Green roofs in Geneva, Switzerland

Year of issue

2025

Summary

Located in Geneva, this case describes the long-running programme of green roofs at the University Hospitals of Geneva (HUG). The first roof (≈0.55 ha, 1993) was designed to retain ~30.25 m^3/day; compared with a conventional roof it retains about 60% of runoff, while also recreating urban habitat. Since then the scheme has expanded: in 2023 HUG added 2,835 m^2 on three buildings (Maison de l'enfance et de l'adolescence, Adult Emergency extension, GIBOR). After a full inventory in 2024, HUG reports more than 11,900 m^2 of vegetated roofs across its sites.

Local monitoring in Geneva (TVEG/HEPIA) confirms hydrologic benefits beyond the original design assumptions: storm peaks are delayed and attenuated, with up to ~75% reduction for a summer event (and ~48% in winter), and a larger share of water returned by evapotranspiration (~61%) relative to a reference roof. The Canton's "Nature en ville" programme documents biodiversity outcomes and provides up-to-date technical guidance; at cantonal level, compliant green roofs can lower stormwater fees.

Photo Gallery



Location

46.2, 6.15

Project

NWRM

National ID

Switzerland_02

Sector

Urban

Installation Date

1993-06

Implementation status

Completed

Contact

Anais Hanus, ACTeon

Overview

Location of the project

On HUG’s Cluse-Roseraie campus, south of Geneva centre, between Rue Gabrielle-Perret-Gentil and Rue Alcide-Jentzer, on the large south-zone terraces above the hospital buildings.

Country

Switzerland

NUTS2 Code

Ticino

Sponge measures implemented in the case study

Green Roofs

Objectives

• Vegetate ~5 500 m² (of 11 000 m² terrace)
• Retain about 30.25 m³/day; ~60 % of rainfall vs. traditional roof
• Recreate a biotope on a hospital terrace to improve microclimate/amenity.

Involved partners

Authority type	Authority name	Authority role	Comments	Authority responsibility
Local water authority	République et canton de Genève	Initiation of the measure	—	Responsible
Architects / Engineers	Nierle, Grand, Praplan et associés architectes SA	Determination of design details of the measure	Architects	Supporting

Authority type	Authority name	Authority role	Comments	Authority responsibility
Architects / Engineers	Tremblet et Cie SA	Determination of design details of the measure	Engineers	Supporting
Architects / Engineers	Zanini-Baechli et associés	Determination of design details of the measure	Engineers	Supporting
Architects / Engineers	Walter Brugger	Determination of design details of the measure	Architects	Supporting
Architects / Engineers	Induni et Cie SA	Implementation	Contractor	Supporting
Architects / Engineers	Trogger SA	Implementation	Contractor	Supporting

Site Information

Climate Zone

Cool temperate moist

Precipitation

915.00 mm

Temperature (°C)

10.70 °C

Evapotranspiration

1.50 mm

Runoff

302.00 mm

Runoff coefficient

0.33

Elevation range

398

Slope range

0.0

Vegetation class

Designed as mixed extensive + intensive green roofs: ~40–50 cm substrate with bulbs, herbaceous perennials, ferns, groundcovers; climbers on pergolas (trees limited by wind exposure). Recent additions include planters with trees, shrubs, perennials (Bio Suisse-labelled).

WFD Ecological status

Moderate

WFD Chemical status

Failing to achieve good

Water quality status

Urban Rhône/Arve face micropollutants (pesticides, drugs), storm overflows/urban runoff, and occasional accidental sewage discharges; biodiversity status locally flagged as mediocre in parts of the Rhône (2020 assessment).

Design and Implementation

Project scale

Micro

Project scale specifications

A site-specific intervention on ~0.55 ha of hospital roofs, targeting on-parcel stormwater retention, thermal/amenity benefits and habitat at the building/campus level—not regional basin management.

Project area

0.55

Area subject to Land use change or Management/Practice change (ha)

0.55 ha

Size

0.60

Size unit

m

Principles

Multifunctionality (runoff control + thermal + biodiversity + patient amenity). Layered build-up (inverted roof, drain layer, 40–50 cm substrate) with water guard in 10 cm drainage to retain rainfall and irrigate by capillarity; separate overflow to storm sewer.

Constraints

Flat roof terraces with structural concrete deck; very wind-exposed, limiting tall trees; substrate depth enabled mixed planting; irrigation designed around local pluviometry with ~700 micro-sprinklers and a controlled water table in the drain layer; overflow to a separate storm network.

Favourable preconditions

The existence of unexploited wide areas like roofs enable the implementation of the measure.

Financing

Total cost

5424140.00 €

Costs investment

4000000.00 €

Financing authorities

Authority name	Type of funding
Republic and Canton of Geneva	Local funds

Policy and Governance

Policy description

Initiated by the Canton (owner/client) as part of “on-parcel stormwater management” good practices; primary aim to recreate urban habitat and reduce runoff/heat and noise, improving patient and neighborhood amenity. Since 2020s, Geneva has pursued canton-wide promotion of green roofs (e.g., PL12778) and HUG’s 2030 sustainability strategy (green surfaces + heat-wave adaptation)

Land ownership

The south-zone roofs at HUG were built for (and by) the Republic and Canton of Geneva; maître d’ouvrage: the Canton. In 2020, only the north zone land transferred to HUG, south zone remains State-owned.

Policy targets

Improved Biodiversity

Increase Water Storage

Oher Societal Benefits

Pressure remarks

The targeted problem is the runoff in urban areas, which increases flood risks.

Part of a wider plan

Yes

Wider plan

Wider plan type	Wider plan focus	Name
National	Water	Federal law on water protection, 24 january 1991
Local	Water	Cantonal law on water (L 2 05)

Public consultation

No

Has contractual arrangements

No

Impacts and Monitoring

Maintenance

Maintenance requirements

The integration of invasive species management into roof maintenance contracts should help limit their spread.

Impact Assessment Methodology

Performance impact assessment method

Unknown

Socio-economic Impacts

Direct benefits information

Green roofs improve the microclimate.

Ancillary benefits information

Green roofs provide vegetation in a urban area, from which - in this case - hospital patients can benefit from.

Biophysical impacts: Hydrology

Hydrological effects

Evapotranspiration plays a significant role in reducing the urban rainwater management.

Retained water

30.00

Retained water unit

m3/day

Information on retained water

This number is theoretical; no performance evaluation has been done.

Increased water storage

60.00

Increased water storage unit

% Percent

Runoff reduction

60.00

Runoff reduction unit

% Percent

Biophysical impacts: Biodiversity

Improved biodiversity

Yes

Information on improved biodiversity

Recreating habitat in urban areas.

Biophysical impacts: Water & Soil Quality

Water quality overall improvements

Not relevant for this application

Soil quality overall improvements

Not relevant for this application

Biophysical impacts: Others

Ecosystem impact climate regulation

No information available

Lessons Learned

Key lessons

The case study provides one example of how to implement and design green roofs. It has been shown that these rooftops are effective in limiting runoff compared to the intensity of rainfall received. Evapotranspiration accounts for a significant portion of the annual water balance. In winter, there is not enough time between rainfall events to evaporate all the water and restore maximum retention capacity, so the drain is used more frequently. In summer, the drain is rarely used.
Across 30 rooftops studied in Geneva, the average vascular plant cover (50%) falls short of the recommended 75%, but the significant presence of bryophytes (48%) partly compensates. Their presence is beneficial for biodiversity and should be preserved through appropriate management.

Barriers

Barrier type	Barrier role	Comments
Attitude of relevant stakeholders	Main barrier	Green roofs implementation on public or private buildings depends on owners' will.
Lacking financing sources	Secondary barrier	The cost of the measure can be a barrier if subsidies or other funds are not available.

Drivers

Driver type	Driver role	Comments
Legal obligations	Main driver	The federal law on water protection requests rain water infiltration in urban areas through retention measures.

Driver type	Driver role	Comments
Organisation committed to it	Secondary driver	The Geneva Canton elaborated recommendations regarding water retention in urban areas

Success factors

Success factor type	Success factor role	Comments
Attitude of relevant stakeholders	Main factor	The hospital, a private stakeholder, asked for implementing the measure.
Financing possibilities	Main factor	—

Transferability

Highly transferable to dense urban roofs with adequate load-bearing, waterproofing, safe maintenance access and wind protection. Pay attention to overflow design, substrate depth/species mix, irrigation needs, and integration with separate storm networks; follow local guides/standards.

Sources

Sources

Hopital cantonnal, zone sud; toiture végétalisée

Stormwater management at the local scale: a green roof study, review and lessons learned

Rapport final du projet "Toitures végétalisées" (TVEG) dans l'agglomération genevoise