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**Subject:** Relationship between nutrients and particles in runoff  
**Date:** 29 June 2018 at 10:32 am  
**To:** Leo Crasti [leo.crasti@enviroaustralis.com.au](mailto:leo.crasti@enviroaustralis.com.au)



Hi Leo,

As per our discussion, I can confirm that there is an understanding that stormwater particles convey phosphorous and nitrogen. Accounts vary - it is very well understood for phosphorous, but the case is not as certain for nitrogen and will be dependent on catchment characteristics.

The MUSIC manual describes the situation pretty well amongst review material which underpins how it works to simulate WSUD system treatment - see Section 7.2 of the MUSIC model user guide, attached. The understanding is strong enough such that the model developers base the removal of TN and TP on the removal of particles via the Universal Stormwater Treatment Model whenever water is in storage - there are other functions simulating water quality but the USTM is typically the main one for most treatment nodes.

Nitrogen is generally understood to be less likely to bind to particles. Broadly speaking, this is because it is assumed that nitrogen carried in stormwater is largely nitrate (NO<sub>3</sub>). The justification is that nitrogen from the atmosphere ends up as NO<sub>3</sub>. This is however being challenged. Recent literature from Queensland calls this assumption into question pretty clearly

See: <https://www.sciencedirect.com/science/article/pii/S0048969717331649>

(the research paper itself is attached)

Let me know if you would like more information, there is a lot floating about on the topic but these were first to come to mind! In short, phosphorous is almost certain to be particle bound but nitrogen is less certain - it would depend on the catchment characteristics, and a high or low pH has an impact on what gets bound to particles too. Recent monitoring in SA is not conclusive - we measured residential catchment runoff and found that in our unfiltered samples, total kjeldahl nitrogen (which is the sum of organic N and ammonia) was a higher proportion of the total N load. Organic N is the portion likely to be particle bound, however, we did not measure ammonia specifically, so more work required there to make a final call.

Cheers,

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