

Groundwater Protection Responses for On-site Wastewater Systems for Single Houses - Summary

The potential suitability of a site for the development of an on-site system is assessed using the methodology outlined in *Wastewater Treatment Manual: Treatment Systems for Single Houses* (EPA, 2000). The groundwater protection responses set out below should be used during the desk study assessment of a site to give an early indication of the suitability of a site for an on-site system. Information from the on-site assessment should be used to confirm or modify the response.

Response Matrix for On-site Treatment Systems

VULNERABILITY RATING	SOURCE PROTECTION AREA *		RESOURCE PROTECTION Aquifer Category					
			Regionally Important		Locally Important		Poor Aquifers	
	Inner (SI)	Outer (SO)	Rk	Rf/Rg	Lm/Lg	Ll	Pl	Pu
Extreme (E)	R3 ²	R3 ¹	R2 ²	R2 ²	R2 ¹	R2 ¹	R2 ¹	R2 ¹
High (H)	R2 ⁴	R2 ³	R2 ¹	R1	R1	R1	R1	R1
Moderate (M)	R2 ⁴	R2 ³	R1	R1	R1	R1	R1	R1
Low (L)	R2 ⁴	R1	R1	R1	R1	R1	R1	R1

* For public, group scheme or industrial water supply sources where protection zones have not been delineated, the arbitrary distances given in DELG/EPA/GSI (1999) of 300 m for the Inner Protection Area (SI) and 1000 m for the Outer Protection Area (SO) should be used as a guide up-gradient of the source.

- R1** Acceptable subject to normal good practice (i.e. system selection, construction, operation and maintenance in accordance with EPA (2000)).
- R2¹** Acceptable subject to normal good practice. Where domestic water supplies are located nearby, particular attention should be given to the depth of subsoil over bedrock such that the minimum depths required (EPA, 2000) are met and that the likelihood of microbial pollution is minimised.
- R2²** Acceptable subject to normal good practice and the following additional condition:
1) There is a minimum thickness of 2 m unsaturated soil/subsoil beneath the invert of the percolation trench of a conventional septic tank system;
- OR**
- 1) A treatment system other than a conventional septic tank system as described in EPA (2000) is installed, with a minimum thickness of 0.6 m unsaturated soil/subsoil with P/T values¹ from 1 to 50 (in addition to the polishing filter which should be a minimum depth of 0.6 m), beneath the invert of the polishing filter (i.e. 1.2 m in total for a soil polishing filter).
- R2³** Acceptable subject to normal good practice, condition 1 above and the following additional condition:
2) The authority must be satisfied that, on the evidence of the groundwater quality of the source and the number of existing houses, the accumulation of significant nitrate and/or microbiological contamination is unlikely.
- R2⁴** Acceptable subject to normal good practice, conditions 1 and 2 above and the following additional condition:
3) No on-site treatment system should be located within 60 m of the public, group scheme or industrial water supply source.
- R3¹** Not generally acceptable, unless: A conventional septic tank system is installed with a minimum thickness of 2 m unsaturated soil/subsoil beneath the invert of the percolation trench (i.e. an increase of 0.8 m from the EPA manual);
- OR**
- A treatment system other than a conventional septic tank system, as described in EPA (2000), is installed with a minimum thickness of 0.6 m unsaturated soil/subsoil with P/T values from 1 to 50 (in addition to the polishing filter which should be a minimum depth of 0.6 m), beneath the invert of the polishing filter (i.e. 1.2 m in total for a soil polishing filter);

¹ The T value (expressed as min/25mm) is the time taken for the water level to drop a specified distance in a percolation test hole. For shallow subsoils the test hole requirements are different and hence the test results are called P values. For further advice see page 25 of the EPA Manual (2000).

AND

subject to the following conditions:

- 1)The authority must be satisfied that, on the evidence of the groundwater quality of the source and the number of existing houses, the accumulation of significant nitrate and/or microbiological contamination is unlikely.
- 2)No on-site treatment system should be located within 60 m of the public, group scheme or industrial water supply source.
- 3) A management and maintenance agreement is completed with the systems supplier.

R3² Not generally acceptable unless: A treatment system other than a conventional septic tank system, as described in EPA (2000), is installed with a minimum thickness of 1.2 m unsaturated soil/subsoil with P/T values from 1 to 50, (in addition to the polishing filter which should be a minimum depth of 0.6 m) beneath the invert of the polishing filter (i.e. 1.8 m in total for a soil polishing filter);

AND

subject to the following conditions:

- 1)The authority must be satisfied that, on the evidence of the groundwater quality of the source and the number of existing houses, the accumulation of significant nitrate and/or microbiological contamination is unlikely.
- 2)No on-site treatment system should be located within 60 m of the public, group scheme or industrial water supply source.
- 3) A management and maintenance agreement is completed with the systems supplier.

Additional Requirements for the Location of On-site Treatment Systems Adjacent to Receptors at Risk, such as Wells and Karst Features

Table 1 below provides recommended distances between receptors and percolation area or polishing filters, in order to protect groundwater. Use of the depths and distances in this table does not guarantee that pollution will not be caused; rather, it will reduce the risk of significant pollution occurring.

Table 1. Recommended Minimum Distance between a Receptor and a Percolation Area or Polishing Filter

T or P Value	Type of soil/subsoil *	Depth of soil/subsoil (m) above bedrock (see note 1,2,3,6)	Minimum distance (m) from receptor to percolation area or polishing filter ****				
			Public Water Supply	Karst feature	down-gradient domestic well or flow direction is unknown (see note 5)	Domestic well alongside (no gradient)	up-gradient domestic well
>30	CLAY; silty, sandy CLAY (e.g. clayey till); CLAY/SILT.	1.2 >3.0	60	15	40 30	25	15
10-30	Sandy SILT; clayey, silty SAND; clayey, silty GRAVEL (e.g. sandy till).	1.2 >8.0	60	15	45 30	25	15
<10	SAND; GRAVEL; silty SAND	2.0** 2.0*** >8.0****	60	15	60 40 30	25	15

* BS5930 descriptions

** water table 1.2-2.0m

*** water table >2.0m

**** The distance from the percolation area or polishing filter means the distance from the periphery of the percolation area or polishing filter and not the centre.

Notes:

1. Depths are measured from the invert level of the percolation trench.
2. Depths and distances can be related by interpolation: e.g. where the thickness of silty, sandy CLAY is 1.2 m, the minimum recommended distance from the well to percolation area is 40 m; where the thickness is 3.0 m, the distance is 30 m; distances for intermediate depths can be approximated by interpolation.
3. Where bedrock is shallow (<2 m below invert of the trench), greater distances may be necessary where there is evidence of the presence of preferential flow paths (e.g. cracks, roots) in the subsoil.
4. Where the minimum subsoil thicknesses are less than those given above, site improvements and systems other than conventional systems, as described in EPA (2000), may be used to reduce the likelihood of contamination.
5. If effluent and bacteria enter bedrock rapidly (within 1-2 days), the distances given may not be adequate where the percolation area is in the zone of contribution of a well. Further site specific evaluation is necessary.
6. Where bedrock is known to be karstified or highly fractured, greater depths of subsoil may be advisable to minimise the likelihood of contamination.