

## Green Infrastructure Hydrological Performance Research at the University of Sheffield

This document highlights papers and web-based resources produced by the University of Sheffield's 'Green Infrastructure for Stormwater Management' Research Group, led by Professor Virginia Stovin ([v.stovin@sheffield.ac.uk](mailto:v.stovin@sheffield.ac.uk), <https://www.sheffield.ac.uk/civil/people/academic/virginia-stovin>).

Current group members include Dr Simon De-Ville (Research Associate, [simon.de-ville@sheffield.ac.uk](mailto:simon.de-ville@sheffield.ac.uk)), Shuxin Ren (PhD student) and Bruce Wickham (PhD student).

Please feel free to get in touch if you would like more information about our work, or to discuss potential collaborations.

Our work focuses on the monitoring and modelling of Sustainable Drainage Systems (SuDS), and our facilities include bespoke green roof test beds. Some aspects of the work have also included vegetated stormwater management ponds.



### Website links:

- [Urban Green DaMS](#) – Bioretention cell research, in collaboration with Newcastle University (NGIF)
- [EUGINE](#) – Enhancing Urban Green Infrastructure via Knowledge Exchange – Mansfield Sustainable Flood Resilience Programme (Severn Trent Water)
- [Green Roofs](#)
- [Vegetated stormwater ponds](#)
- [ET blog post](#)

### Papers (since 2012) – Our favourites are shown in bold!

Peng, Z., Stovin, V. et al., 2023, Visualisation of Clogging in Green Infrastructure Growing Media, *Urban Water Journal*. <https://doi.org/10.1080/1573062X.2023.2180394>

**Stovin, V., Quinn, R. and Rouge, C., 2023, Continuous Simulation Supports Multiple Design Criteria for Sustainable Drainage Systems (SuDS), *Journal of Sustainable Water in the Built Environment*. <https://doi.org/10.1061/JSWBAY.SWENG-495>**

Stovin, V.R., Sonnenwald, F., Golzar, M. and Guymer, I., 2022, The Impact of Cylinder Diameter Distribution on Longitudinal and Transverse Dispersion within Random Cylinder Arrays, *Water Resources Research*. <https://doi.org/10.1029/2021WR030396>

Sefton, C., Sharp, L., Quinn, R., Stovin, V., Pitcher, L., 2022, The feasibility of domestic raintanks contributing to community-oriented urban flood resilience, *Climate Risk Management*, 2022, 35, 100390 <https://doi.org/10.1016/j.crm.2021.100390>

Peng, Z., Garner, B. and Stovin, V., 2021, Two Green Roof Detention Models Applied in Two Green Roof Systems, *ASCE Journal of Hydrologic Engineering*, [https://doi.org/10.1061/\(ASCE\)HE.1943-5584.0002155](https://doi.org/10.1061/(ASCE)HE.1943-5584.0002155)

**Abdalla, E.M.H., Pons, V., Stovin, V., De-Ville, S., Fassman-Beck, E., Alfredsen, K. and Merete Muthanna, T., 2021, Evaluating different machine learning methods to simulate runoff from extensive green roofs, *Hydrol. Earth Syst. Sci.*, 25, 5917–5935, <https://doi.org/10.5194/hess-25-5917-2021>**

- Askari, S.H., De-Ville, S., Hathway, E.A. and Stovin, V., 2021, Estimating Evapotranspiration from Commonly Occurring Urban Plant Species Using Porometry and Canopy Stomatal Conductance. *Water*, 13, 2262. <https://doi.org/10.3390/w13162262>
- De-Ville, S., Green, D., Edmondson, J., Stirling, R., Dawson, R and Stovin, V., 2021, Evaluating the Potential Hydrological Performance of a Bioretention Media with 100% Recycled Waste Components, *Water*, 13, 2014. <https://doi.org/10.3390/w13152014>
- Quinn, R., Rougé, C. and Stovin, V., 2021, Quantifying the performance of dual-use rainwater harvesting systems, *Water Research X*. <https://doi.org/10.1016/j.wroa.2020.100081>
- Peng, Z., Smith, C. and Stovin, V., 2020, The importance of unsaturated hydraulic conductivity measurements for green roof detention modelling. *Journal of Hydrology*. <https://doi.org/10.1016/j.jhydrol.2020.125273>**
- Quinn, R.; Melville-Shreeve, P.; Butler, D.; Stovin, V., 2020, A Critical Evaluation of the Water Supply and Stormwater Management Performance of Retrofittable Domestic Rainwater Harvesting Systems. *Water*, 12, 1184. <https://doi.org/10.3390/w12041184>
- Edmondson, J.L., Cunningham, H., Densley Tingley, D.O., Dobson, M.C., Grafius, D.R., Leake, J.R., McHugh, N., Nickles, J., Phoenix, G.K., Ryan, A.J. Stovin, V., Taylor Buck, N., Warren, P.H. and Cameron, D.D., 2020, The hidden potential of urban horticulture, *Nature Food*. <https://doi.org/10.1038/s43016-020-0045-6>
- Peng, Z., Smith, C. and Stovin, V., 2019, Internal fluctuations in green roof substrate moisture content during storm events: Monitored data and model simulations, *Journal of Hydrology*, 573, 872-884, <https://doi.org/10.1016/j.jhydrol.2019.04.008>**
- De-Ville, S., Menon, M., Jia, X. and Stovin, V., 2018, A longitudinal microcosm study on the effects of ageing on potential green roof hydrological performance, *Water*, 10, 784; <https://doi.org/10.3390/w10060784>
- Ji, P., Sæbø, A., Stovin, V. and Hanslin, H.M., 2018, *Sedum* root foraging in layered green roof substrates, *Plant and Soil*, 430(1). 263-276. <https://doi.org/10.1007/s11104-018-3729-z>
- Berretta, C., Aiello, A., Jensen, H.S., Tillotson, M.R., Boxall, A. and Stovin, V., 2018, Influence of design and media amendments on the performance of stormwater biofilters, *Proceedings of the Institution of Civil Engineers – Water Management*, <https://doi.org/10.1680/jwama.16.00121>
- De-Ville, S., Menon, M. and Stovin, V., 2018, Temporal variations in the potential hydrological performance of extensive green roof systems, *Journal of Hydrology*, 558, 564-578, <https://doi.org/10.1016/j.jhydrol.2018.01.055>
- Sonnenwald, F., Guymer, I. and Stovin, V., 2017, Computational fluid dynamics modelling of residence times in vegetated stormwater ponds, *Proceedings of the Institution of Civil Engineers – Water Management*, <https://doi.org/10.1680/jwama.16.00117>
- Yuan, J., Dunnett, N. and Stovin, V., 2017, The influence of vegetation on rain garden hydrological performance, *Urban Water Journal*, DOI: <https://doi.org/10.1080/1573062X.2017.1363251>
- Peng, Z. and Stovin, V., 2017, Independent validation of the SWMM Green Roof Module, *ASCE Journal of Hydrologic Engineering*, 22(9): 04017037, [https://doi.org/10.1061/\(ASCE\)HE.1943-5584.0001558](https://doi.org/10.1061/(ASCE)HE.1943-5584.0001558)**
- De-Ville, S., Menon, M., Jia, Xiaodong, Reed, G. and Stovin, V., 2017, The impact of green roof ageing on substrate characteristics and hydrological performance, *Journal of Hydrology*, 547, 332-244, <http://dx.doi.org/10.1016/j.jhydrol.2017.02.006>
- Sonnenwald, F., Hart, J.R., West, P., Stovin, V.R. and Guymer, I., 2017, Transverse and longitudinal mixing in real emergent vegetation at low velocities, *Water Resources Research*, 53, <https://doi.org/10.1002/2016WR019937>.

- Fassman-Beck, E., Hunt, W., Berghage, R., Carpenter, D., Kurtz, T., Stovin, V., and Wadzuk, B., 2015, Curve Number and Runoff Coefficients for Extensive Living Roofs, *J. Hydrol. Eng.*, [https://doi.org/10.1061/\(ASCE\)HE.1943-5584.0001318](https://doi.org/10.1061/(ASCE)HE.1943-5584.0001318)
- Stovin, V., Poë, S., De-Ville, S. and Berretta, C., 2015, The influence of substrate and vegetation configuration on green roof hydrological performance, *Ecological Engineering*, Vol. 85, 159-172.: <https://doi.org/10.1016/j.ecoleng.2015.09.076>
- Stovin, V., Vesuviano, G. and De-Ville, S., 2017, Defining green roof detention performance, *Urban Water Journal*. <https://doi.org/10.1080/1573062X.2015.1049279>
- Poë, S., Stovin, V. and Berretta, C., 2015, Parameters influencing the regeneration of a green roof's retention capacity via evapotranspiration, *Journal of Hydrology*, 523, 356-367. <https://doi.org/10.1016/j.jhydrol.2015.02.002>
- Berretta, C., Poë, S. and Stovin, V., 2014, Moisture content behavior in extensive green roofs during dry periods: The influence of vegetation and substrate characteristics, *J. Hydrol.*, 511, 374-386. <http://dx.doi.org/10.1016/j.jhydrol.2014.01.036>
- Stovin, V., Poë, S. and Berretta, C., 2013, A modelling study of long term green roof retention performance, *Journal of Environmental Management*, 131, 206-215. <http://dx.doi.org/10.1016/j.jenvman.2013.09.026>
- Yio, MHN, Stovin, V., Werdin, J. and Vesuviano, G., 2013, Experimental Analysis of Green Roof Detention Characteristics, *Water Science and Technology*, 68.7 1477-1486. <https://doi.org/10.2166/wst.2013.381>
- Vesuviano, G. and Stovin, V., 2013, A generic hydrological model for a green roof drainage layer, *Water Science and Technology*, 68.4, 769-775. <https://doi.org/10.2166/wst.2013.294>.
- Stovin, V.R., Moore, S.L., Wall, M., and Ashley, R.M., 2013, The potential to retrofit sustainable drainage systems to address combined sewer overflow discharges in the Thames Tideway catchment, *Water and Environment Journal*, Vol. 27, Issue 2, 216-228. <https://doi.org/10.1111/j.1747-6593.2012.00353.x>
- Moore, S.L., Stovin, V.R., Wall, M. and Ashley, R.M., 2012, A GIS-based methodology for selecting stormwater disconnection opportunities, *Water Science and Technology*, 66.2, 275-283. <https://doi.org/10.2166/wst.2012.172>
- Stovin, V., Vesuviano, G. and Kasmin, H., 2012, The hydrological performance of a green roof test bed under UK climatic conditions, *Journal of Hydrology*, Vol. 414-415, 148-161. ISSN 0022-1694. <https://doi.org/10.1016/j.jhydrol.2011.10.022>

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