

# OR/15/002 Appendix 3: Tables for vulnerability classification

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Ó Dochartaigh B É, Doce D D, Rutter H K and MacDonald A M. 2015. User Guide: Groundwater Vulnerability (Scotland) GIS dataset, Version 2. Revised Report. *British Geological Survey Internal Report*, OR/15/002.

These tables are used, with the rules in Section 3, to define the assigned vulnerability class for each given combination of input parameters. They have been slightly modified from the tables used to derive Version 1 of the groundwater vulnerability dataset (Ball et al. 2004<sup>[1]</sup>), as follows:

- Vulnerability Class 4 has been subdivided throughout into two sub-classes, Class 4a and Class 4b. Class 4a includes areas where superficial deposits have low permeability; Class 4b includes areas where superficial deposits have moderate or high permeability. The tables have been amended to reflect this.
- Because of this change, one table (the original Table 2) has been removed as no longer needed.

The following abbreviations and legend are used in the tables:

VH = Very High permeability  
 H = High permeability  
 M = Moderate permeability  
 L = Low permeability  
 n/a = not applicable

Vulnerability class:



Table A1 Bedrock Flow Type = Fractured; no soil or superficial deposits mapped (Rule 3).

**Fractured bedrock, no soil or superficial deposits**

**Fractured bedrock, no soil or superficial deposits** 5

Table A2 Bedrock Flow Type = Fractured; soil present; no superficial deposits mapped (Rule 4).

**Superficial deposits thickness (m)**

<1

Soil permeability	H	5
	M	5
	L	4a

Table A3 Bedrock Flow Type = Fractured; superficial deposits are mapped, Clay Thickness <5m (Rule 2).

		Superficial deposits thickness (m)			
		1-3	3-10	10-30	> 30
Superficial deposits permeability at surface	VH or H	4a	4a	3	2
	M	4a	3	2	1
	L	4b	2	1	1

Table A4 Bedrock Flow Type = Fractured; superficial deposits are mapped; Clay Thickness => 5 m (Rule 2)

		Superficial deposits thickness (m)			
		<3	3-10	10-30	> 30
Superficial deposits permeability at surface	VH or H	n/a	1	1	1
	M	n/a	1	1	1
	L	n/a	1	1	1

Table A5 Superficial Deposits Permeability at surface = High or Very High; there is a water table in superficial deposits (Superficial Deposits Thickness > Depth to Water in Superficial Deposits) (Rule 1).

		Depth to Water in Superficial Deposits (m)			
		<3	3-10	10-30	> 30
Superficial deposits permeability at surface	VH or H	4a	4a	3	2

Table A6 Bedrock Flow Type = Significantly Intergranular (including mixed fracture/intergranular); no soil or superficial deposits (Rule 6)

		Depth to Water in Bedrock (m)			
		0-3	3-10	10-30	30+
Bedrock permeability	VH or H	5	5	4a	3
	M	5	4a	3	3
	L	5	4a	3	3

Table A7 Bedrock Flow Type = Significantly Intergranular (including mixed fracture/intergranular); no superficial deposits; high or moderate soils (HOST classes in Group B - see Rule 7).

		Depth to Water in Bedrock (m)			
		0-3	3-10	10-30	30+
Bedrock permeability	VH or H	5	5	4a	3
	M	5	4a	3	3
	L	5	4a	3	3

Table A8 Bedrock Flow Type = Significantly Intergranular (including mixed fracture/intergranular); no superficial deposits; low permeability soils (HOST classes in Group A - see Rule 7)

		Depth to Water in Bedrock (m)			
		0-3	3-10	10-30	30+
Bedrock permeability	VH or H	4a	4a	3	3
	M	4a	3	3	3
	L	4a	3	3	3

Table A9 Bedrock Flow Type = Significantly Intergranular (including mixed fracture/intergranular); Superficial Deposits Permeability at surface = Very High or High (Rule 5).

Depth to Water in Bedrock (m)	Bedrock permeability	High permeability superficial deposits thickness (m)				
		<3	3-10	10-30	>30	=>5m clay in sequence
<10 m	VH or H	4a	4a	3	2	1
	M	4a	3	3	2	1
	L	4a	3	2	2	1
10-30 m	VH or H	4a	3	3	2	1
	M	3	2	2	2	1
	L	3	2	2	1	1
>30 m	VH or H	3	3	2	2	1
	M	3	2	2	1	1
	L	3	2	1	1	1

Table A10 Bedrock Flow Type = Significantly Intergranular (including mixed fracture/intergranular); Superficial Deposits Permeability at surface = Moderate (Rule 5)

Depth to Water in Bedrock (m)	Bedrock permeability	Moderate permeability superficial deposits thickness (m)				
		<3	3-10	10-30	>30	=>5m clay in sequence
<10 m	VH or H	4a	3	2	2	1
	M	4a	3	2	2	1
	L	3	2	2	1	1
10-30 m	VH or H	4a	3	2	2	1
	M	3	2	2	2	1
	L	3	2	1	1	1
>30 m	VH or H	3	2	2	2	1
	M	3	2	2	1	1
	L	3	1	1	1	1

Table A11 Bedrock Flow Type = Significantly Intergranular (including mixed fracture/intergranular); Superficial Deposits Permeability at surface = Low (Rule 5)

Depth to Water in Bedrock (m)	Bedrock permeability	Low permeability superficial deposits thickness (m)				
		<3	3-10	10-30	>30	=>5m clay in sequence
<10 m	VH or H	4b	2	1	1	1
	M	4b	2	1	1	1
	L	3	2	1	1	1
10-30 m	VH or H	3	2	1	1	1
	M	3	2	1	1	1
	L	3	1	1	1	1

	VH or H	<b>3</b>	<b>2</b>	<b>1</b>	<b>1</b>	<b>1</b>
>30 m	M	<b>3</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>
	L	<b>3</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>

## Reference

1. [↑](#) Ball D, MacDonald A, Ó Dochartaigh B, del Rio M, FitzSimons V, Auton C and Lilly A. 2004. Development of a groundwater vulnerability screening methodology for the Water Framework Directive. SNIFFER Report Project WFD28 / BGS Commissioned Report CR/03/294C.

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