Local planning guidance on non-mains drainage for developers & drainage engineers

With thanks to the Environment Agency Groundwater and Contaminated Land team in Kent, South London & East Sussex for their technical input.

Background & Regulations

Many rural areas in the southeast with no easy access to mains drainage have to look at alternatives to enable development. This may be suitable for the odd individual property, but for larger developments this can pose a risk to groundwater quality, and its protection. We are already seeing widespread nitrogen pollution of groundwater throughout Kent, and locally cumulative discharges of sewage effluent are thought to be a significant contributor to the problem. There are various alternatives to consider, but the cost and environmental impacts for all proposals need to be considered carefully for the relevant options. These include septic tanks, package treatment plants (PTP) and sealed cesspits (also known as cesspools). More on these overleaf.

A main sewer should always be the first option if it is at all accessible. If available, the main sewer is the default and recommended for simplicity, ease of maintenance and protection of the environment. The government General Binding Rules on non-mains drainage systems reiterate this, and any other options should only be considered where a mains sewer is not viable. Connection to the mains sewer is considered potentially feasible where the distance from the (domestic) development site to the sewer is less than the number of properties multiplied by 30 metres. Details on the General Binding Rules can be found here:

https://www.gov.uk/government/publications/small-sewage-discharges-in-england-general-binding-rules

Most systems using some form of infiltration for final effluents will need an Environmental Permit, unless they are exempt under the GBRs due to small volumes and use of British Standard-compliant drainage layout and equipment. All submissions to the Local Planning Authority should include all relevant information on foul drainage proposals using the following form, to determine whether a permit is required:

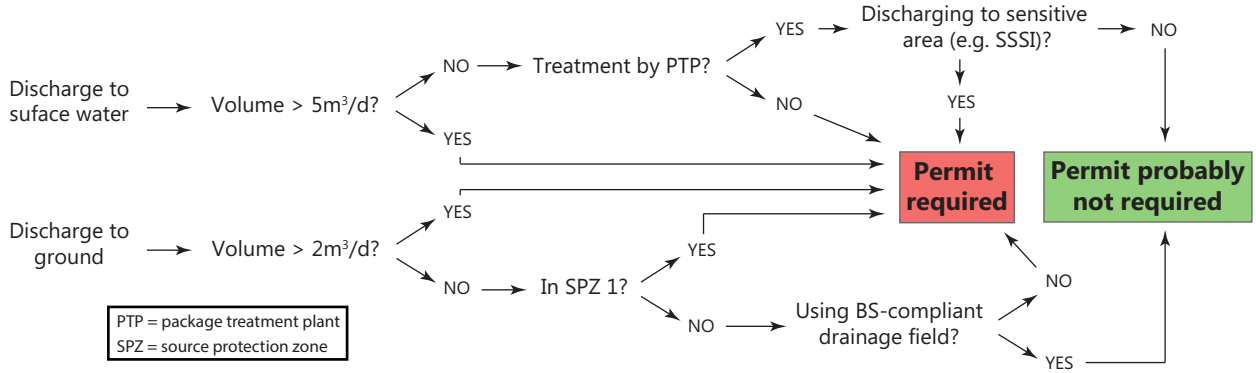
https://www.gov.uk/government/publications/foul-drainage-assessment-form-fda1

If a permit is required the applicant should submit sufficient information to the EA to show that a permit could be granted for the specific design of proposed foul drainage in that location. The information required to submit and achieve a successful permit application, where it is possible for the EA to grant one, can be found here:

https://www.gov.uk/permits-you-need-for-septic-tanks/apply-for-a-permit

The amount of waste water to be discharged will need to be calculated and compared to the flow in the receiving water or ground conditions, and the environmental status of that surface or groundwater body. Other parameters should be taken into account, including the depth to groundwater, whether the site is within a Source Protection Zone or Safeguard Zone, proximity to other environmentally-sensitive areas, and existing permits in the area. The latter is important for assessing cumulative impacts to controlled waters.

Preliminary development design should carefully consider the environmental isssues for foul drainage options - **this should not be a final step, but part of project planning from the start**. Restricted access for tankers removing sludge from septic tanks or cesspool systems may be a particular constraint.

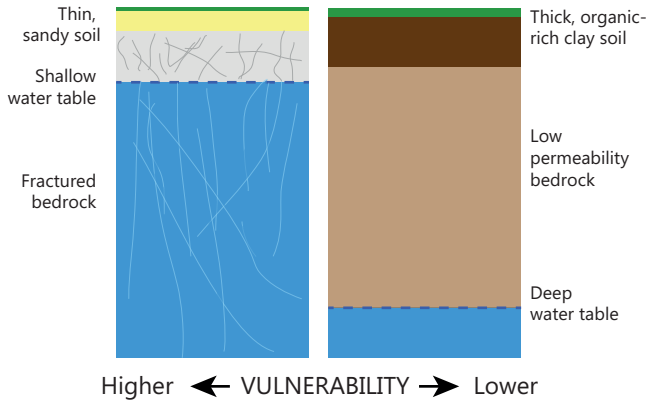


Flow chart with some of the parameters used to assess whether a discharge requires an Environmental Permit, or is exempt under the General Binding Rules. Note - all discharges will be assessed on a site-specific basis and the above is a guide only.

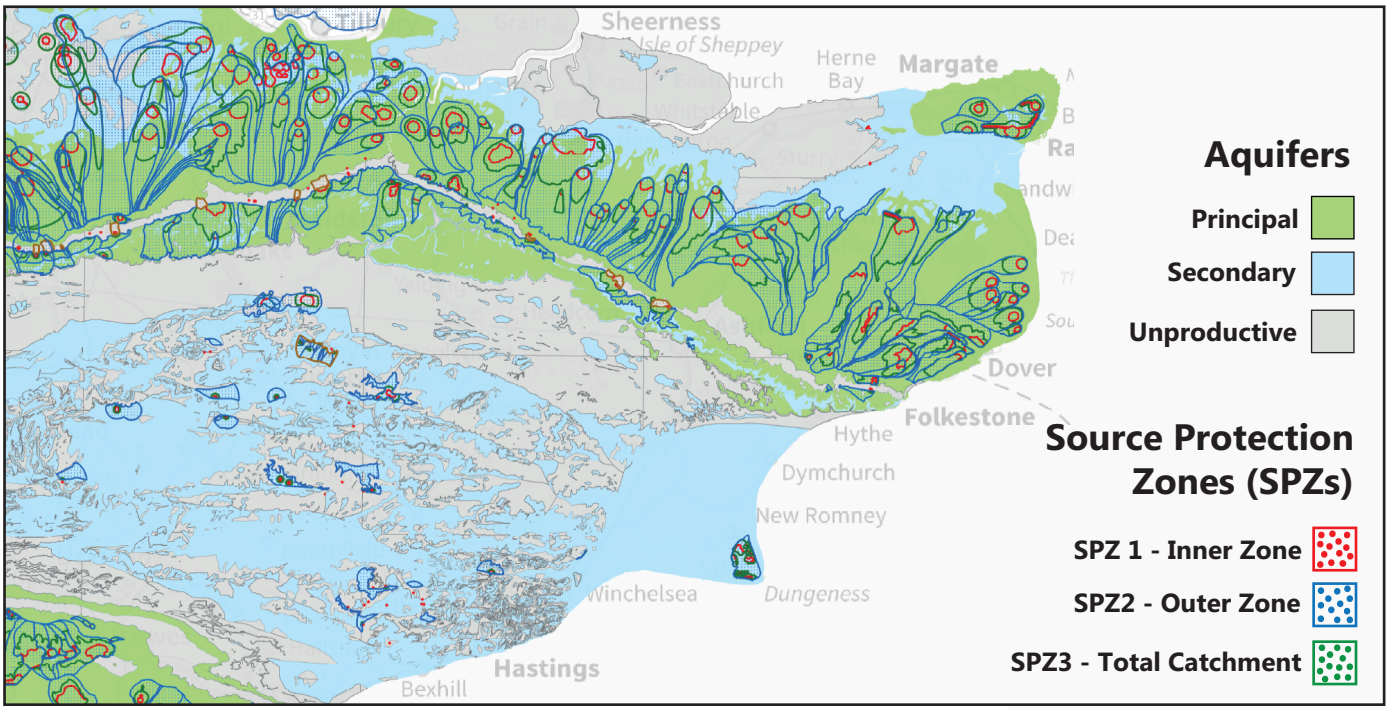
Hydrogeology and Groundwater Vulnerability in Kent

In general, groundwater vulnerability is higher where there is no hard cover, the soils are thinner, the un-saturated zone (depth to the water table) is small and the bedrock is highly fractured (as is common in chalk).

Although thick, organic-rich clay soils reduce ground-water vulnerability, they are often not suitable for British Standard drainage fields. In areas with clay geology overlying chalk, as occurs along much of northern Kent, deep infiltration is often proposed.



The vast majority of natural attenuation of contaminants occurs in the upper soil layers. By-passing this layer increases the impact to aquifers. The risk from multiple deep discharges in a relatively small area must be assessed cumulatively, as together they often pose an unacceptable risk to the aquifer.



Hydrogeological map of Kent showing the extent of Principal aquifers, Secondary aquifers and unprodcutive strata, and their relationship to the Source Protection Zones. Note - in places Secondary aquifers directly overlie Principal aquifers.

Aquifer Designations

Principal aquifers support water supply on a strategic scale and may provide base flow for rivers. In Kent these are the Chalk, and the Folkestone and Hythe Beds of the Lower Greensand. Approximately 85% of all groundwater abstracted for public and private use is derived from the chalk, and approximately 10% from the Lower Greensand.

Secondary aquifers are important for supporting local supply and providing base flow for rivers. Examples in Kent include the Thanet Sands, the Tunbridge Wells Sands and the gravel beach deposits at Dungeness

Unproductive strata are the low permeability clay deposits found across the county, including the London Clay, Gault Clay, Atherfield Clay, Weald Clay and Wadhurst Clay.

Source Protection Zones

These are zones around all major groundwater sources (e.g. boreholes) that show the risk of contamination from any activities that might cause pollution in that area. The closer to the source, the greater the risk.

The three main zones represent travel times from any point below the water table to the source. The **inner zone (SPZ1)** is equal to 50 days, the **outer zone (SPZ2)** is 400 days, while **SPZ3** represents the total catchment

The map above shows the extent of SPZs across Kent, with the relationship to Principal aquifers obvious. Many rural areas in Kent with no mains foul drainage are found within these SPZs.

Please see https://magic.defra.gov.uk/ to check if a site is in an SPZ.

Non-Mains Drainage - Treatment Options

In areas with no mains sewer there are several options to consider. These are broadly categorised as sealed and non-sealed. The latter discharge either to surface water or the ground, and will require a permit unless they meet the General Binding Rules. Certain discharges, such as those in Source Protection Zone 1 or to a borehole, will always require a permit.

Cesspits (cesspools) - **SEALED**

Cesspits are sealed systems that do not discharge to the environment. They are single-chambered vessels that require frequent emptying, usually by a tanker - space for emptying must be taken into account when designing site layout. Modern examples are made from plastic or fibreglass, and should be fitted with high level warning alarms. Cesspits are not recommended when other options are viable. Cesspits do not require a permit, but the owner must ensure it is well maintained and not leaking.

Septic Tanks - **DISCHARGES TO ENVIRONMENT**

Septic tanks only provide basic treatment. Waste water is collected in an underground tank where the solids undergo some anaerobic processing and settle out, while fats and other organic material that float form a crust. The remaining liquid, which is usually a murky grey, passes into a second chamber where additional settlement occurs. The liquid is then discharged to the environment. Discharges from septic tanks will not require a permit if they meet all requirement of the General Binding Rules. They will require periodic emptying of sludge.

Package Treatment Plants (PTP) - **DISCHARGES TO ENVIRONMENT**

These work in a similar way to septic tanks, but have additional bioactive treatment zones where air is introduced, promoting aerobic breakdown of the waste. Some treatment plants have mechanically-rotating discs that provide a greater surface area for biological activity. They provide a higher level of treatment than septic tanks, but discharges will still need to adhere to the GBRs or require a permit. As with septic tanks, PTPs will require occasional sludge removal by tankers. Package treatment plants require a power supply.

Non-Mains Drainage - Discharge Options

Surface Water

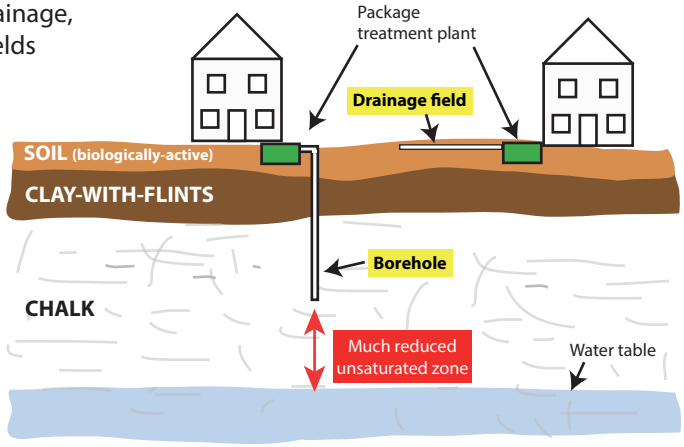
Each surface water discharge assessment will deal with site-specific risks. Any discharge to surface water must be treated by a package treatment plant, and any discharges over 5m^3/d will require a permit. It must not be assumed a discharge will be acceptable to a watercourse just because there is one nearby.

Drainage Field

To meet the GBRs, discharges to ground must discharge via a British Standard drainage field. Any other discharge to land will require an Environmental Permit. Drainage fields are situated in the biologically-active upper soil layers where there are high levels of natural attenuation. They add to the treatment provided by the septic tank or PTP. When designing new developments, consideration should be given to the space a drainage field will require. In areas with poor drainage, artificial mounds can be constructed to allow BS drainage fields to be installed. This option should always be considered before a borehole.

Boreholes

In areas with poor surface drainage, developers often propose discharge to deeper structures such as boreholes. **The EA does not endorse this.** Boreholes by-pass the biologically-active zone and reduce the unsaturated zone (distance from the surface to the top of the water table), which significantly reduces the natural attenuation of contaminants and therefore poses a far greater risk to the underlying aquifer. Discharges to boreholes will always require a permit, and applications are subject to a detailed risk assessment that also takes account of any existing local discharges and their cumulative impact.



Simple schematic showing the difference between drainage fields and boreholes. The reduced unsaturated zone decreases natural contaminant attenuation and poses a higher risk to the aquifer. In areas with chalk bedrock, the surface is often covered by low-permeability clay deposits, prompting consideration of boreholes for effluent disposal.

Additional Information & Considerations

Additional non-mains drainage guidance is available on the Planning Portal website at https://www.planningportal.co.uk/info/200204/local_authorities/154/advice_for_local_authorities_on_non-mains_drainage_from_non-major_development. Other things to consider include:

Effluent volume and infiltration calculations

There are standard effluent flow calculations for many types of property, which relate to occupant usage. In all cases where infiltration is being considered, infiltration tests (also known as percolation tests) will be required to determine the capacity of the soil and underlying ground to take in liquids. These assessments must also consider elements like deep foundations, wells or existing drainage systems that may allow effluent to bypass the upper soil layers and reduce natural attenuation.

Pre-application discussion and consultations

Before planning any construction work and associated drainage you need to find our whether or not you need planning permission or Building Regulations approval. For any scheme that requires formal consent you should allow time for early pre-application discussion and consultation with relevant parties. In identifying the appropriate foul drainage solution you need to consider the impact of these options on the building and any features.

Understanding the impact of proposals

When considering drainage options for new facilities it is advisable to undertake an assessment of the soils and hydrogeology at an early stage. This will ensure that the information it reveals can be taken into account when developing the specification. The assessment should consider whether fieldwork will be needed before permission is granted or works begin.

Foul disposal systems should be located away from sensitive areas. Such avoidance is made possible by understanding the site setting in full. It should not be assumed that you will find relevant information just by doing shallow soil tests.

Non-Mains Drainage - Checklist

When considering non-mains drainage for a development, the following steps should be followed as a minimum. Further information can be found on https://www.gov.uk/permits-you-need-for-septic-tanks, or pre-application advice can be sought from the EA and Local Authority.

- Check whether a mains sewer connection is available - if yes, infiltration systems are unlikely to be acceptable to the EA unless there are over-riding reasons why a connection cannot be made.
- Collate as much relevant background information as possible, including details of site hydrology, hydrogeology, geology, depth to groundwater, likelihood of nearby infiltration pathways, or sensitive receptors (e.g. Source Protection Zones, Safeguard Zones, Nitrate Vulnerable Zones, SSSIs etc.). Applications in sensitive areas are likely to be more restricted.
    - https://magic.defra.gov.uk/ should be used to check for site sensitivities
- Determine the flows and loads of the proposed development. Volumes to be discharged can be compared with the General Binding Rules requirements to determine whether a permit is needed.
- Undertake percolation tests for the area to be used for infiltration. This must be undertaken in accordance with Buildings Regulation guidance.
- Produce an infiltration assessment and a statement of options, and have a preliminary discussion with the EA and Local Planning Authority.
- If disposal to ground is acceptable, plan the internal and external layouts for rooms producing waste water, including where it will exit to the non-mains drainage option. Ensure space for tankers to empty systems is included in site plans.
- If an Environmental Permit is required, apply for permission. If granted, the drainage system should be installed and maintained as per specification and permit requirements.