SUPPORTING INFORMATION

Part 1: FORMULATIONS OF THE INDICATORS EXTRACTED FROM SUBREACH FIELD SURVEYS AND REACH DESK STUDIES

Group A: Indicators used for identifying the indicative river type.

Indicators estimated from maps and aerial imagery

A1 Braiding index (*BI*) assesses whether the river reach typically shows a single flowing thread of water or more than one thread. The threads of water may be separated by mid-channel bars or split into distinct channels by vegetated islands. The *BI* is the average number of distinct flowing threads counted across 10 equally-spaced cross-sections of the river corridor (typically spaced by at least the width of the bankfull river channel) under baseflow conditions. Reaches may be single thread ($BI \leq 1.1$) or multithread *(BI>1.1)* and multithread reaches may be split into wandering *(BI<1.5)* or braided *(BI≥1.5)*. Note, however, that for application in England, the *BI* index is mainly used in coarse-bed rivers (where A8 is gravel or coarser) to discriminate single thread from multi-thread (wandering or braided) rivers. Wandering and braided rivers are not separated because both are extremely rare in England.

A2 Sinuosity index (*SI*) is assessed for river reaches that typically show a single thread ($BI \leq 1.1$). *SI* is the ratio of the river reach length along the centre line of the (main) river channel divided by the length of the broad river or valley course. For confined rivers the valley course length should be measured along the valley centre line. For partly confined and unconfined river sections join the points of inflection between major bends with straight lines to define the valley course unless the valley side is encountered, where the line must be deflected to remain in the valley bottom. Reaches may be straight ($SI \leq 1.05$), sinuous ($1.05 < SI < 1.5$), or meandering ($SI \geq 1.5$).

A3 Anabranching index (*AI*) assesses for multi-thread reaches, how many threads are typically separated by well-vegetated areas (islands) into distinct channels rather than flowing around bare or sparsely vegetated bars. The *AI* is the average number of distinct flowing channels separated by islands, counted across 10 equally-spaced cross-sections of the anabranching river system (typically spaced by at least the width of the anabranching belt) under baseflow conditions. Although rivers with occasional islands ($1.05 < AI < 1.5$) could be discriminated, for application in Britain, this index is only used in rivers where A8 is sand or finer to discriminate single thread from multi-thread, anabranching rivers. The latter are very rare and are discriminated where $AI \geq 1.5$.

A4 Level of confinement (U, PC, C) is estimated from the approximate proportion of the river reach's bank length that is in contact (close proximity) to valley side slopes or ancient terraces. This can be estimated visually from map contours or from a 3-D visualisation of the reach (e.g. on Google Earth).

> Confined reaches have more than 90% of the total river bank length in contact
>
> Unconfined (U) reaches have less than 10% of their total river bank length in contact
>
> Partly confined (PC) reaches have an intermediate level (between 10 and 90%) of bank-hillslope contact.

A5 Valley gradient is the difference in elevation between the start and end of the river reach divided by the length of the broad valley course. For single thread rivers the valley course length is estimated as described for index A2. For multithread reaches, the valley course length is estimated from the approximate centre line of the area enclosing the multiple river threads and any surrounding unvegetated bars.

Indicators estimated from subreach field observations

A6 Bedrock reaches are recorded (i.e. A6=1) where bedrock is observed as 'extensive' (>33% cover) in at least 3 surveyed modules or is 'extensive' in 2 modules and 'present' (5 to 33% cover) in the remaining 3 modules of the subreach.

A7 Coarsest bed material size class records the coarsest bed material size class (clay, silt, sand, gravel, cobble, boulder and bedrock) that is observed as present or extensive in any module in the subreach. If more than one subreach has been surveyed, use the coarsest value from any of the subreaches.

A8 Average alluvial bed material size class is a weighted average of the recorded alluvial bed material size classes (i.e. excludes bedrock) recorded as present or extensive in all 5 modules within the subreach (clay, silt, sand, gravel, cobble, boulder). The average size (in phi units) is calculated using the following equation:

=((10*CL)+(6.5*SI)+(1.5*SA)+(-3.5*GP)+(-7*CO)+(-9*BO))/(CL+SI+SA+GP+CO+BO)

Where CL, SI, SA, GP, CO, BO are the total cover of clay, silt, sand, gravel, cobble, boulder recorded as P (19 %) or E (67 %). The derived average (in phi units) is assigned to a size class as follows:

	Minimum size (phi)	Maximum size (phi)
Clay (CL)		≥ 9
Silt (SI)	< 9	≥ 4
Sand (SA)	< 4	≥- 1
Gravel (GP)	<- 1	≥- 6
Cobble (CO)	<- 6	≥ - 8
Boulder (BO)	< - 8	

Approach to developing Group B, C, D and E: River Condition Indicators

The methods used to derive a score for each river condition indicator were based on judgements of likely scenarios and were further informed and fine-tuned using a calibration data set of 40 subreaches that was collected for this purpose. The river condition scores synthesise subsets of MoRPh5 field survey observations to characterise:

1. Positive aspects of the river corridor: the diversity (richness) and abundance (extent) of habitats offered by vegetation structure, sediment, vegetation- and sediment-related physical features and hydraulic habitats observed at low flow.
2. Negative aspects of the river corridor representative of local human interventions or pressures.

The river condition indicators synthesise properties separately for the bank tops, bank faces, channel-water margins, and channel bed. The following procedure was adopted in devising the river condition indicator scores:

(i) Indicators were formulated to represent coherent aspects of the river bank tops, bank faces, channel-water margin and channel bed. Each indicator combines information from groups of related fields in subreach surveys to characterise particular aspects of the environment and, wherever possible, the formulations were tested using the calibration data set.

(ii) The numerical evaluation of each indicator combined observations of the presence, count, or A, T, P, E abundance of each included element, sometimes also incorporating weights to reflect their relative positive or negative importance. Where the A, T, P, E abundance scale had been used in the field survey this was translated into 0, 2, 19, 67 to approximate the mid-point

percentage of these abundance classes. The numerical evaluations generated positive values for indicators that characterised positive aspects of the subreach and negative values for negative aspects.

(iii) The resultant values calculated for each indicator across the 40 calibration subreaches were then described by summary statistics and frequency histograms.

(iv) Informed by this summary information, some indicators were revised to improve their discrimination and/or to simplify their computation. Stages (ii) and (iii) were then repeated.

(v) Finally, the values for each indicator were assigned scores of 0, 1, 2, 3 or 4 for positive indicators and 0, -1, -2, -3, -4 for negative indicators, based on a combination of judgements of likely scenarios and on any descriptive statistics and graphical outputs generated from the calibration data set. Because most of the indicator values displayed skewed frequency distributions, emphasis was placed on the median and quartile values derived from the calibration data when guiding threshold values to allocate the condition indicator scores of 0 to +/-4.

(vi) In a small number of cases indicators were not well represented within the calibration data. In these cases, class thresholds were entirely based on likely scenarios.

Group B: Bank Top Indicators

B1 Bank top riparian vegetation structure This indicator is a count of the presence (Present (P) or Extensive (E) only) of 5 vegetation structural types that are recorded on the bank tops (mosses / lichens, short / creeping herbs / grasses, tall herbs / grasses, scrub / shrubs, saplings / trees) of the 5 surveyed modules. The count is applied to each bank separately and then the values for the two banks are added together.

Condition indicator values and scores:

Indicator value	0	1 to 4	5 to 7	8	9 to 10
Indicator score	0	1	2	3	4

B2 Bank top tree feature richness This indicator is a count of the presence (P or E only) of 5 tree features that are recorded on bank tops (fallen trees, leaning trees, j-shaped trees, tree/shrub branches trailing into the river channel, large wood) of the 5 surveyed modules. The count is applied to each bank separately and then the values for the two banks are added together.

Condition indicator values and scores:

Indicator value	0	1	2 to 3	4 to 6	7 to 10
Indicator score	0	1	2	3	4

B3 Bank top water-related features This indicator applies the following look-up table to each bank and then adds the scores.

Water-related feature	**T**	**P**	**E**
Pond: disconnected	2	19	67
Pond: connected	2	19	67
Side channel	2	19	67
Wetland: Short non-woody vegetation (e.g. mosses, sedges)	2	19	67
Wetland: Tall, non-woody vegetation (e.g. reeds, rushes)	2	19	67

Wetland: Shrubs and trees (e.g. alder / willow carr)	2	19	67

Condition indicator values and scores:

Indicator value	0	<20	20 to <135	135 to <335	≥335
Indicator score	0	1	2	3	4

B4 Bank top NNIPS cover This indicator combines the number and extent of 6 non-native invasive plant species (NNIPS) on each bank by applying the following look-up table. The results for the two banks are added for each module and then summed over the 5 modules.

Species	**T**	**P**	**E**
Himalayan balsam	-2	-19	-67
Japanese knotweed	-2	-19	-67
Giant hogweed	-2	-19	-67
Floating pennywort	-2	-19	-67
Other species 1	-2	-19	-67
Other species 2	-2	-19	-67

Condition indicator values and scores:

Indicator value	0	<0 to -19	<19 to -67	<67 to -268	<-268
Indicator score	0	-1	-2	-3	-4

B5 Bank top managed ground cover This indicator assesses the potential severity (likely pressure on the river ecosystem) and extent of the dominant and sub-dominant artificial / managed ground cover types observed on each bank. The weightings for each cover type in the following table are multiplied by -2, -19, -67, respectively according to their abundance T, P, E on each bank top, then summed across both bank tops and accumulated across the 5 modules in the subreach.

	Artificial managed ground cover A	**Weighting**
Tr	Transport infrastructure (road, railway, car park)	5
Ic	Buildings (commercial / industrial)0	5
Re	Buildings (residential)	5
Ld	Landfill area	4
Sy	Storage area	3
Fp	Pedestrianised, footpath	2
Ar	Arable agriculture / allotments	2
Pv	Permanently vegetated agriculture (e.g. pasture, orchard)	1
Pr	Permanently vegetated recreation (e.g. playing fields, parks, gardens)	1
Pw	Plantation woodland	1
Ow	Open water (e.g. canal, reservoir)	0

Condition indicator values and scores:

Indicator value	0	< 0 to -95	<-95 to -670	<-670 to -1340	<-1340
Indicator score	0	-1	-2	-3	-4

Group C: Bank Face Indicators

C1 Bank face riparian vegetation structure This indicator is a count of the presence (P or E only) of 5 vegetation structural types that are recorded on the bank faces (mosses / lichens, short / creeping herbs / grasses, tall herbs / grasses, scrub / shrubs, saplings / trees) of the five surveyed modules. The count is applied to each bank separately and then the values for the two banks are added together.

Condition indicator values and scores:

Indicator value	0	1 to 4	5 to 7	8 to 9	10
Indicator score	0	1	2	3	4

C2 Bank face tree feature richness This indicator is a count of the presence (P or E only) of 7 tree features that are recorded on bank faces (fallen trees, leaning trees, j-shaped trees, tree/shrub branches trailing into channel, large wood, exposed tree roots, discrete organic accumulations) of the five surveyed modules. The count is applied to each bank of the MoRP5 subreach separately and then the values for the two banks are added together.

Condition indicator values and scores:

Indicator value	0	1 to 3	4 to 6	7 to 9	10 to 14
Indicator score	0	1	2	3	4

C3 Bank face natural bank profile extent A maximum of 2 natural bank profile types are recorded on each bank. The indicator is the sum of the abundance of natural profiles recorded as P (19) or E (67) across both banks for each module and then these values are accumulated over the 5 modules.

Condition indicator values and scores:

Indicator value	0	1 to ≤335	>335 to 670	>670 to ≤1340	≥1340
Indicator score	0	1	2	3	4

C4 Bank face natural bank profile richness The indicator is a count of 7 different natural bank profile types (V, Vo, Vu, Vt, St, Gt, Cm) that are recorded as P or E along either bank of any module within the MoRPh5 subreach. A single count is applied across both banks (i.e. maximum possible value is 7)

Condition indicator values and scores:

Indicator value	0	1	2	3	≥4
Indicator score	0	1	2	3	4

C5 Bank face natural bank material richness Count of 10 different natural bank material types (BE, BO, CO, GP, EA, SA, SI, CL, PE, OR) that are recorded as dominant in the upper or lower parts of any of the bank profiles within the subreach (i.e. each type can only be counted once).

Condition indicator values and scores:

Indicator value	0	1	2	3	≥4
Indicator score	0	1	2	3	4

C6 Bank face bare (unvegetated) sediment extent The indicator value is the total abundance of bare sediment on the bank face across both banks along the subreach (T, P and E are counted as 2, 19 and 67).

Condition indicator values and scores: (note non-linear scale because intermediate abundances of bare sediment provide the most varied habitat):

Indicator value	0	>0 to 70 or >600	>70 to 135 or >535 to 600	>135 to 205 or >465 to 535	>205 to 465
Indicator score	0	1	2	3	4

C7 Bank face artificial bank profile extent A maximum of 2 artificial profile types from a possible set of 5 (Rs, Ts, Em, Sm, Pc) are recorded on each bank. This indicator is based on the total extent of all artificial profiles recorded across both banks (where T = -2, P = -19 or E = -67) within a single MoRPh module and then the values are summed across the 5 modules in the subreach.

Condition indicator values and scores:

Indicator value	0	<0 to -57	<-57 to -134	<-134 to -335	<-335
Indicator score	0	-1	-2	-3	-4

C8 Bank face reinforcement extent The indicator represents the vertical (T(top only) = 0.5, B(bottom only) = 0.5, W(whole) = 1) and horizontal (T = -2, P = -19, E = -67) extents of reinforcement multiplied together for each bank and then added across both banks and all 5 modules in the subreach.

Condition indicator values and scores: (reaches m to t only):

Indicator value	0	<0 to -34	<-34 to -168	<-168 to -335	<-335
Indicator score	0	-1	-2	-3	-4

C9 Bank face reinforcement material severity The indicator represents the sum of the severity level of the dominant reinforcement type observed on each bank. The values for the two banks in each module are added together and then accumulated for the 5 modules in the subreach.

	Dominant reinforcement type	**Severity**
CC	Concrete	-3
CB	Concrete & brick / laid stone (cemented)	-3
BR	Brick / laid stone (cemented)	-3
SP	Sheet piling	-3
WP	Wood piling	-2
RR	Rip-rap (large laid stone, uncemented)	-2
GA	Gabions	-2
BW	Builders Waste (rubble)	-1
WO	Washed out	-1
WS	Willow spiling	0
RE	Planted reeds	0
BC	Biotex / coir	0

Condition indicator values and scores:

Indicator value	0	-1 to -3	-4 to -12	-12 to -18	<-18
Indicator score	0	-1	-2	-3	-4

C10 Bank face NNIPS cover This indicator combines the number and extent of up to 6 non-native invasive plant species (NNIPS) on each bank face by applying the following look-up table. The results for the two banks are added for each module and then summed over 5 modules.

Species	T	P	E
Himalayan balsam	-2	-19	-67
Japanese knotweed	-2	-19	-67
Giant hogweed	-2	-19	-67
Floating pennywort	-2	-19	-67
Other species 1	-2	-19	-67
Other species 2	-2	-19	-67

Condition indicator values and scores:

Indicator value	0	<0 to -19	<19 to -67	<67 to -268	<-268
Indicator score	0	-1	-2	-3	-4

Group D: Channel Margin – Water Edge Indicators

Indicator D1 - Channel margin aquatic vegetation extent

This indicator is the accumulated lateral extent of 4 aquatic morphotypes (liverworts/mosses/lichens; emergent broad-leaved; emergent linear-leaved; amphibious), scored T=2, P=19, E=67 for their lateral extent along each channel margin. Values are calculated for each bank of a module, summed for both banks and then the values for all 5 modules are added together.

Condition indicator values and scores:

Indicator value	0	>0 to 67	>67 to 335	>335 to 860	>860
Indicator score	0	1	2	3	4

D2 Channel margin aquatic morphotype richness This indicator is a count of up to 4 aquatic morphotypes (liverworts/mosses/lichens; emergent broad-leaved; emergent linear-leaved; amphibious) that are recorded as P or E in any module across both channel margins within a subreach.

Condition indicator values and scores:

Indicator value	0	1	2	3	4
Indicator score	0	1	2	3	4

D3 Channel margin physical feature extent This indicator records the total extent of 8 margin physical features recorded as P or E (unvegetated side bar, vegetated side bar, berm, bench, stable cliff, eroding cliff, toe, marginal backwater) and 1 that is recorded as a count (tributary junction). Abundances are scored 19, 67 for P or E and 67 is assigned for a count of at least 1. The values are summed across both banks and across all 5 modules within a subreach

Condition indicator values and scores:

Indicator value	0	>0-268	>268-536	>536 - 860	>860
Indicator score	0	1	2	3	4

D4 Channel margin physical feature richness This indicator counts the number of 9 different channel margin physical features that are recorded as P or E (unvegetated side bar, vegetated side bar, berm, bench, stable cliff, eroding cliff, toe, marginal backwater) or have a count of at least 1 (tributary junction). Each feature can only be counted once within a subreach (i.e. maximum count is 9).

Condition indicator values and scores:

Indicator value	0	1 to 2	3 to 4	5 to 6	7 to 9
Indicator score	0	1	2	3	4

D5 Channel margin artificial features The indicator scores pipes and outfalls according to their number and weights jetties and deflectors according to their size (and thus relative potential impact) as follows:

Feature	**Minor**	**Intermediate**	**Major**
Jetty	-2	-19	-67
Deflector (includes bridge pier at/on bank face)	-4	-34	-134
	Score for each		
Pipes / outfalls (if appear potentially functional): RECORD AS COUNT	-19		

Condition indicator values and scores:

Indicator value	0	<0 - -76	<-76 - -134	<-134 - -268	<-268
Indicator score	0	-1	-2	-3	-4

Group E: Channel Bed Indicators

E1 Channel aquatic morphotype richness The indicator is a count of all aquatic plant morphotypes recorded on the channel bed as T, P or E apart from filamentous algae (i.e. 9 possible types).

Condition indicator values and scores:

Indicator value	0	1	2-3	4-6	>6
Indicator score	0	1	2	3	4

E2 Channel bed tree feature richness The indicator is a count of 6 tree features on the channel bed that are recorded as P or E (vegetation shading channel, submerged tree roots, large wood, discrete accumulation of organic material) or have a count of $\geq$1 (large wood dam, fallen tree). Each feature can only be counted once (i.e. maximum score is 7).

Condition indicator values and scores:

Indicator value	0	1	2 to 3	4 to 5	6 to 7
Indicator score	0	1	2	3	4

E3 .Channel bed hydraulic feature richness The indicator is a count of 8 possible water surface flow types (free fall, chute, broken standing waves, unbroken standing waves, upwelling, rippled, smooth, no perceptible flow) observed as P or E. Each feature can only be counted once (i.e. maximum score is 8).

Condition indicator values and scores:

Indicator value	1	2	3 to 4	5 to 6	7 to 8
Indicator score	0	1	2	3	4

E4 Channel bed natural physical feature extent The indicator is based on 11 features, of which 7 (exposed bedrock, exposed unvegetated boulders, exposed vegetated boulders, unvegetated mid channel bars, vegetated mid-channel bars, islands, cascades) are recorded as T (=2), P (=19) or E (=67) and 4 (pools, riffles, steps, waterfalls) are recorded as a count (here assigned 19 for a count of 1 and 67 for a count of more than 1). The total for all features is summed over all 5 modules in the subreach.

Condition indicator values and scores:

Indicator value	0	>0 to 67	>67 to 201	>201 to 804	≥804
Indicator score	0	1	2	3	4

E5 Channel bed natural physical feature richness This indicator is a count of a possible 11 physical features (exposed bedrock, exposed unvegetated boulders, exposed vegetated boulders, unvegetated mid channel bars, vegetated mid-channel bars, islands, cascade, pools, riffles, steps, waterfalls) that are observed as P or E or have a count of at least 1. Each feature is only counted once giving a maximum value of 11 for the MoRPh5 subreach.

Condition indicator values and scores:

Indicator value	0	1 to 2	3 to 4	5 to 7	>7
Indicator score	0	1	2	3	4

E6 Channel bed material richness The indicator is a count of the 9 possible mineral and organic materials (peat, organic, clay, silt, sand, gravel-pebble, cobble, boulder, bedrock) that are observed as P or E on the channel bed. Each material type is only counted once giving a maximum value of 9 for the MoRPh5 subreach.

Condition indicator values and scores:

Indicator value	0	1	2	3 to 4	≥5
Indicator score	0	1	2	3	4

E7 Channel bed siltation The indicator is the sum of the weighted abundances of any patchy silt layer (T=-2, P=-19, E=-67) and continuous overlying silt layer (T=-4, P=-38, E=-134) across the bed of all 5 modules in the subreach.

Condition indicator values and scores:

Indicator value	0	<0 - -19	<-19 - -201	<-201 - -335	<-335

Indicator score	0	-1	-2	-3	-4

E8 Channel bed reinforcement extent The indicator is the extent of bed reinforcement (T=-2, P=-19, E=-67) summed across all 5 modules of the subreach.

Condition indicator values and scores:

Indicator value	0	<0 - -19	<-19 - -67	<-67 - -201	<-201
Indicator score	0	-1	-2	-3	-4

E9 Channel bed reinforcement materials severity The indicator is the severity of the dominant bed reinforcement type observed in a MoRPh module. Values for each module are summed for the MoRPh5 indicator:

	Dominant reinforcement type	**Severity**
CC	Concrete	-3
CB	Concrete & brick / laid stone (cemented)	-3
BR	Brick / laid stone (cemented)	-3
SP	Sheet piling	-3
WP	Wood piling	-2
RR	Rip-rap (large laid stone, uncemented)	-2
GA	Gabions	-2
BW	Builders Waste (rubble)	-1
WO	Washed out	-1

Condition indicator values and scores:

Indicator value	0	-1 to -2	-3	-4 to -12	<-12
Indicator score	0	-1	-2	-3	-4

E10 Channel bed artificial features severity The indicator incorporates 7 artificial bed features which are assigned scores (see following table) to reflect the relative severity of their impact. The values for each module are summed across the 5 modules of the subreach:

Artificial feature	**T**	**P**	**E**
Large trash (car parts, trolleys, traffic cones etc)	-16	-152	-536
	Narrow	**Int.**	**Wide**
Bridge shadow (see **(iii)**)	0	0	-67
	Count≥1		
Major weir	-536		
Intermediate weir	-152		
Minor weir	-16		
Bridge pier in river bed	-152		
Culvert	-1072		

Condition indicator values and scores:

Indicator value	0	<0 - -16	<-19 - -152	<-152 - -536	<-536
Indicator score	0	-1	-2	-3	-4

E11 Channel bed NNIPS cover This indicator combines the number and extent of up to 6 non-native invasive plant species (NNIPS) on the channel bed and any exposed in-channel features such as islands and bars by applying the following look-up table. Thus the indicator represents the total cover of NNIPS (6 possible species each assigned T=-2, P=-19 and E=-67). The results for the observed species are added for each module and then summed over 5 modules.

Species	T	P	E
Himalayan balsam	-2	-19	-67
Japanese knotweed	-2	-19	-67
Giant hogweed	-2	-19	-67
Floating pennywort	-2	-19	-67
Other species 1	-2	-19	-67
Other species 2	-2	-19	-67

Condition indicator values and scores:

Indicator value	0	<0 - -19	<-19 - -38	<-38 - -134	<-134
Indicator score	0	-1	-2	-3	-4

E12 Channel bed filamentous algae cover The indicator is the extent (T=-2, P=-19 and E=-67) of filamentous algae on the channel bed and summed across the 5 modules of the MoRPh5 subreach.

Condition indicator values and scores:

Indicator value	0	<0 - -19	<-19 - -67	<67 - -201	<-201
Indicator score	0	-1	-2	-3	-4

Part 2: Likely maximum condition indicator and average 'best condition' scores for canals & navigable rivers and for large rivers

Indicators	Canals and navigable rivers	COMMENTS	Large rivers	COMMENTS
B1 Bank top riparian vegetation structure	3	Similar to intermediate to low gradient rivers but slightly degraded along tow path	4	Similar to other intermediate to low gradient rivers
B2 Bank top tree feature richness	3	Similar to intermediate to low gradient rivers but slightly degraded along tow path	4	Similar to other intermediate to low gradient rivers
B3 Bank top water-related features	3	Similar to intermediate to low gradient rivers on at least one bank and some artificial water related features related to canal function	3	Similar to other intermediate to low gradient single-thread rivers
C1 Bank face riparian vegetation structure	2	Similar to intermediate to low gradient rivers on at least one bank but poor on tow path bank	4	Similar to other intermediate to low gradient rivers
C2 Bank face tree feature richness	3	Similar to intermediate to low gradient rivers on at least one bank	4	Similar to other intermediate to low gradient rivers
C3 Bank face natural bank profile extent	2	Mainly confined to one bank	4	All profiles should be natural
C4 Bank face natural bank profile richness	2	Low richness likely because of navigation function	4	High richness possible
C5 Bank face natural bank material richness	1	Negligible richness likely	2	Intermediate to low richness
C6 Bank face bare sediment extent	1	Potential for some exposure along at least one bank (away from tow path)	2	A small amount of bank erosion likely, giving an intermediate score
D1 Channel margin aquatic vegetation extent	2	Potential to be extensive along at least one bank	2	Potential to be quite extensive
D2 Channel margin aquatic morphotype richness	3	Potential for high diversity along at least one bank (away from tow path)	2	Potential for margins to be similar to other intermediate to low gradient rivers
D3 Channel margin physical feature extent	3	Similar to other intermediate to low gradient river types	3	Similar to other intermediate to low gradient river types
D4 Channel margin physical feature richness	3	Similar to other intermediate to low gradient river types	3	Similar to other intermediate to low gradient river types
E1 Channel aquatic morphotype richness	0	Probably cleared for/by navigation	0	Unlikely to be present / observable on large rivers
E2 Channel bed tree features richness	3	Similar maximum to intermediate to low gradient river types	3	Similar maximum to intermediate to low gradient river types
E3 Channel bed hydraulic features richness	1	Rarely exceeds 1 category (no perceptible flow)	2	Similar maximum to intermediate to low gradient river types
E4 Channel bed physical feature extent	0	Emergent features largely removed, submerged features not visible	1	Only emergent features visible and their extent likely to be fairly limited
E5 Channel bed physical feature richness	0	Emergent features largely removed, submerged features not visible	1	Only emergent features visible
E6 Channel bed material richness	0	Not visible	0	Not visible
Average	**1.8**		**2.5**	

Part 3: RIVER CONDITION INDICATOR SCORES FOR THE 40 CALIBRATION SUBREACHES

	River Condition Indicator Scores																													
	B1	**B2**	**B3**	**B4**	**B5**	**C1**	**C2**	**C3**	**C4**	**C5**	**C6**	**C7**	**C8**	**C9**	**C10**	**D1**	**D2**	**D3**	**D4**	**D5**	**E1**	**E2**	**E3**	**E4**	**E5**	**E6**	**E7**	**E8**	**E9**	**E10**	**E11**	**E12**
a1	4	2	0	0	-2	3	3	3	3	2	4	0	0	0	0	3	1	4	2	0	1	2	4	4	4	3	0	0	0	0	0	0
a2	4	2	0	0	-2	3	3	3	2	2	4	0	0	0	0	3	1	4	4	0	1	2	3	4	4	3	0	-1	-2	-3	0	0
b1	4	1	3	0	0	4	4	3	3	4	3	0	0	0	0	3	2	2	2	0	2	2	4	3	3	3	0	0	0	0	0	-1
b2	4	3	4	0	-2	4	4	3	4	4	3	0	0	0	0	3	3	3	3	0	3	3	4	3	3	4	-2	0	0	0	0	-1
c1	4	4	1	0	-3	4	4	3	4	3	3	0	-1	-1	0	3	3	3	3	0	1	2	3	4	3	4	-2	0	0	0	0	0
c2	4	3	0	0	-4	4	4	3	4	2	4	0	-2	-2	0	3	3	4	4	0	2	4	4	4	4	4	-2	0	0	0	0	0
d1	3	0	2	0	0	4	3	3	4	3	2	0	0	0	0	2	1	3	4	0	1	1	3	3	3	3	0	0	0	0	0	0
d2	3	0	0	0	0	3	3	3	4	4	2	0	0	0	0	2	1	3	2	0	1	2	3	4	3	4	0	0	0	0	0	0
e1	1	1	0	0	-2	2	1	3	4	1	2	0	0	0	0	2	1	3	4	0	1	2	3	2	2	3	0	0	0	0	0	0
e2	4	3	0	0	-2	3	2	3	3	3	3	0	-1	-1	0	1	2	3	4	0	2	3	3	3	2	4	0	0	0	0	0	0
f1	1	0	2	0	0	2	0	3	4	4	4	0	0	0	0	1	1	3	2	0	0	0	3	3	3	4	0	0	0	0	0	0
f2	2	0	2	0	0	2	0	3	4	4	3	0	0	0	0	2	1	3	4	0	0	0	2	3	2	4	0	0	0	0	0	0
g1	4	3	1	0	0	3	3	3	4	4	1	0	0	0	0	0	0	4	3	0	0	4	2	3	2	2	-3	0	0	0	0	0
g2	3	4	0	0	0	2	4	3	4	2	4	0	0	0	0	0	0	3	3	0	0	4	2	3	2	3	-3	0	0	0	0	0
h1	2	4	1	0	-2	2	3	3	4	2	3	-1	0	0	-1	2	2	4	4	0	2	3	2	3	3	3	-1	0	0	0	0	0
h2	1	0	0	0	-2	1	0	3	3	2	4	-2	0	0	-1	2	2	4	3	0	1	0	2	2	1	3	-2	0	0	0	0	0
i1	2	0	0	0	-2	2	2	3	4	1	2	0	0	0	0	3	2	4	3	0	3	1	2	2	1	3	-3	0	0	0	0	-1
i2	1	0	0	0	-2	3	3	3	4	1	4	0	0	0	0	3	2	4	4	0	3	2	2	3	2	3	-3	0	0	0	0	0
j1	1	0	0	0	-3	2	2	3	4	1	2	0	-1	-2	0	2	3	2	3	0	4	3	2	1	1	3	-2	-1	-2	0	0	-2
j2	1	0	0	0	-3	2	3	3	3	1	1	0	0	0	0	3	1	3	3	0	4	3	2	2	1	2	0	0	0	0	0	-1
k1	3	2	0	-3	-2	3	2	3	3	2	1	0	0	0	-3	3	2	3	3	0	2	2	2	2	1	1	0	0	0	0	0	0
k2	2	0	0	-3	-2	2	2	3	4	2	3	0	0	0	-3	3	2	4	4	0	2	2	2	1	1	1	0	0	0	0	0	0
l1	2	0	0	0	0	2	0	3	3	1	0	0	-1	-1	-2	3	3	3	3	-1	3	1	2	1	1	2	-2	0	0	0	0	0
l2	2	1	0	-2	0	2	2	3	3	1	1	0	0	0	-2	3	3	2	3	0	3	2	2	2	1	2	-2	0	0	0	0	0
m1	3	1	0	-2	-2	3	4	3	4	4	3	0	-2	-1	-3	1	0	3	4	0	1	2	2	2	1	3	-2	0	0	-3	0	-3
m2	3	2	0	-3	-2	3	3	3	3	3	4	0	-1	-1	-2	1	2	2	3	0	0	3	2	2	1	3	-2	0	0	-4	0	0

	River Condition Indicator Scores																														
	B1	**B2**	**B3**	**B4**	**B5**	**C1**	**C2**	**C3**	**C4**	**C5**	**C6**	**C7**	**C8**	**C9**	**C10**	**D1**	**D2**	**D3**	**D4**	**D5**	**E1**	**E2**	**E3**	**E4**	**E5**	**E6**	**E7**	**E8**	**E9**	**E10**	**E11**	**E12**
n1	3	1	0	0	-4	2	3	2	2	3	1	-3	-2	-2	0	0	0	3	3	-1	1	3	2	2	2	3	0	0	0	0	0	0
n2	3	1	0	0	-2	3	2	2	2	1	1	-2	-1	-1	0	2	2	1	2	0	2	2	2	1	1	2	0	0	0	0	0	0
o1	2	1	0	0	-2	1	1	2	2	1	1	0	-3	-2	-3	0	0	2	1	0	2	2	2	0	0	3	0	0	0	0	0	-1
o2	2	2	0	0	-2	2	2	3	2	1	2	0	-4	-2	-3	1	0	2	1	-1	2	1	2	0	0	3	0	0	0	0	0	0
p1	2	0	0	0	-4	2	0	2	2	1	0	0	-4	-3	0	2	2	2	1	0	1	0	0	2	1	2	0	0	0	-1	0	0
p2	2	1	0	0	-4	3	1	3	2	1	1	0	-3	-3	0	3	3	2	1	0	3	0	1	3	1	2	0	0	0	0	0	0
q1	2	0	0	0	-3	3	1	2	4	3	2	-3	-3	-2	0	3	2	3	4	-1	0	1	2	2	1	4	-3	0	0	-1	0	0
q2	1	0	0	0	-3	2	1	2	2	3	4	-4	-3	-2	0	2	1	2	2	-1	1	2	1	1	1	3	-4	-3	-3	-2	0	0
r1	3	4	0	0	-1	3	4	2	2	1	3	-4	-3	-4	0	2	3	1	1	0	0	2	2	2	2	3	-4	0	0	-2	0	0
r2	4	4	0	0	-2	3	3	1	2	1	2	-4	-4	-3	0	2	2	2	2	0	1	2	2	3	2	4	-3	-2	-3	-3	0	0
s1	3	2	0	0	-2	3	4	2	1	1	1	-4	-4	-4	-1	2	2	1	1	0	1	3	1	1	0	3	-4	-2	-3	-4	0	-4
s2	3	2	0	-1	-2	3	4	3	3	1	2	-4	-3	-4	-1	3	2	1	1	0	1	2	1	1	1	4	-3	-3	-3	-4	0	-3
t1	3	3	0	0	-2	1	0	0	0	0	1	-4	-4	-4	0	1	1	1	1	-1	0	2	2	1	0	4	-1	-4	-4	-4	0	0
t2	3	3	0	-1	-3	2	1	0	0	0	0	-4	-4	-4	0	2	1	0	0	0	0	2	3	1	0	3	-2	-4	-4	-3	0	0

Part 4: RANGES AND THRESHOLD VALUES OF THE PRELIMINARY CONDITION SCORE USED TO ASSIGN THE FINAL CONDITION SCORE FOR RIVERS OF DIFFERENT TYPE

River type	Canals /Navigable Rivers	Large	A	B	C	D	E	F	G	H	I	J	K	L	M
Likely Maximum score	1.8	2.5	2.4	2.7	2.7	2.7	2.7	2.8	3.0	2.9	3.1	2.8	2.4	2.4	2.4
Good	>1.4	>2.0	>1.9	>2.2	>2.2	>2.2	>2.2	>2.3	>2.5	>2.4	>2.5	>2.3	>1.9	>1.9	>1.9
Fairly Good	1.4 to >0.7	2.0 to >1.3	1.9 to >1.2	2.2 to >1.4	2.2 to >1.4	2.2 to >1.4	2.2 to >1.4	2.3 to >1.5	2.5 to >1.6	2.4 to >1.6	2.5 to >1.7	2.3 to >1.5	1.9 to >1.2	1.9 to >1.2	1.9 to >1.2
Moderate	0.7 to >-0.1	1.3 to >0.3	1.2 to >0.2	1.4 to >0.2	1.4 to >0.2	1.4 to >0.2	1.4 to >0.2	1.5 to >0.4	1.6 to >0.5	1.6 to >0.5	1.7 to >0.6	1.5 to >0.4	1.2 to >0.2	1.2 to >0.2	1.2 to >0.2
Fairly Poor	-0.1 to >-1.2	0.3 to >-1.0	0.2 to >-1.0	0.2 to >-0.9	0.2 to >-0.9	0.2 to >-0.9	0.2 to >-0.9	0.4 to >-0.9	0.5 to >-0.9	0.5 to >-0.9	0.6 to >-0.8	0.4 to >-0.9	0.2 to >-1.0	0.2 to >-1.0	0.2 to >-1.0
Poor	≤-1.2	≤-1.0	≤-1.0	≤-0.9	≤-0.9	≤-0.9	≤-0.9	≤-0.9	≤-0.9	≤-0.9	≤-0.8	≤-0.9	≤-1.0	≤-1.0	≤-1.0