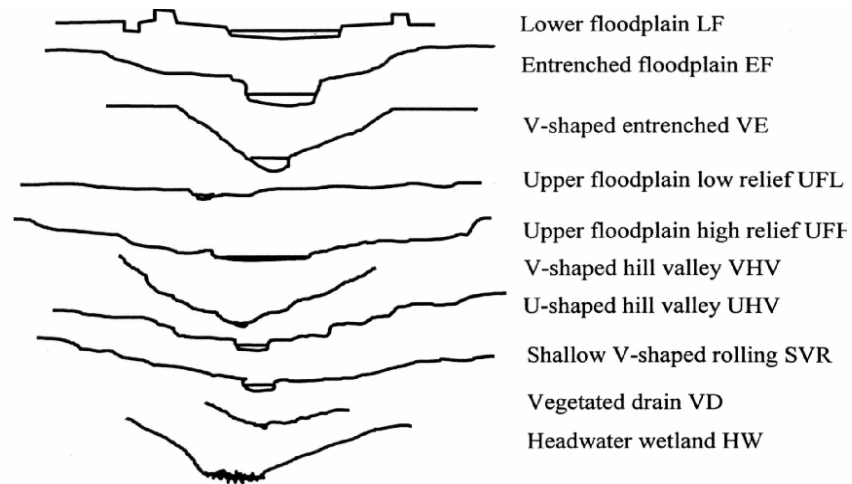


## Appendix 1

### In-stream Habitat Characteristics

#### Streambank Shape

Assess the contour of the stream valley at selected sites along the stream based on examples presented in Quinn (1999).



**Fig. 1: Examples of stream valley shapes.**

#### Sediment Substrate

List the dominant substrate size class within the stream section based on size classes presented below. Include any artificially introduced substrates such as boulders, gabion baskets, concrete blocks etc. Do not include lined concrete channels in the substrate assessment.

**Table 1: Sediment size classes.**

Substrate Class	Code	Size Range (diameter)
Bed rock	<b>Br</b>	-
Boulders	<b>B</b>	> 26 cm
Large Cobble	<b>L</b>	13 – 26 cm
Small Cobble	<b>C</b>	6 – 12 cm
Gravel	<b>G</b>	0.2 – 6 cm
Sand	<b>S</b>	< 0.2 cm
Silt/mud	<b>M</b>	Fines
Concrete	<b>Co</b>	-

#### Wetted channel width

Estimate stream channel width (m) at the widest and narrowest points across the stream at each site. Wetted channel width measurements should be recorded as a mean of the two measures collected in centimetres.

**Stream depth**

Measure or estimate stream depth (m) within the stream section to record maximum and minimum depths.

**Channel Modification**

Identify whether any channel modifications have occurred within the surveyed reach. Channel modifications include straightening or channelling (**ST**), reinforcing of the banks (**RE**) or lining of the streambed (**LI**) with artificial (**A**) or natural (**N**). Piped sections of stream are noted (**P**).

**Bank Erosion**

List the percentage (%) of erosion scars or bank slumping along the stream section by identifying the area of exposed earth on the stream bank that has resulted from bank slumping or loss.

**Inorganic Litter**

Streams are common sinks of human debris in urban environments, which is often most pronounced within stream reaches that have roads, footpaths or bridges crossing a reach. Identify the presence of any non-biodegradable rubbish accumulation within the stream channel and/or along the stream banks.

**Culverts**

For each culvert present, note its construction type as concrete (**C**), Corrugated iron (**I**), gabion baskets (**G**) or other (**name**). Describe the shape and whether the culvert comprises a single or multiple pipe structure. Identify whether the culvert structures present in the stream are restricting flows through the build-up of organic debris, or other sources of potential flow restrictions. Identify whether the culvert structure is perched above the stream at the downstream outlet.

**Fish Passage**

Identify the type of barrier (i.e., waterfall, dam, weir, culvert or other) in the study reach that would prevent the passage of fish to upstream habitat. If fish barriers are present in the survey reach, or anywhere that they occur in a stream, identify whether they will restrict fish passage for efficient swimmers (**S**), climbers (**C**) or all (**All**) modes of movement.

**Piped sections**

It is important to identify any piped sections of stream by first undertaking a GIS based desktop approach before entering the field if possible. A

comprehensive map locating all piped stream sections can then be taken into the field and “added to” if additional piped sections are located during field assessments.

For each piped section identified in the field, information gathered should include the presence and abundance of suitable upstream habitat, and how isolated the non-piped sections are within each stream catchment.

## **Riparian and Macrophyte Characteristics**

### **Riparian Vegetation Composition**

Estimate the proportion of area above the stream section that is shaded by riparian vegetation (%). Estimate the distance in metres that the riparian zone extends laterally away and longitudinally along the stream banks, before a major landuse change.

### **Overhead cover**

Using average overhead cover, estimate the proportion of area above the stream section that is shaded by riparian vegetation. Express this value as a percentage (%) of the stream section.

### **Macrophytes**

Observations of aquatic vegetation are made on-site, from the stream bank or Instream. Plant material is only collected where later confirmation of identification is required. Dominant aquatic vegetation is listed.