



# A multi-functional, multi-compartment constructed wetland to support urban waterway restoration

## Focus

The study illustrated the performance of a multi-compartment constructed wetland in Perth, WA: *Wharf Street Constructed Wetland* (WSCW).

The wetland aimed to restore a degraded urban drainage system to improve urban liveability by preventing stormwater nutrients enter the Canning River whilst also providing public space and improving local amenity.

## Approach

WSCW is managed by the City of Canning (WA), and covers a surface area of ~1ha. It is comprised of two *Surface Flow* (SF 1 and SF 2) and two laterite-based *Subsurface Flow* (SSF1 and SSF 2) compartments (Figure 1). Performance was assessed by computing nutrient attenuation as standardized delta concentration (SDC) for base flow (Figure 2) and event flow (Figure 3 & 4) conditions. The long-term average attenuation was then computed.

## Findings

## Site: Wharf Street Constructed Wetland



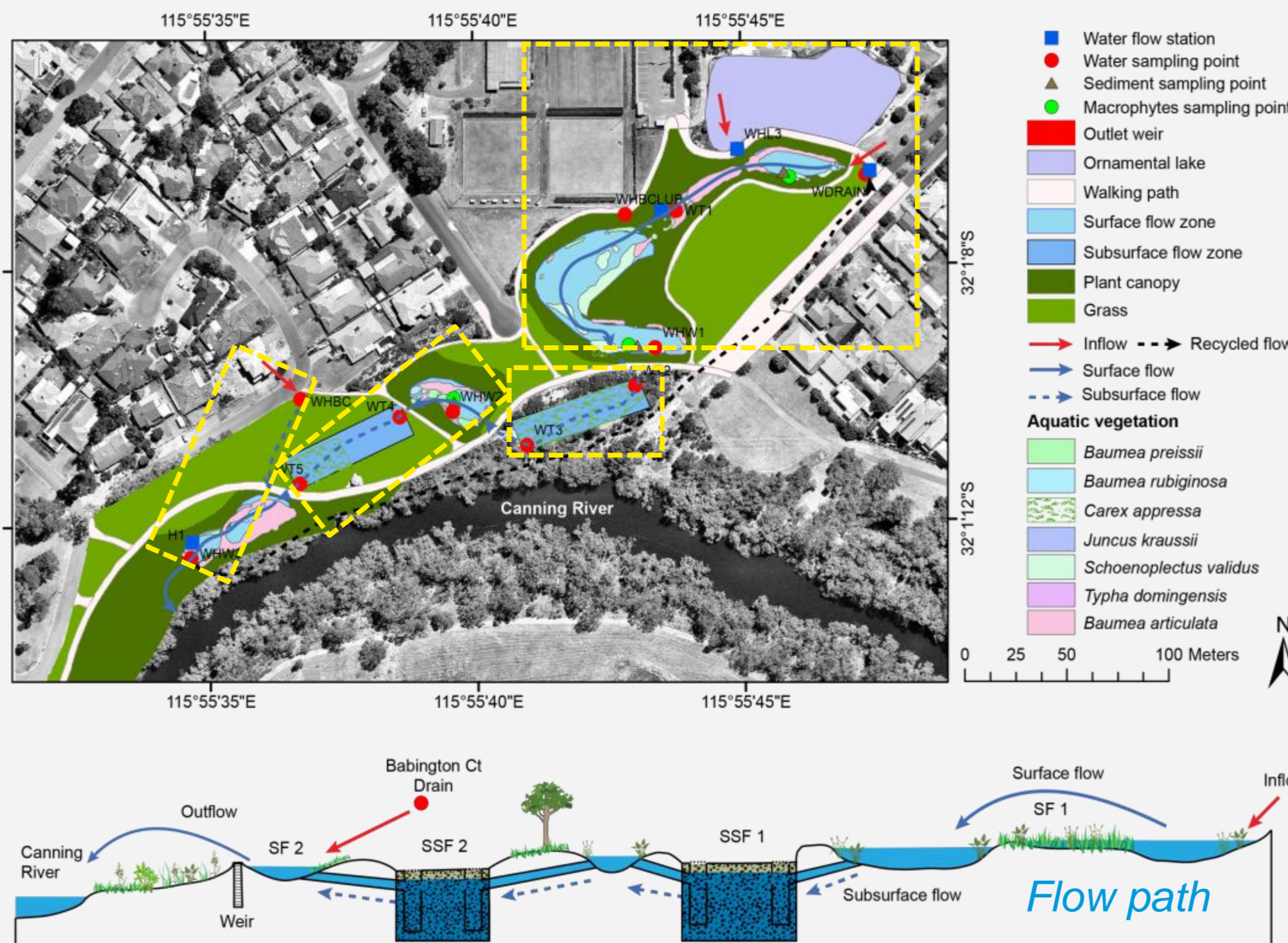
Laterite-based subsurface flow compartment



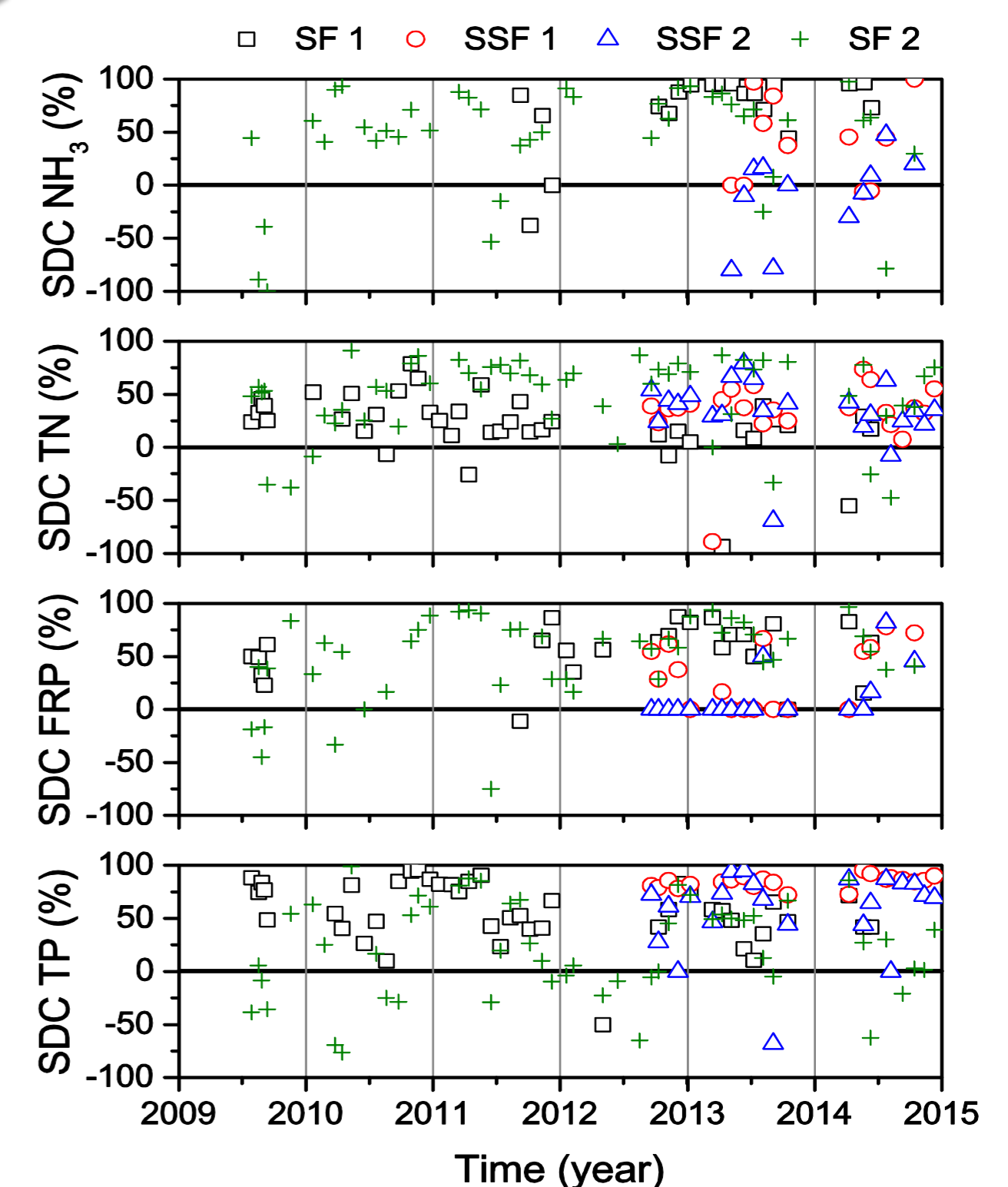
Wetland discharge to the Canning River



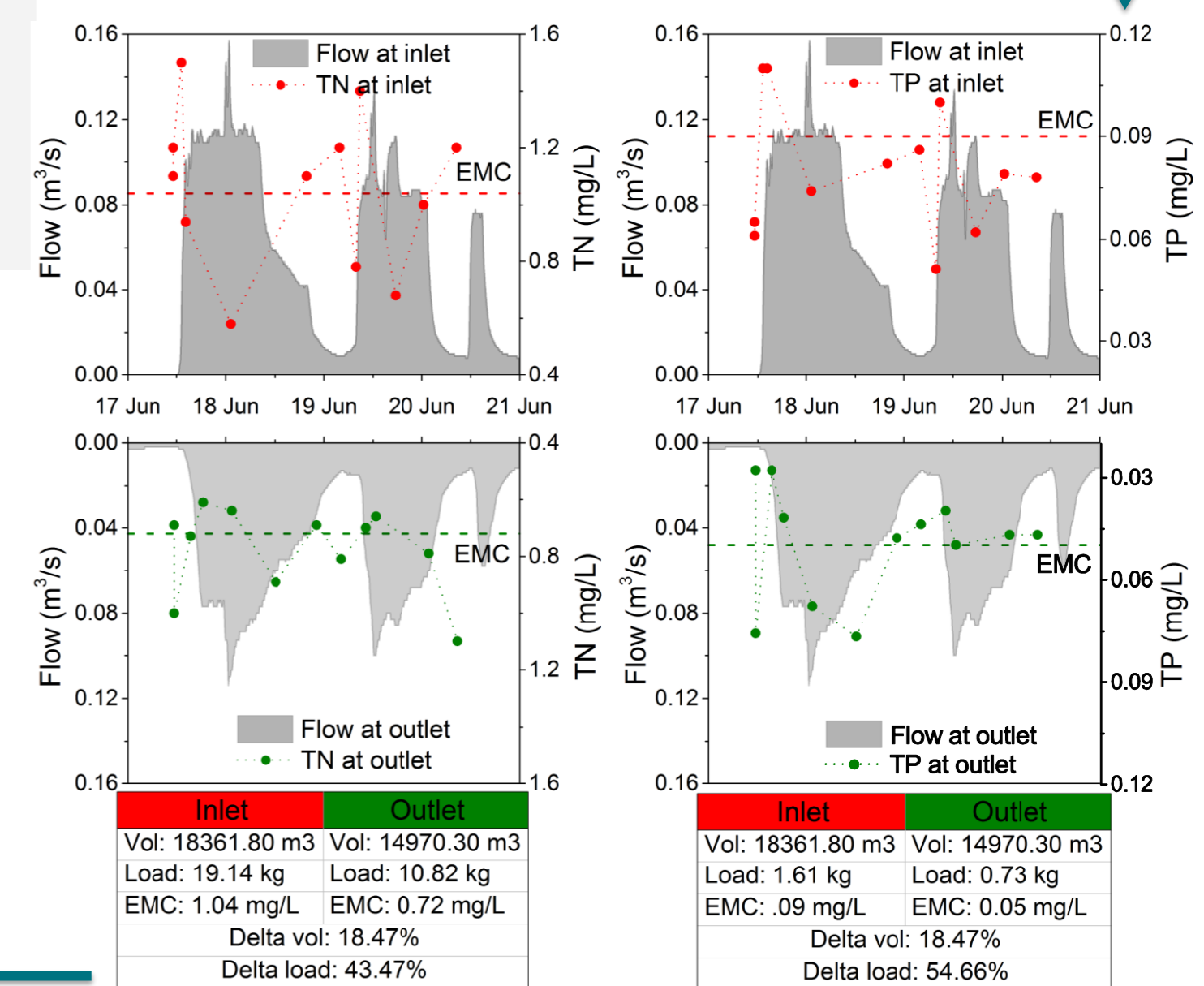
Local amenity



**Figure 1:** Overview of WSCW indicating multiple compartments and different sampling points. Water enters through WDRAIN, WHL3 and WHBC points. The SDC was computed comparing the INLET and OUTLET of each compartment:  
**SF1:** WHDRAIN and WHW1;  
**SSF1:** WT2 and WT3;  
**SF2:** WHW2 and WT5;



**Figure 2:** Long-term (2009-2014) nutrient attenuation by the different compartments during base flow conditions. Attenuation computed as SDC (+100% indicates complete removal).



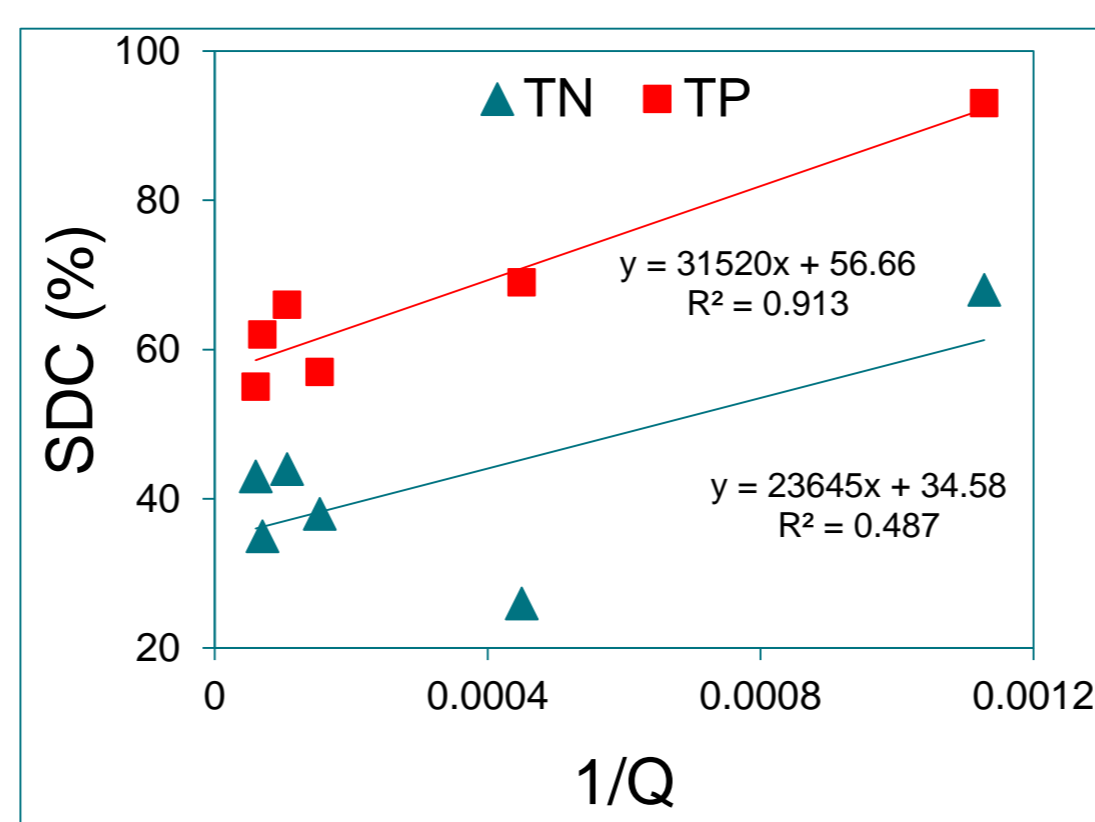
**Figure 3:** Event sampling (17-21 June, 2014) demonstrates nutrient variation throughout a storm and reduction in concentration between the inlet and outlet

## Summary

5yr average estimate of nutrient attenuation by WSCW under different flow conditions:

SDC	Base flow	High flow	Storm event
<b>TN</b>	32%	46%	41%
<b>TP</b>	60%	48%	66%

In addition, the restoration improved the ecological services of the urban waterway by providing a diverse area for habitat and recreational activities.



**Figure 4:** The degree of nutrient attenuation during a storm varies based on storm magnitude