatory Method (WAT-RM-04) – Indirect sewage discharges to groundwater", SEPA. Internal guidance for SEPA staff, free on SEPA's website, <http://www.sepa.org.uk>. Direct link at the time of issuing: https://www.sepa.org.uk/media/152688/wat_rm_04.pdf. Includes SEPA's position for discharges to land, including for the percolation value of your land, which type(s) of system(s) to use and when to consider discharge to surface water.
20. In Wales, Appendix H2 of "Drainage and waste disposal: Approved Document H", free, on the "Planning/ Building regulations" section of Welsh Government's website, <http://gov.wales>. Direct link at time of issuing: <http://gov.wales/docs/desh/publications/130205building-regs-approved-document-h-drainage-en.pdf>.
21. In England, Appendix H2 of "Drainage and waste disposal: Approved Document H", 2015, free online on the gov.uk website. Direct link at time of issuing, with an explanatory note, also in the Planning Portal: https://www.planningportal.co.uk/info/200135/approved_documents/71/part_h_-_drainage_and_waste_disposal
22. "BS 6297:2007+A1:2008. Code of practice for the design and installation of drainage fields for use in wastewater treatment". (UK wide). You can buy it from <http://shop.bsigroup.com/>. Direct link at time of issuing: <http://shop.bsigroup.com/ProductDetail/?pid=00000000030186875>.

Assessment of your wastewater treatment needs– wastewater composition, volume, type of flow

23. British Water's "Code of practice on flows and loads (Sizing Criteria, Treatment Capacity for Sewage Treatment Systems)", free on the Codes of Practice section of the British Water's website, <http://www.britishwater.co.uk/Publications/codes-of-practise.aspx>. Direct link at the time of issuing: <http://www.britishwater.co.uk/media/download.aspx?MediaId=72>

Private wastewater treatment systems

24. "BS EN 12566-3:2005+A2:2013. Small wastewater treatment systems for up to 50 PT. Packaged and/or site assembled domestic wastewater treatment plants." You can buy it from <http://shop.bsigroup.com/>. Direct link at time of issuing: <http://shop.bsigroup.com/ProductDetail/?pid=00000000030282050>.
25. British Water's list of certified wastewater treatment systems – free, on British Water's website, <http://www.britishwater.co.uk/>. Direct link at the time of issuing, <http://www.britishwater.co.uk/Accreditation-Certification/certified-equipments.aspx>. This list may not contain all CE certified equipment, as manufacturers and suppliers have to contact British Water to have their equipment added.
26. In Northern Ireland and Scotland, "Septic tanks" environmental topic webpages, free, on the NetRegs website, <http://netregs.org.uk>, direct link at the time of issuing <http://www.netregs.org.uk/environmental-topics/water/septic-tanks/>.
27. "BS EN 12566-1:2000. Small wastewater treatment systems for up to 50 PT. Prefabricated septic tanks." You can buy it from <http://shop.bsigroup.com/>. Direct link at time of issuing: <http://shop.bsigroup.com/ProductDetail/?pid=00000000030044571>.

28. "BS EN 12566-4:2007. Small wastewater treatment systems for up to 50 PT. Septic tanks assembled in situ from prefabricated kits." You can buy it from <http://shop.bsigroup.com/>. Direct link at time of issuing: <http://shop.bsigroup.com/ProductDetail/?pid=00000000030173523>.
29. "BR 478: 'Mound filter systems for the treatment of domestic wastewater", Richard D S Phelps & John Griggs, 2005, ISBN1-86081-747-5 You can buy it from <http://www.brebookshop.com>. Direct link at the time of issuing: <http://www.brebookshop.com/details.jsp?id=148788>.
30. "Building Research Establishment Good Building Guide No 42 (GBG42): Reed Beds", 2001, ISBN 1860814379. You can buy it from, www.brebokshop.com, phone 01923 664 262; you can read it for free for 30 days at <https://www.scribd.com/doc/103113933/Gbg42-Part-2>.

Use of sludge on land

31. In Northern Ireland: "The Sludge (Use in Agriculture) Regulations (Northern Ireland) 1990" (NISR 1990 No. 245). Free, online - direct link on the legislation.gov.uk website is http://www.legislation.gov.uk/nisr/1990/245/pdfs/nisr_19900245_en.pdf.
32. "Sewage sludge on farmland: code of practice for England, Wales and Northern Ireland". Free, online - direct link at the gov.uk website is <https://www.gov.uk/government/publications/sewage-sludge-on-farmland-code-of-practice/sewage-sludge-on-farmland-code-of-practice>.
33. In Scotland, Wales and England, "The Sludge (Use in Agriculture) Regulations (1989)" (SI 1989 No. 1263). Free, online - direct link on the legislation.gov.uk website is <http://www.legislation.gov.uk/uksi/1989/1263/contents/made>.
34. In Scotland: "Paragraph 8(2) Exemption. The storage and spreading of sludge on non-agricultural land" (Technical Guidance Note). Free, on SEPA's website – direct link is <https://www.sepa.org.uk/media/105222/the-storage-and-spreading-of-sludge-technical-guidance-note-for-paragraph-8-exemptions.pdf>.

Building standards / building control

35. In Northern Ireland, in "Building Regulations (Northern Ireland) 2012. Technical Booklet N- Drainage" from the Department of Finance Northern Ireland's website, <https://www.finance-ni.gov.uk/>. Free online, with direct link at the time of issuing: <https://www.finance-ni.gov.uk/sites/default/files/publications/dfp/Technical-booklet-N-Drainage-October-2012.pdf>.

For the other nations see references 18 (Scotland), 20 (Wales), 21 (England).

Information on permissions from the environmental regulator

36. In Northern Ireland, "Regulating sewage discharges" webpage of the Department of Agriculture, Environment and Rural Affairs website, <https://www.daera-ni.gov.uk/>. Direct link at the time of issuing: <https://www.daera-ni.gov.uk/articles/regulating-wastewater-discharges>.
37. In Northern Ireland, "Waterways discharge consent (Northern Ireland)" webpage of the Gov.uk website. Direct link at the time of issuing: <https://www.gov.uk/waterways-discharge-consent-northern-ireland/northern-ireland-environment-agency>.
38. In Scotland, "Small scale sewage discharges (e.g. septic tanks or package treatment plants)" webpage on SEPA's website, <https://www.sepa.org.uk/>. Direct link at the time of issuing: <https://www.sepa.org.uk/regulations/water/small-scale-sewage-discharges/>.
39. In Scotland, "Regulatory Method (WAT-RM-03) – Sewage discharges to surface waters", internal guidance for SEPA staff. Free, on the www.sepa.org.uk website. Direct link at the time of issuing: <https://www.sepa.org.uk/regulations/water/pollution-control/pollution-control-guidance/>. See also reference 19, "Regulatory Method (WAT-RM-04) – Indirect sewage discharges to groundwater".
40. In Wales, "Discharges to surface water and groundwater" webpages on NRW's website <https://naturalresources.wales/?lang=en>. Direct link at the time of issuing: <https://naturalresources.wales/permits-and-permissions/water-discharges/discharges-to-surface-water-and-groundwater/?lang=en>.
41. In Wales, Natural Resources Wales's Environmental Management Toolkits for discharges of sewage effluent, free, on NRW's website, <https://naturalresources.wales>. Direct link at the time of issuing: <https://naturalresources.wales/permits-and-permissions/environmental-permits/environment-management-system/?lang=en>.
42. In England, at Gov.uk, search for example "sewage discharges" and "sewage discharge permissions". At the time of issuing, this includes the "Septic tanks and treatment plants: permits and general binding rules" webpages (direct link: <https://www.gov.uk/permits-you-need-for-septic-tanks>) and "Discharges to surface water and

groundwater: environmental permits” webpage (direct link: <https://www.gov.uk/guidance/discharges-to-surface-water-and-groundwater-environmental-permits>).

References on planning considerations

In Northern Ireland, guidance on all NIEA issues relating to planning (including drainage and water issues, domestic dwellings and their associated foul discharges) are on the Standing Advice webpage of the Northern Ireland Planning Portal (NIPP) (<https://www.planningni.gov.uk/>), with direct link at the time of issuing:

http://www.planningni.gov.uk/indexand/advice/northern_ireland_environment_agency_guidance/standing_advice.htm.

In particular see references 42, 43 and 44, free online:

43. “Standing Advice Note 1 – Single dwellings”, direct link: https://www.planningni.gov.uk/index/advice/northern_ireland_environment_agency_guidance/standing_advice_note_no_1_single_dwellings_issue_2_april_2017.pdf.

44. “Standing Advice Note 2 – “Multiple dwellings”, direct link: https://www.planningni.gov.uk/index/advice/northern_ireland_environment_agency_guidance/standing_advice_2_multiple_dwellings-2.pdf.

45. “Standing Advice Note 23 – Commercial and industrial developments”, direct link: https://www.planningni.gov.uk/index/advice/northern_ireland_environment_agency_guidance/standing_advice_note_no_23_commercial_and_industrial_developments_issue_2_june_2016.pdf.

In Scotland, see references 46 to 49:

46. In Scotland, “Planning Advice Note PAN 79: Water and drainage” (2006), free, online on Scottish Government’s website, www.gov.scot . Direct link at the time of issuing: <http://www.gov.scot/Publications/2006/09/26152857/0>.

47. “SEPA Position Statement 06-08: Policy and supporting guidance on provision of wastewater drainage in settlements” (2006). Free, on SEPA’s website, www.sepa.org.uk. Direct link at the time of issuing: http://www.sepa.org.uk/media/152636/position_statement_06_08.pdf.

48. “Land Use Planning System SEPA Guidance Note 19 – Planning advice on waste water drainage”. Free, on SEPA’s website, www.sepa.org.uk. Direct link at the time of issuing: <http://www.sepa.org.uk/media/143338/lups-gu19-planning-guidance-on-waste-water-drainage.pdf>.

49. “Scottish Planning Policy” (2014). Free, on Scottish Government’s website, [gov.scot](http://www.gov.scot). Direct link at the time of issuing <https://beta.gov.scot/publications/scottish-planning-policy>.

50. In Wales, “Welsh Office Circular 10/99 – Planning requirements in respect of the use of non-mains sewerage incorporating septic tanks in new development” (1999). Free, on the Planning Circulars section of the Welsh Government website [gov.wales](http://www.gov.wales). Direct link at the time of issuing <http://gov.wales/topics/planning/policy/circulars/welshofficecirculars/circular1099/?lang=en>.

51. In England, “Water supply, wastewater and water quality – considerations for planning applications”, on Gov.uk website, on the “Water supply, wastewater and water quality page” (<https://www.gov.uk/guidance/water-supply-wastewater-and-water-quality>). Browse down to the bottom of that page or use the contents list on the right side of the page.

Installation, operation and maintenance of private wastewater treatment and drainage systems

52. British Water’s “Code of practice - Guide to the installation of small wastewater treatment systems”, free on British Water’s website: <http://www.britishwater.co.uk>. Direct link at time of issuing: <http://www.britishwater.co.uk/media/download.aspx?MediaId=73>.

53. Call of Nature website, <http://www.callofnature.info/>. Guidance on the correct operation and maintenance of private wastewater systems; includes links to regulations for England.

54. British Water’s “Code of practice - guide for users of small wastewater treatment systems”, free on British Water’s website: <http://www.britishwater.co.uk>. Direct link at time of issuing: <http://www.britishwater.co.uk/Publications/codes-of-practise.aspx>.

55. “The septic tank guide”, from the Dee Catchment Partnership; free on www.theseptictankguide.info.

56. ‘Looking after your septic tank: a guide and logbook for householders’, Snowdonia-Active publication available at <http://www.loving-our-lake.org/2013/10/14/looking-after-your-septic-tank/>.

57. British Water’s database of accredited service engineers, for servicing PSTPs – on British Water’s website, <http://www.britishwater.co.uk/>. Direct link at the time of issuing: <http://www.britishwater.co.uk/directory/findengineer.aspx>.

58. British Water's "[Code of practice - guide to the desludging of small wastewater treatment systems](http://www.britishwater.co.uk/Publications/codes-of-practise.aspx)" – free on British Water's website. Direct link at time of issuing: <http://www.britishwater.co.uk/Publications/codes-of-practise.aspx>.

Registered waste carriers

59. In Northern Ireland, check the public registers, from the '[Public registers](https://www.daera-ni.gov.uk/topics/waste/public-registers)' webpage on the Department of Agriculture, Environment and Rural Affairs website. Direct link at the time of issuing, <https://www.daera-ni.gov.uk/topics/waste/public-registers>.
60. In Scotland, check a list of registered waste carriers on the '[Registered waste carriers and brokers](http://apps.sepa.org.uk/rocas/)' webpage on SEPA website. Direct link at the time of issuing is <http://apps.sepa.org.uk/rocas/> . If in doubt about a particular carrier, contact SEPA.
61. In Wales, check online if a waste carrier is registered, on the Natural Resources Wales webpage "[Find out if a site has a permit, licence or exemption \(Public Register\)](https://naturalresources.wales/permits-and-permissions/check-for-a-permit-licence-or-exemption/?lang=en)". Direct link at the time of issuing: <https://naturalresources.wales/permits-and-permissions/check-for-a-permit-licence-or-exemption/?lang=en>.
62. In England, check online if a waste carrier is registered, from the Gov.uk website. Direct link at the time of issuing: <https://environment.data.gov.uk/public-register/view/search-waste-carriers-brokers>

Duty of care for waste

63. In Northern Ireland and Scotland, "Duty of care" environmental topic webpages on the NetRegs website, www.netregs.org.uk. Direct Link at the time of issuing: http://www.netregs.org.uk/library_of_topics/waste/duty_of_care.aspx.

Guidance for owners of private wastewater treatment systems, both householders and businesses, and also for desludging contractors that move the waste away, in references 64 and 65:

64. In Scotland, "Duty of Care – a code of practice". free, from Scottish Government's website, Gov.scot. Direct link at the time of issuing: <http://www.gov.scot/Publications/2012/10/2631/0>.
65. In Wales, and England, "Waste Duty of Care: code of practice", free on Gov.uk. Direct link at the time of issuing: <https://www.gov.uk/government/publications/waste-duty-of-care-code-of-practice>.

Desludging services

66. Northern Ireland Water's de-sludging services for domestic septic tanks, wastewater treatment plants and cesspools - find information on the Northern Ireland Water website, <https://www.niwater.com/home/>. Direct link at the time of issuing: <https://www.niwater.com/arrange-septic-tank-emptying/>.
67. Scottish Water's de-sludging services for domestic and business septic tanks - find information on Scottish Water website, <http://www.scottishwater.co.uk/>. Direct link at the time of issuing: <http://www.scottishwater.co.uk/you-and-your-home/septic-tank-emptying/about-septic-tank-emptying>.

See also reference 57.

7. Figures' references and copyrights

- a. "Individual home sewage treatment systems (AE892 (Revised))" by Scherer, T.; North Dakota State University, <https://www.ag.ndsu.edu/publications/home-farm/individual-home-sewage-treatment-systems> . To use and share this content you must follow the conditions in their [Creative Commons](https://creativecommons.org/licenses/by/4.0/) licence and their [Rules for Use](https://www.ag.ndsu.edu/publications/home-farm/individual-home-sewage-treatment-systems#rules-for-use).
- b. Eawag (2014): "eCompendium – The online compendium of sanitation systems and technologies", by Tilley, E., Ulrich, L., Lüthi, C., Reymond, Ph., Zurbrügg, C.; Dübendorf: Swiss Federal Institute of Aquatic Science and Technologies (Eawag). Available at: www.eCompendium.sswm.info." Open source copyright – check details at <http://ecompendium.sswm.info/copyright> .
- c. "Septic system operation and maintenance", New York State Department of Health. Direct link at the time of issuing <https://www.health.ny.gov/publications/3208/> To obtain permission to use the image, contact: *Center for Environmental Health, Bureau of Water Supply Protection, Empire State Plaza-Corning Tower, Room 1110, Albany, New York 12237. Phone: (518) 402-7650, E-mail: bpwsp@health.state.ny.us* .

Appendix A: Percolation Test

Avoid carrying out this test in extreme weather conditions such as drought, frost and heavy rain.

- a) Excavate at least two (three in Northern Ireland) holes 300mm square to a depth 300mm below the proposed invert level (bottom of pipe) of the infiltration pipe and space them evenly along the proposed line of the subsurface irrigation system.
- b) Fill each hole with water to a depth of at least 300mm and allow to seep away overnight.
- c) Next day, refill each hole with water to a depth of at least 300mm and observe the time in seconds for the water to seep away from 75% full to 25% full (i.e. a depth of 150mm).
- d) Divide this time by 150. This answer gives the average time in seconds (V_p) required for the water to drop 1mm.
- e) The test should be carried out at least three times with at least two trial holes. The average figure from the tests should be taken. This is the percolation value V_p (in seconds).
- f) The average figure for the percolation value (V_p) is obtained by summing all the values and dividing by the number of values used.
- g) Drainage field disposals should only be used when percolation tests indicate average values of V_p between 15 and 100 and the preliminary assessment of the trial hole tests has been favourable.
- h) The minimum value of 15 ensures that untreated effluent cannot percolate too rapidly into ground water.
- i) Where V_p is above the limit of 100 effective treatment is unlikely to take place in a drainage field as there will be inefficient soakage in this location which may lead to sewage ponding on the surface.
- j) For domestic premises, the floor area of the drainage field (A in square metres) required may be calculated from:

$$A = p \times V_p \times 0.25 \text{ for septic tanks}$$

$$A = p \times V_p \times 0.20 \text{ for package sewage treatment plants}$$

where:

p is the number of people served by the tank (this should be the maximum number of people that could live in the house).

V_p is the percolation value described above.

If in doubt, consult your professional advisor or local authority building standards/ building control officer for advice.

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