

11 August 2022
By E-mail

Palmerston North City Council
32 The Square
Palmerston North Central (4410)
New Zealand



Forbes Ecology

Dr. Adam Forbes
adam@forbesecology.co.nz

Attn: Keegan Aplin-Thane

Dear Keegan,

Re: Characterisation of Waterways Present within the Kakatangiata Master Plan Area

Introduction and Methods

The Palmerston North City Council have engaged Forbes Ecology Limited to undertake a high-level characterisation of waterways present within the Kakatangiata Master Plan Area.

The waterway characterisation was undertaken using best practice methods for waterway hydroclass and habitat characterisation. Survey locations were determined from a map of waterway alignments provided by GHD stormwater engineers. A site visit to representative reaches accessible from public vantage points was undertaken on the 27 June 2022 by Dr Adam Forbes. Rainfall depths in the previous 7, 14, 21, 30, and 60 days prior to the site visit were 1, 56.5, 118, 163.5, and 274.5 mm, respectively.

Waterway hydroclass was estimated in the field based on the following definitions:

Permanent river or stream

The continually flowing reaches of any river or stream.

Intermittent stream

Stream reaches that cease to flow for periods of the year because the bed is periodically above the water table. This category is defined by those stream reaches that do not meet the definition of permanent river or stream and meet at least three of the following criteria:

- a) It has natural pools*
- b) It has a well-defined channel, such that the bed and banks can be distinguished*
- c) It contains surface water more than 48 hours after a rain event which results in stream flows*

- d) *Rooted terrestrial vegetation is not established across the entire cross-sectional width of the channel*
- e) *Organic debris resulting from flood can be seen on the floodplain, or*
- f) *There is evidence of substrate sorting process, including scour and deposition.*

Ephemeral Stream

Stream reaches with a bed above the water table at all times, with water only flowing during and shortly after rain events. This category is defined as those stream reaches that do not meet the definition of permanent river or stream or intermittent stream.

Waterway habitats were characterised using Protocol 1 (P1) Site Characterisation of Harding et al. (2009)¹. P1 Site Characterisation covers attributes relating to the channel and bank, instream, riparian and catchment. In total 7 sites (survey points; SP 1-7) were assessed using P1. In addition, to extend the scope of the characterisation in a cost-effective manner, a further 6 waterway locations were photographed (Photopoints; PP1-6) and broadly compared against the range of the P1 results.

The locations of SP 1-7 and PP 1-6 are shown in Figure 1.



Figure 1. Locations of SP 1-7 and PP 1-6 in the Kakatangiata Master Plan Area.

¹ For the full protocol see pages 55-58 of the manual accessible at this link:
<https://www.envirolink.govt.nz/assets/Envirolink/Stream20Habitat20Assessment20Protocols.pdf>

Results and Discussion

Each of the seven waterways surveyed (i.e., SP 1-7) are of either permanent or intermittent hydroclass (Table 1). The difference between permanent and intermittent status can be further assessed in the future by revisiting during dry summer conditions.

Table 1. Hydroclass results

Site	Hydroclass
SP1	Permanent or intermittent
SP2	Permanent or intermittent
SP3	Permanent or intermittent
SP4	Permanent
SP5	Permanent or intermittent
SP6	Permanent
SP7	Permanent or intermittent
PP1	Permanent or intermittent
PP2	Ephemeral
PP3	Permanent or intermittent
PP4	Ephemeral
PP5	Permanent
PP6	Permanent

Waterways at SP 1, 2, 3, 5, and 7 are of a similar wetted width (0.4-0.6 m) and are each artificially channelised (Table 2). Flow types are variously runs and riffles. Pools are absent. These waterways are set within banks 1-2 m high of moderate stability. The banks are vegetated except for SP 3 where bank cover is sparse.

Waterways at SP 4 and 6 are strongly and weakly sinuous, respectively. Bank heights are lower than other survey points, around 0.25-5 m high. These factors indicate a more natural flow path. Both these waterways have larger contributing catchments and therefore both SP4 and 6 have a greater flow magnitude, with wetted widths of 2-3 m and 6 m, respectively. Pool habitats were present in both waterways.

At all seven survey points waterways were soft bottomed and unstable except for SP3 where cobbles were also present. Waterways generally had poor shading being either open or only partially shaded. Except for where roading or residential development was immediately adjacent, riparian zones were generally greater than 10 m wide on each bank featuring cover types ranging from short grazed grass, residential garden, or amenity area. Dominant catchment land uses were a combination of residential or animal grazing.

Compared with the survey results from SP 1-7, the six photopoint assessment sites show a similar nature and range in waterway character. The exceptions being PP2 and 4 which were both of ephemeral hydroclass.

Table 2. Results from P1 habitat characterisation at 7 sites within the Kakatangiata Masterplan Area

	Parameter	SP1	SP2	SP3	SP4	SP5	SP6	SP7
Channel and Bank	Wetted channel width (m)	0.4	0.5	0.6	2-3	0.5	6	0.6
	Channel shape	AC	AC	AC	SS	AC	WS	AC
	Flow conditions	Base flow	Base flow	Base flow	Base flow	Base flow	Base flow	Base flow
	Flow types present	Run	Run, riffle	Run, riffle	Run, pool	Run, riffle	Pool	Run
	Lower bank height (m)	1.25	1.5	1 TL & TR	0.25 TL & TR	2 TL & TR	0.5 TL & TR	2 TL & TR
	Bank stability	MS	MS	MS	MS	MS	MS	MS
	Bank cover	Soil, grass	Soil, grass, trees	Sparse	Sparse	Grass	Trees	Grass
In-stream	Bed substrates	Silt, sand, mud	Silt, sand, mud	Cobbles, silt, mud	Silt, mud	Silt, mud	Silt, mud	Silt, mud
	Bed stability	Unstable	Unstable	Unstable	Unstable	Unstable	Unstable	Unstable
	Macrophytes	Absent	Absent	Sparse	Common	Absent	Absent	Absent
	Periphyton	Absent	Sparse	Sparse	Sparse	Absent	Absent	Absent
	Wood	Absent	Absent	Sparse	Absent	Absent	Sparse	Absent
	Moss	Absent	Absent	Absent	Absent	Absent	Absent	Absent
	Leaves	Common	Common	Common	Common	Sparse	Sparse	Sparse
Shading	Open	Partial	Partial	Open	Partial	Partial	Open	
Riparian and catchment	Riparian width (m)	TR >10, TL 2	>10 TR & TL	>10 TL & TR	>10 TL & TR	>10 TL & TR	>10 TL & TR	TL 3, TR 5
	Stock damage	Absent	Minor	Absent	Minor	Absent	Absent	Absent
	Riparian cover	Soil, grass, road	Grass, shelterbelt.	Trees, grass	Grass, wetland spp.	Grass	Trees, grass	Grass
	Adjacent land use	Road, short grazed	Residential	Residential, short grazed	Short grazed	Grazing, residential	Garden	Amenity, road
Catchment land use	Residential, grazing	Grazing, residential	Residential, grazing	Grazing	Grazing, residential	Residential	Grazing, residential	

Notes: Regarding channel shape - AC = Artificially Channelised, MS = Mostly Stable, SS = Strongly Sinuous, Weakly Sinuous

Closing

Please contact me if you have any questions or wish to discuss this advice.

Yours Sincerely

A handwritten signature in blue ink, appearing to read 'Adam Forbes', with a stylized, cursive script.

Dr Adam Forbes

Principal Ecologist
Forbes Ecology Limited

Appendix

Photographs of Survey Points and Photo Points along the waterways assessed

SP1



SP2



SP3



SP4



SP5



SP6



SP7



PP1



PP2



PP3



PP4



PP5



PP6

