

UK Technical Advisory Group on the Water Framework Directive

Guidance on Typology for Rivers for Scotland, England and Wales

(Final Working Paper)

This Guidance Paper is a working draft defined by the UKTAG. It documents the principles to be adopted by agencies responsible for implementing the Water Framework Directive (WFD) in the UK. This method will evolve as it is tested, with this working draft amended accordingly.

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WFD Requirement:	Article 5; Annex 2, Typology Characterisation, Rivers	UKTAG Review:	25 March 2003 (Principles of methodology) 5 June 2003 (Results for GB)

1. Purpose of the Paper

- 1.1 This paper describes the development of a typology for England, Wales and Scotland.
- 1.2 It does not describe the rivers typology development for Northern Ireland, which is being undertaken by the North/South TAG for Ecoregion 17. The Northern Ireland representatives on Rivers Task Team are maintaining an overview of the two processes.

2. The Directive's Requirements

- 2.1 As part of the characterisation process for typing waters in each River Basin District, Article 5 and Annex II of the Water Framework Directive require Member States to undertake an analysis of its characteristics according to the technical specification outlined in Annex 2.
- 2.2 Member States must complete the process of characterisation by 22nd December 2004, and report the results to the Commission by 22 March 2005. The initial definition and testing of the typology method for rivers, lakes, and transitional and coastal waters is therefore urgent priority tasks in the implementation of the Directive.

3. Basis of the Rivers Typology approach and relationship to other guidance

- 3.1 This paper describes the approach to typology of natural rivers in Great Britain (Scotland, England and Wales) consistent with one of the typology systems described in the Water Framework Directive and further elucidated in the "Guidance on establishing reference conditions and ecological status class boundaries for inland surface waters" (CIS WG 2.3 REFCOND, 2003).
- 3.2 The major purpose of the typology, is to enable the reporting of characterisation and water body status to the Commission as required by the Directive.
- 3.3 It was not envisaged that the typology would be required to do more than broadly differentiate reference condition biological and supporting quality element values. This more precise

differentiation will be a necessary outcome from the development of the classification methods for each required quality element and is a later stage in implementation work.

3.4 This guidance is related to and should be read in association with, other guidance documents produced to support the typology of surface waters across the UK, specifically the following:

- (a) Task 2.a (ii) Guidance on Typology for Coastal & Transitional Waters of the UK and Republic of Ireland
- (b) Task 2.a (iii) *Guidance on Typology for Lakes for the UK*
- (c) *Task 10.a Intercalibration*

4. Content of this guidance paper

- Basis of the typology method (Section 5) in including construction of the typology
- Application of typology method, supported by tables and maps as relevant (Section 6).
- Future requirements for method development and testing (Section 7)

5. Basis of the typology

5.1 The characteristics of natural rivers used in deriving the basic GB typology use the typing factors and ranges (where given) of System A of the Directive and are listed as follows:

Altitude (mean catchment)	Catchment size (km ²)	Dominant geology
< 200m.	10 -100	Siliceous
200 –800m	100 – 1000	Calcareous
> 800m	1000 – 10,000	Organic

5.2 This typology generates a theoretical 27 river types though in practice many of these do not exist or are not significantly populated. The application of this typing system to the river network in England, Wales and Scotland has provided a typology map of GB that has identified 18 significant types.

The spatial distribution of draft typed catchments for Scotland is shown in Annex 2. Figure 1:

- Each polygon represents a stretch between river confluences at the 1:250,000 scale.
- These stretches have been typed with the attributes of mean catchment altitude; dominant geology and catchment size.
- The river network can now be overlaid to type stretches as they cross type boundaries.

5.3 This typology does not deal with artificial linear watercourses (canals).

5.4 **Construction of the typology maps:** The technical processes used in constructing the typology maps are summarised in the following paragraphs:

(a) Geology source data

Geology data at 1:250,000 scale was used by the EA and a system of determining dominant geology types has been devised (and validated by BGS). SEPA used 1:250000 for solid and drift from 1: 625,000; a system for classifying dominant geology was devised internally and compared with the EA method. The two methods were shown to be compatible.

(b) Automated method development

Automated systems for delivering a map of the GB rivers network with the applied typology was developed for England and Wales and also separately by SEPA for Scotland. Both methods, which run within an ArcView GIS, requires the following 5 inputs:

- OS panorama (DTM)

- Geology datasets 1:250,000 and 1:625,000
- CEH Flowgrid (ArcInfo outflow classes)
- Hydrometric areas (CEH)
- CEH River Network @ 1: 50,000

The two automated methods worked to the same rules and produced compatible and consistent outputs using ArcInfo/ArcView and associated systems.

6. Outcomes of the typology system applied to the GB river network

6.1 Annex 1: Table 1 holds a summary of the distribution of the current river network into lengths into types across Scotland, England and Wales. A combined typology for GB and separate tabs for the components from Scotland and from England and Wales have been provided. The following points should be noted:

- (a) Small coastal catchments (<10 km²) have not been typed (geology and altitude) and it is expected that this will be carried out by SEPA/EA on a case-by-case basis for significant small catchments.
- (b) Dominant types are not coincident in Scotland and in England and Wales. The dominant type in the SEPA network (38%) is medium altitude (200-800m), small size (10-100 km²), siliceous rivers; in the E&W network the dominant type (34%) is low altitude (<200m), small size (10-100km²), calcareous rivers.
- (c) In the combined GB typology there are 3 types not found in Scotland and 2 types not found in E&W.
- (d) Identified below is the number of types against the percentage of river network in the combined GB typology defined as above or below 1% of the river network (Note 1% is equal to 648km river length).

% of river network (river length km)	Number of types
< 1% (648 km)	7
≥ 1%	11

- (e) The greater than 1% category can be broken down into:

% of river network (river length km)	Number of types	Cumulative Number of Types >1% river network
>20% (>12963 km)	2	2
10% (6482 km) - 20% 12963 km)	2	4
5(3241 km) -10 % (6482 km)	2	6
1 (648 km) – 5 % (3241 km)	5	11

- (f) Consideration has been given to the amalgamation of poorly populated types but they were considered to be largely true types even though rare throughout the GB rivers network and it was decided to stay with a strictly System A typology.

6.2 Ecological checks on the typology: Broad ecological relevance has been demonstrated by cross-checking against higher-level RIVPACS macroinvertebrate groups and macrophyte NVC communities. However, the organic river types showed wide ranges of community types with little or no differentiation biologically using the data available for this checking.

Annex 1 Table 1. Summary of the distribution of the current river network into lengths into types across Scotland, England and Wales

GB Type	Scot km	E&W km	GB km	% river network	Mean catchment altitude (metres)	Total area (km2)	Dominant geology	
1	3034.4	3804.4	6838.8	10.6	< 200	10-100	S	
2	3726.0	13083.9	16809.9	25.9	< 200	10-100	C	
3	1201.2	157.1	1358.3	2.1	< 200	10-100	O	
4	238.3	830.5	1068.8	1.6	< 200	100-1000	S	
5	422.3	7242.1	7664.4	11.8	< 200	100-1000	C	
6	156.5	77.9	234.4	0.4	< 200	100-1000	O	
7		77.7	77.7	0.1	< 200	>=1000	S	<i>EA to check if true type</i>
8		2177.6	2177.6	3.4	< 200	>=1000	C	
9		226.2	226.2	0.3	< 200	>=1000	O	
10	10129.3	4065.5	14194.8	21.9	200-800	10-100	S	
11	1922.0	2276.7	4198.7	6.5	200-800	10-100	C	
12	1154.2	402.4	1556.6	2.4	200-800	10-100	O	
13	3255.7	1908.3	5164.0	8.0	200-800	100-1000	S	
14	386.5	1614.8	2001.3	3.1	200-800	100-1000	C	
15	90.2		90.2	0.1	200-800	100-1000	O	
16	539.9	8.7	548.6	0.8	200-800	>=1000	S	
17	15.3	515.2	530.5	0.8	200-800	>=1000	C	
18	74.7		74.7	0.1	>= 800	10-100	S	
	26346.5	38469.0	64815.5	100.0				