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**The Faculty of Computing, Engineering and the Built Environment (CEBE) is making major investments in growing the quality and volume of research across its two constituent Schools (Schools of Engineering and the Built Environment, and Computing and Digital Technology) through investments in academic staff and researchers, doctoral students and new labs, workshops and equipment.**

The [Water, Environment and Communities Research Centre](https://www.bcu.ac.uk/computing-engineering-and-the-built-environment/research/water-environment-and-communities) is located in the Faculty of Computing, Engineering and the Built Environment (CEBE) and based at our City Centre Campus. The Centre undertakes applied research on a range of contemporary themes relating to water and the environment reflecting the diversity and interdisciplinary nature of issues concerning the development of resilient communities. The Centre undertakes a portfolio of applied interdisciplinary research, knowledge exchange, education, community engagement and advice for decision makers and policy makers at all levels. The Centre’s work embraces and integrates local, national and international perspectives on water, focusing on environmental challenges towards sustaining resilient communities.

We have a range of PhD studentships now available across the range of disciplines represented in the centre. There are a limited number of funding opportunities available with some studentships including full scholarships while others having partial or self-funding options. Funding will be determined based on the strength of the candidate and quality of the proposal. Some of these projects also include support from our collaborating organisations.

**THE POTENTIAL OF CONSTRUCTED WETLANDS TO REDUCE STORMWATER RUNOFF AND POLLUTION**

**How to apply**

**The closing date for applications is 23.59 on Sunday 1 December 2019.**

To apply, please complete the [project proposal form](http://www.bcu.ac.uk/Download/Asset/1c822112-124b-e911-818d-005056831842) , **ensuring that you quote the project reference,** and then complete the [online application](https://www.bcu.ac.uk/courses/bsbe-research-degrees-phd-2018-19)  where you will be required to upload your proposal in place of a personal statement.

You will also be required to upload two references, at least one being an academic reference, and your qualification/s of entry (Bachelor/Masters certificate/s and transcript/s)

For international applicants, a valid English language qualification, such as International English Language Test System (Academic IELTS) or equivalent with an overall score of 6.5 with no band below 6.0, must be submitted with your application.

These studentships come with full fee waivers for both UK and international candidates. There will also be the opportunity for some paid teaching work of up to 180hrs per academic year. Exceptionally strong candidates may also be offered a bursary. Final funding arrangements will be determined based on the strength of the candidate and quality of the proposal. Some of these projects also include support from our collaborating organisations.

You can find further details on studying for a PhD and details of how to apply [here](https://www.bcu.ac.uk/courses/bsbe-research-degrees-phd-2018-19)

**Project title: THE POTENTIAL OF CONSTRUCTED WETLANDS TO REDUCE STORMWATER RUNOFF AND POLLUTION**

**REF: CEBE-WETPOL**

**Contact:**

The successful candidate will be supported by an interdisciplinary research team, consisting, in particular, of Dr Vasiliki Ioannidou ([vasiliki.ioannidou@bcu.ac.uk](mailto:vasiliki.ioannidou@bcu.ac.uk)) and Professor David Proverbs ([david.proverbs@bcu.ac.uk](mailto:david.proverbs@bcu.ac.uk)). For further information please contact the Director of Studies, Dr Vasiliki Ioannidou ([vasiliki.ioannidou@bcu.ac.uk](mailto:vasiliki.ioannidou@bcu.ac.uk)).

The project is in collaboration with the Coal Authority, providing in-kind support through access to their facilities across the UK and obtained datasets as required.

**Overview:**

Storm water runoff typically contains and transports a wide range of pollutants, resulting in negative environmental effects with potential threats to ecosystems and health. Hundreds of runoff treatment ponds and constructed wetlands (CWs) intended to moderate these impacts are likely to be delivering sub‐optimal (and perhaps actually below legally required) levels of improvement in water quality due to poor understanding of flow patterns, hydraulic design parameters and the effects of vegetation. At the same time there is an increasing push to consider natural approaches to reducing flood risk. This is strongly supported by the EU Floods Directive, as the European Commission recognises that flooding is an increasing problem in Europe. This PhD research will generate a unique dataset to describe the influence of different types and configurations of aqueous system (i.e. CWs and ponds) hydraulic designs and vegetation on their fundamental flow, and treatment characteristics. Parallel aim of this PhD research is to quantify and assess the capability of CWs and ponds in the reduction of peak flows, in order to alleviate urban runoff during storm events. The proposed tools will ensure that future wetland and pond designs meet all their water quantity and quality requirements, and ecosystem services objectives for current legislation and the increasingly stringent EU regulatory framework anticipated over the next decade.

**Person specification:**

An MSc or equivalent professional or research experience in civil engineering, hydraulics or water engineering. Knowledge of environmental science and flood risk management would also be useful.

**References:**

CIRIA (2007) The SUDS Manual, ISBN 978‐0‐86017‐697‐8.

Environment Agency (2012) Rural Sustainable Drainage Systems (RSuDS), ISBN: 978‐1‐84911‐277‐2.

German, J., Jansons, K., Svensson, G., Karlsson, D. & Gustafsson, L. G. (2005). Modelling of different measures for improving removal in a stormwater pond. Water Science & Technology, 52(5), 105-112.

Highways Agency (2006) Design Manual for Roads and Bridges, Vol 4, Section 2, Pt 1, Vegetated Drainage Systems for Highway Runoff.

Ioannidou, V.G. & Arthur, S. (2018). Hydrological Response of a Permeable Pavement Laboratory Rig for Stormwater Management. Efficient Water Systems (EWaS) 3rd Conference, Lefkada Island, Greece, 27-30 June

Ioannidou, V.G. & Pearson, J.M. (2018). ‘Hydraulic & Design Parameters in Full-Scale Constructed Wetland & Treatment Units: Six Case Studies’. Environmental Processes.

Kjellin, J, Wörman, A, Johansson, H, & Lindahl, A. (2007). Controlling factors for water residence time and flow patterns in Ekeby treatment wetland, Sweden. Advances in Water Resources, 30(4), 838-850.

Min, J. H. & Wise, R. W., (2009). Simulating short-circuiting flow in a constructed wetland: the implications of bathymetry and vegetation effects. Hydrological Processes, 23, 830-841.

Nepf, H.M. (2012a). Flow and transport in regions with aquatic vegetation. Annual Review of Fluid Mechanics, 44, 123-142.

Nepf, H.M. (2012b). Hydrodynamics of vegetated channels. Journal of Hydraulic Research, 50(3), 262-279. DOI: 10.1080/00221686.2012.696559.

Proverbs, D.G. Booth, C., Lamond, J. and Hammond, F. (2012) Solutions for climate change challenges of the built environment, Blackwell Publishing

Persson, J., Somes, N.L.G. & Wong, T.H.F. (1999). Hydraulics efficiency of constructed wetlands and ponds. Water Science and Technology, 40(3), 291-300.

SEPA, Scottish Environment Protection Agency (2003) “Ponds, Pools and lochans – Guidance on good practice in the management and creation of small waterbodies in Scotland” SEPA,SBN 1‐901322‐16‐5.

Shilton A. (2005) Pond Treatment Technologies, IWA Publishing.

Shucksmith, J. D. (2008). Impact of vegetation in open channels on flow resistance and solute mixing. PhD Thesis. Sheffield.

Somes, N.L.G., Persson, J. & Wong, T.H.F. (1998). Influence of Wetland Design Parameters on the Hydrodynamics of Stormwater Wetlands. Hydrastorm, Adelaide, 27-30 September, 1998, 123-128.

Stovin, V.R., Grimm, J.P, & Lau, S.D (2008). Solute Transport Modeling for Urban Drainage Structures. ASCE, 134(8). https://doi.org/10.1061/(ASCE)0733-9372(2008)134:8(640)

Su, T.M., Yang, S.C., Shih, S.S. & Lee, H.Y. (2009). Optimal design for hydraulic efficiency on free-water-surface constructed wetlands. Ecological Engineering, 35, 1200-1207.