

# Co-UDlabs ON-LINE WORKSHOP –4<sup>TH</sup> NOV

WP8 (JRA 3)

## Improving resilience and sustainability in urban drainage solutions

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RESUMEN / OBJETIVO DE  
SECTOR DE AGUA

**SISTEMAS DE DRENAXE E SANEAMENTO SUSTENTABLE**

**PLANTA PILOTO DE DEPURACIÓN DE AGUAS RESIDUAIS – ACT.2**

- Función: depuración e recuperación de aguas residuales urbanas
- Principios de funcionamiento:
  - Pretratamiento: pantanos, asentamiento (SA)
  - Filtración: filtros de arena (FA)
- Sistemas de tratamiento:
  - 8 células de aeración
  - Área de resaca: Par. Flotante
  - Capacidad: 20 l/s/m<sup>2</sup> de SA
  - Consumo: 0,5 kWh/m<sup>3</sup> de SA
  - Mantenimiento: operación sencilla e adaptable para replicación (SE, DCO, nitrógeno, fosforo, y amoníaco...)

Diagramas asociados: (1 m<sup>2</sup>), UC de flujo horizontal (14 m<sup>2</sup>), UC de flujo vertical (12 m<sup>2</sup>), UC con afluencia artificial (1 m<sup>2</sup>)

EXPOSICIÓN PARA PARTICIPACIÓN INTERNACIONAL CIENCIA 2019

Proyecto EDC2019-06607-P "Infraestructura piloto a escala real para la monitorización e validación de infraestructuras de Soluciones Basadas en Naturaleza en Campus Central de Universidade da Coruña."

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# OBJECTIVES & NEEDS

- ◆ Future challenges as climate change, new regulatory standards and economic and population growth will **increase the pressure on UD infrastructure**.
- ◆ We need to **develop efficient strategies and tools to increase the sustainability and resilience** of UD infrastructure under surcharge conditions → We still need a better understanding of some hydraulic and pollutant transport processes.
- ◆ Large scale facilities involved in the project allows us to **work at realistic scales**, and to improve our understanding of flood- and pollution-related processes. And also to obtain unique datasets for future development, calibration and validation of UD models.

## WP 8. IMPROVING RESILIENCE AND SUSTAINABILITY IN URBAN DRAINAGE SOLUTIONS

- ◆ **TASK 8.1. Development of consensus on measurement of hydraulic and WQ performance of UD technologies.**
  - ◆ *SubTask 8.1.1:* Development of scalable **hydrodynamic** performance protocols.
  - ◆ *SubTask 8.1.2:* Development of scalable measurement protocols to assess the **pollutant** retention and release potentials of UD structures.
- ◆ **TASK 8.2. Quantifying the resilience of UD infrastructure.**
- ◆ **TASK 8.3. Improving the sustainability of UD infrastructure.**
  - ◆ *SubTask 8.3.1:* Hydrodynamic design for **storm water detention ponds** optimized for cost-efficient maintenance.
  - ◆ *SubTask 8.3.2:* Designer **soils** for Sustainable Urban Drainage Systems.

## ◆ Subtask 8.1.1: Development of scalable hydrodynamic performance protocols

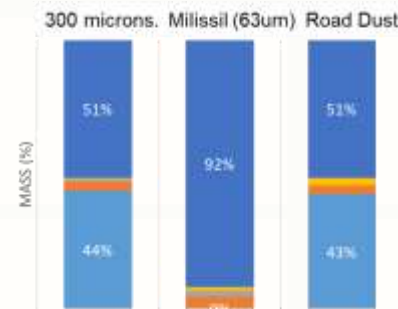
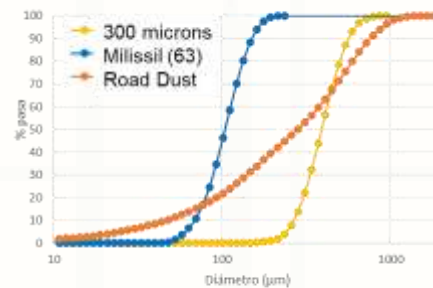
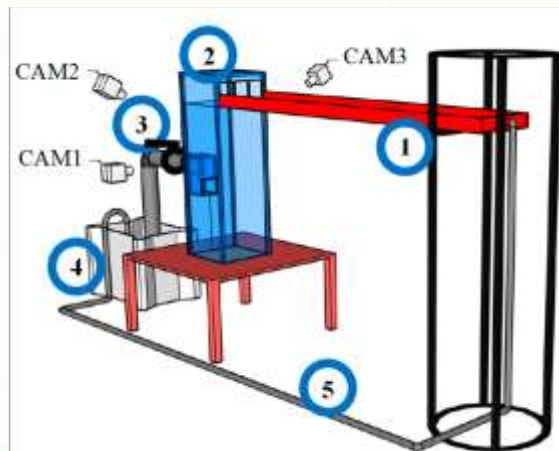
- Assessment of new techniques to build-up the topography/geometry of UD infrastructure.
- Assessment of different imaging velocimetry techniques to measure surface runoff velocities during rainfall events: LSPIV and BIV (bubble image velocimetry).
- Extension of an existing framework describing energy losses (and hence surface/sewer flow exchange) through UD structures under flood conditions.
- ...



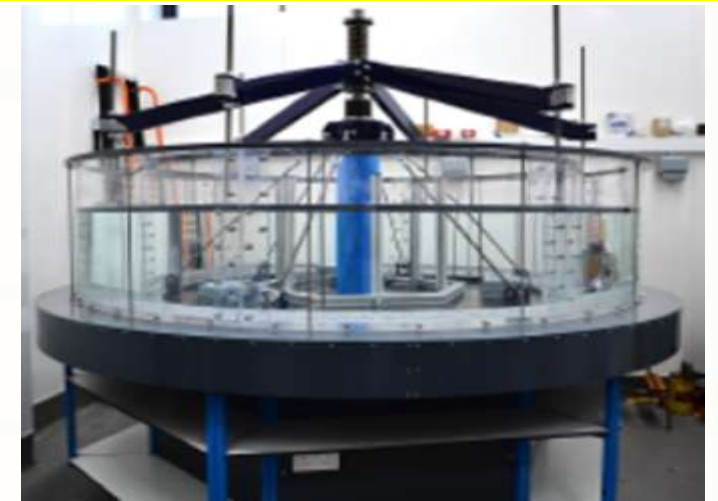
## ◆ Subtask 8.1.2: Development of scalable measurement protocols to assess the pollutant retention and release potentials of UD structures

- Transport of solids through gullies.
- Define a standardized test media for sediment wash off and permeable pavements clogging.
- Solute and microbial transport and survivability in urban runoff flows.
- ...

Jesper Ellerbæk Nielsen will present concepts and strategies for stormwater treatment and management in Aalborg.



Influence of particle size on permeable pavement retention



## ◆ Task 8.2. Quantifying the resilience of urban drainage infrastructure

- ◆ Topics as: operating over its design capacity, overland flow in roads and streets, exchange flow from sewer to surface,...
- Better characterisation of surcharge flows.
- Open access datasets of 2D velocity, and depth averaged tracer concentrations in urban flood surface runoff conditions.
- ◆ Related to Task 8.1.2., since such flows contain a number of pollutants including bacteria.



Andrew Hagger is responsible for the sewers in London: a huge combined sewer system with very few places to put surface water.

Maria Rus will talk about Almere, which is in a city below sea level with shallow sewers.

◆ Subtask 8.3.1: Hydrodynamic design for stormwater detention ponds optimized for cost-efficient maintenance.

OTHU Django Reinhardt settling & infiltration stormwater basins (INSA)



Experimental Storm Water and SUDS basin (AaU)



Pond at campus de Elviña (UDC)



- ◆ Subtask 8.3.2: Designer soils for Sustainable Urban Drainage Systems.
- ◆ Improve the infiltration efficiency of SUDS and reduce the environmental impact by increasing the absorbance and degradation of pollutants.

Green Roof - INSA



OTHU SUDS (INSA)



Experimental Storm  
Water and SUDS basin  
(AaU)



Daniela Falter (Emschergenossenschaft, Germany) will present the implementation of sustainable drainage to address the surface runoff.

Joao Paulo Leitao (EAWAG, Switzerland) is looking at how different SUDS affect CSOs.



**THANK YOU!**

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