APPENDIX E3
FLUVIAL GEOMORPHOLOGY

Table *i*: Reach Function Definitions

Reach Function	Description
Sediment Source	Sediment output from the reach is greater than sediment supply from upstream.
Sediment Transfer	Sediment output is approximately equal to input from upstream. Sediment is transmitted through the reach, which features few sites of active erosion, or deposition either because the channel is adjusted and naturally stable or because the bed and banks have been stabilized artificially.
Sediment Exchange	Sediment output is approximately equal to input from upstream (as for a transfer reach), but incoming sediment is exchanged with that derived within the reach, which features active erosion and depositional sites.
Sediment Sink	Sediment input to the reach is greater than sediment output to the next reach downstream.
Winterbourne	Flow expected only at high flow, therefore the balance of sediment inputs and outputs is seasonally dependent.
	(adapted from Thorne and Skinner, 2002)

Table *ii*: Conservation Status

Susceptibility to disturbance	Score	Description
High	**8-10**	Conforms most closely to natural, unaltered state and will often exhibit signs of free meandering and possess well-developed bedforms (point bars and pool-riffles sequences) and abundant bank side vegetation.
Moderate	**5-7**	Shows signs of previous alteration but still retains many natural features, or may be recovering towards conditions indicative of higher category.
Low	**2-4**	Substantially modified by previous engineering works and likely to possess an artificial cross-section (e.g. trapezoidal) and will probably be deficient in bedforms and bank side vegetation.
Channelized	**1**	Awarded to reaches whose bed and banks have hard protection (e.g. concrete walls or sheet piling).
Culverted	**0**	Totally enclosed by hard protection.
Navigable	**-**	Classified separately due to their high degree of flow regulation and bank protection, and their probable strategic need for maintenance dredging.
		(Department for Environment, Food and Rural Affairs, 2003)

Table *iii*: Field Indicators of Instability and Stability – Reach Process

Category	Indicator	Category	Indicator
Incising	Perched boulder berms Terraces Old channels Old slope failures Undermined structures Exposed tree roots (both banks) Narrow/deep channel Bank failures (both banks) Exposed bridge footing(s) Exposed sanitary or storm sewer, pipeline, etc. Elevated storm sewer outfall(s) Undermined gabion baskets/ concrete aprons, etc. Scour pools downstream of culverts or storm sewer outlets Cut face on bar forms Head cutting due to knick point migration Terrace cut through older bar material Suspended armour layer visible in bank Channel worn into undisturbed overburden or bedrock	**Aggrading**	Buried structures Buried soils Large uncompacted point bars Eroding banks at shallows Contracting bridge space Deep fine sediment over coarse gravels in bank Many unvegetated point bars Large silt/clay banks Lobate Bar Coarse materials in riffles embedded Siltation in pools Medial bars Accretion on point bars Poor longitudinal sorting of bed materials Deposition in the overbank zone
Widening	Bank failures (both banks) Evolvement of a new planform at a lower elevation Fallen or leaning trees, fence posts, etc. Occurrence of large organic debris Exposed tree roots Basal scour on inside meander bends Gabion baskets or concrete walls, etc. out flanked Length of basal scour >50% through subject reach Exposed length of previously buried pipe, cable, etc. Fracture lines along top of bank Exposed building foundation	**Laterally Adjusting**	Significant number of bank erosion areas Formation of chute(s) Single thread channel to multiple channel Evolution of pool-riffle form to low bed relief form Cut-off channel(s) Formation of island(s) Thalweg alignment out of phase meander form Bar forms poorly formed, reworked or removed
Stable	Vegetated bars and banks Compacted weed covered bed Bank erosion rare Old structures in position	**Narrowing**	Sedimentation on both channel margins

(Adapted from Sear and Newson, 1994)

Table *iv*: Rapid Geomorphic Assessment

Stability Index (SI)	Condition
< 0.20	In Regime
0.21-0.40	Transitional
> 0.41	Adjusting