Data from the UKCRIC National Green Infrastructure Facility: Advancing knowledge of Green Infrastructure and Sustainable Drainage Systems.

1 Introduction

The NGIF is a full-scale living laboratory for multidisciplinary testing and demonstration of fully functional green infrastructure and sustainable drainage systems, based at Newcastle University, in the North-East of England. NGIF is based in the Urban Sciences Building (NE4 5TG) and features a number of heavily instrumented green infrastructure features along Holmes Avenue and throughout the Urban Sciences Building.

This read me document is supplementary to the NGIF dataset ('ngif.zip') which forms a complete and up-to-date repository of all data collected at the UKCRIC National Green Infrastructure Facility (NGIF) and an introductory video showcasing the facility ('video.mov').

The NGIF data and associated resources are made available under **CC BY 4.0** licence and is registered under the following DOI: https://doi.org/10.25405/data.ncl.14605569. Individual sensor readings are contained within the ngif.zip file and are organised according to the following data structure:

[Facility Name]–[Experimental Location]–[Sensor ID, parameter and location].csv

Example:

ngif-[Lysimeter 3]-[A_SoilVUE_temp_75cm]

(Based at NGIF, situated in Lysimeter 3, measured at the SoilVUE sensor in Cell A, measuring soil temperature at a depth of 75 cm)

2 Data availability

The following sections outline the experimental setups which are situated at the NGIF and have data available for download. The NGIF online data app (here) provides a useful visualisation and plotting tool prior to downloading data (or for interrogating specific time periods/events). The map plot on the NGIF data app also shows the locations (longitude, latitude) of each of the experimental setups. Supplementary videos with additional details of the experimental setups, notable rainfall/flood events and project background are available via the NGIF YouTube channel (here).

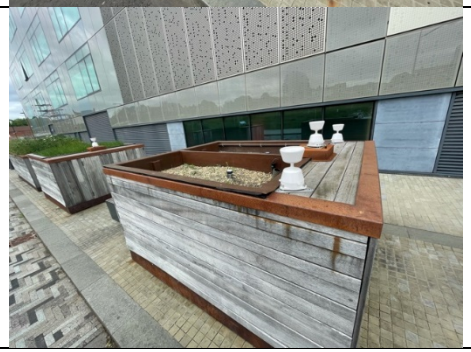
3 Contact and further information

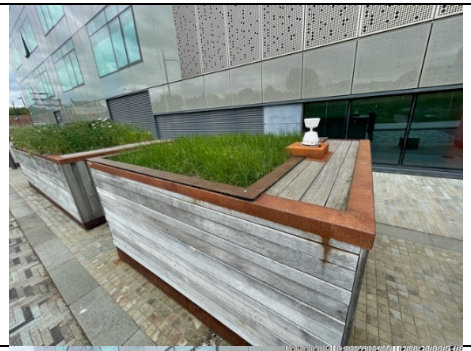
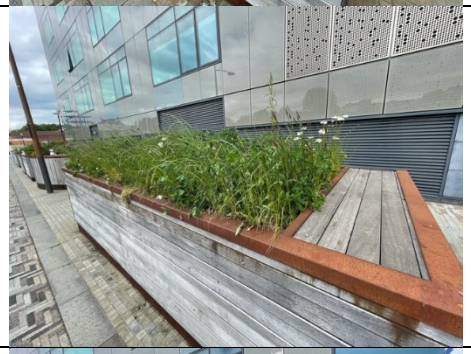
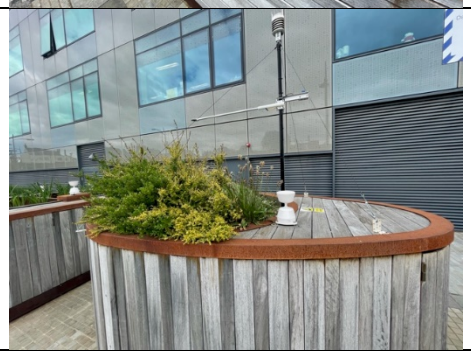
Please contact green.infrastructure@newcastle.ac.uk for further information on the experiments we conduct and to discuss collaborative projects/using our data.

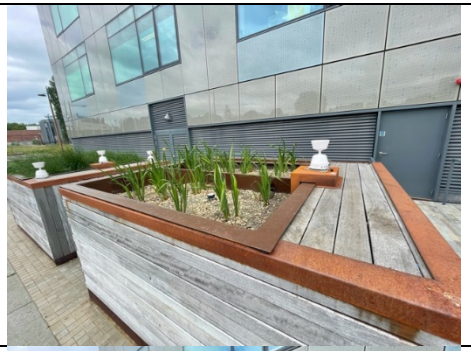
Updated: July 2021

4.1 Lysimeters

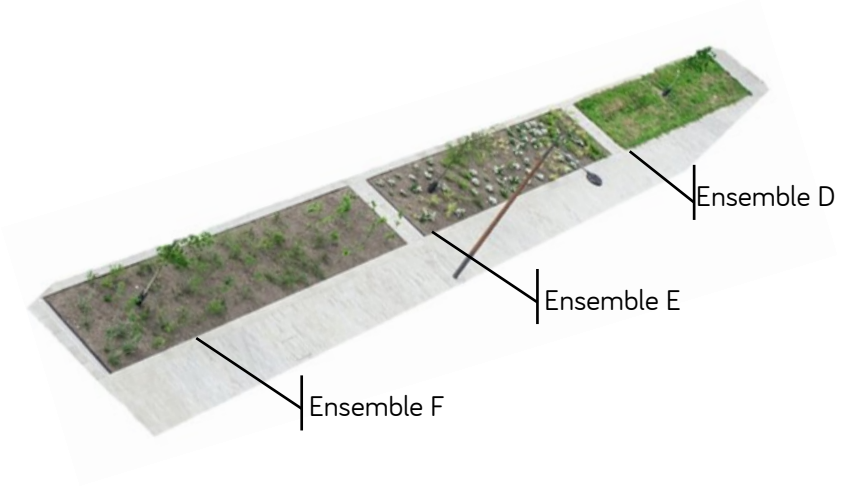
The current lysimeter configurations (as of June 2021) are listed below.

Name	Description	Notes	Photograph
Lysimeter 1	Teaching and demonstration lysimeter featuring a weather station and pit rain gauge. Soil profile consists of compost mulch over sand, over clay, over gravel and planted with dense tufted grass. Gauged outflow.	Circular (Ø 2 m, 1.2 m deep) Commissioned: Spring 2018	
Lysimeter 2	Sand filled lysimeter featuring wheat-straw pellet amended topsoil with grass and clover planting – investigating the carbon capture potential and remediation properties of amended substrates. Gauged outflow.	Rectangular (5 m × 2 m, 1.2 m deep) Commissioned: Autumn 2017	
Lysimeter 3	Bare earth Urban Green DaMS lysimeter investigating hydrological performance of green infrastructure. Lysimeter split into two hydrologically isolated cells – Cell A: restricted outflow, Cell B: unrestricted outflow. Gauged inflows and outflows.	Square (2 m × 2 m, 1.2 m deep), split into two 1 m × 2 m cells Commissioned: August 2020	

Lysimeter 4	Amenity grass Urban Green DaMS lysimeter investigating hydrological performance of green infrastructure. Lysimeter split into two hydrologically isolated cells – Cell A: restricted outflow, Cell B: unrestricted outflow. Gauged inflows and outflows.	Square (2 m × 2 m, 1.2 m deep), split into two 1 m × 2 m cells Commissioned: August 2020	
Lysimeter 5	Sand filled lysimeter featuring biochar amended topsoil with grass and clover planting – investigating the carbon capture potential and remediation properties of amended substrates. Gauged outflow.	Rectangular (5 m × 2 m, 1.2 m deep) Commissioned: Autumn 2017	
Lysimeter 6	Automatic weather station for site-wide evapotranspiration and weather calculations. Gauged outflow.	Circular (Ø 2 m, 1.2 m deep) Commissioned: Autumn 2017	

Lysimeter 7	Shrubbed (*Iris Sibirica*) Urban Green DaMS lysimeter investigating hydrological performance of GI. Lysimeter split into two hydrologically isolated cells – Cell A: restricted outflow, Cell B: unrestricted outflow. Gauged inflow and outflows.	Square (2 m × 2 m, 1.2 m deep), split into two 1 m × 2 m cells Commissioned: August 2020	
Lysimeter 8	Shrubbed (*Deschampsia Goldtau*) Urban Green DaMS lysimeter investigating hydrological performance of GI. Lysimeter split into two hydrologically isolated cells – Cell A: restricted outflow, Cell B: unrestricted outflow. Gauged inflows and outflows.	Square (2 m × 2 m, 1.2 m deep), split into two 1 m × 2 m cells Commissioned: August 2020	
Lysimeter 9	High plasticity clay slope featuring fallow and grassed surfaces – investigating the near-surface deterioration processes (inc. desiccation cracking) of infrastructure slopes. Gauged outflow and surface runoff.	Rectangular (5 m × 2 m, 1.2 m deep) Commissioned: June 2021	
Lysimeter 10	Sand filled column covered by a topsoil planted with ryegrass featuring an in-situ heating element – investigating the heat rejection potential of GI for combined Ground Source Heat Exchanger and SuDS performance enhancement. Gauged inflow and outflow.	Circular (Ø 2 m, 1.2 m deep) Commissioned: April 2019	

4.2 Ensembles

Name	Description	Notes	Photograph
Ensemble A	Ground level, rectangular rain garden vegetated with amenity grass	Commissioned: April 2020	
Ensemble B	Ground level, rectangular rain garden vegetated with typical raingarden planting (mixed shrubbed species)	Commissioned: April 2020	
Ensemble C	Ground level, rectangular rain garden vegetated with edible herbs from the *Lamiaceae* family	Commissioned: April 2020	
Ensemble D	Ground level, rectangular rain garden	Commissioned: Autumn 2017	
Ensemble E	Ground level, rectangular rain garden	Commissioned: Autumn 2017	
Ensemble F	Ground level, rectangular rain garden	Commissioned: June 2018	

4.3 Green roof, swale and rainwater harvesting tank

Name	Description	Notes	Photograph
Green Roof	Sloped green roof on the Urban Sciences Building. Triangular shape draining into one gauged corner. Vegetated with a wildflower blanket and 100mm thick wildflower substrate. This is surrounded by 20-40mm round ballast and has an underlying drainage layer. Fitted with 5 soil moisture sensors.	Commissioned: Autumn 2017	
Swale	140-metre-long fully functional SuDS feature. Contains wooden leaky barriers, gabion baskets and whinstone rip-rap to maximise flow attenuation and reduce erosion. This grassed swale discharges into a wetland which is vegetated with pre-seeded coir pallets and native marginal (British wildflower) vegetation. Swale is fitted with x16 water level sensors and x5 soil moisture sensors.	Commissioned: April 2019	

Rainwater harvesting tank	50,000L rainwater harvesting tank. Water collected from adjacent university building (floor 6, Urban Sciences Building) and stored under Holmes Avenue. Ultrasonic pressure transducer used to monitor water level inside the tank. Water available for SuDS experiments, including the swale.	Commissioned: 2017	 

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