Drainage management in the city of Hradec Kralove, Czech Republic

Year of issue

2025

Summary

Urban constructions carried out by JVProjektvh which include the removal or sinking of existing curbs, lowering or adjustment of the surface, transfer of storm water from the area of street inlets to decentralized devices, taking apart gutters and street inlets within green areas.

It is still included in urbanism today, and mimicked in other cities.

Photo Gallery



Location

50.2105, 15.82305

Project

NWRM

National ID

Czeck_01

Sector

Urban

Installation Date

2011-03

Implementation status

Ongoing

Contact

Jovanka Ignjatovic

Overview

Location of the project

Hradec Králové, city of 90 000 inhabitants at the confluence of the Elbe and the Orlice.

Country

Czechia

NUTS2 Code

Severovýchod

Sponge measures implemented in the case study

Filter Strips

Soakaways

Involved partners

Authority type	Authority name	Authority role
Local water authority	Municipality of Hradec Kralove	Initiation of the measure
—	DHI	Monitoring
—	JVProjectVH	Implementation

Site Information

Climate Zone

Cool temperate moist

Precipitation

474.00 mm

Temperature (°C)

7.40 °C

Runoff

380.00 mm

Runoff coefficient

0.80

Elevation range

233

Design and Implementation

Project scale

Meso

Project scale specifications

This project takes into consideration a city as a whole.

Project area

24300

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

24300.00 ha

Size

332.00

Size unit

km

Basis of design

Return period for the design of retention volume: 5 years

Principles

The design of such project needs informations on the local conditions : underground status, infiltratbility of the soil, meteorology.

Constraints

The past few decades, Hradec Kralove has suffered from massive urbanization resulting in overloading of the system of natural and artificial water bodies as well as of the sewer system.

Favourable preconditions

Hradec Kralove was planned as a green city before the Second World War by architect Josef Gocar. Today, it is still an excellent example of clever urban planning. Stormwater drainage was solved as a first priority before starting planning the urbanization itself. Gocar designed a system combining natural water bodies and open vegetated channels. Moreover, infiltration systems were created in some areas.

Financing

Total cost information

There are no information at this stage

Financing authorities

Authority name	Type of funding	Financing share
Hradec Králové municipality	Local funds	100 %

Policy and Governance

Policy description

Mising sustainable urban drainage systems (exceptions: rare individual projects and EU financed projects)

Land ownership

Only public-owned land or buildings

Policy targets

Runoff control

Part of a wider plan

Yes

Wider plan

Wider plan type	Wider plan focus	Name	Comments
Local	Urban	City Development Plan	These areas were determined in the catchment and incorporated into the new City Development Plan processing

Public consultation

Yes

Consultation activities

Activity stage	Activity type	Key issues	Comments
Screening phase	Surveys	Individual issues	People were reached to inquire about any water problems they might know about.

Has contractual arrangements

No

Impacts and Monitoring

Monitoring System

Monitoring parameters

Current status of stormwater management. No deep impact monitoring is carried out.

Impact Assessment Methodology

Performance impact assessment method

Unknown

Performance impact estimation information

The DAS HK incorporated extensive monitoring and surveys (rainfall, water levels, discharges, water quality parameters, ecological status of streams, catchment hydrogeology and infiltration potential etc.)
Hydrodynamic modeling of the sewer system, water bodies, artificial open channels, underground waters and elements of stormwater management was performed (MIKE Urban, MIKE11) and hydraulic capacity of the individual parts of the system as well as flooding frequency was assessed based on a 10-years rainfall data series. CSOs impacts were assessed with REBEKAII.
Paralelly, a groundwater flow model was created by Jacobs Consultancy.

Socio-economic Impacts

Direct benefits information

Reduction of the impervious area of the existing development by 15%; Long-term conception of the city stormwater drainage respecting sustainability principles.
Link rules and criteria of sustainable stormwater management within the region with the new City Development Plan.

Ancillary benefits information

The attitude towards stormwater management has started to change towards sustainability

Biophysical impacts: Hydrology

Information on increased water storage

Not increased the volume stored, technical measures in the planned development aim at approaching pre-urbanization runoff conditions (similar hydrograph volume and shape).

Information on runoff reduction

Improved runoff control by measures in the catchment, sewer system and open channels

Biophysical impacts: Biodiversity

Information on improved biodiversity

N/A info

Biophysical impacts: Water & Soil Quality

Water quality overall improvements

Not relevant for this application

Information on water quality overall

Sustainable sewage system allows a better protection of water bodies through a reduction of unwanted discharges.

Soil quality overall improvements

Not relevant for this application

Information on soil quality overall improvements

N/A info

Biophysical impacts: Others

Ecosystem impact climate regulation

Not relevant for the specific application

Lessons Learned

Key lessons

Study showd that:
- storm water management must be integrated into urban planning to guarantee sustainable development of the city;
- transparent step-by-step guidelines specifying activities and responsibilities at each level of urban planning from the stormwater management point of view must be prepared;
- this tipe of projects went beyond the current Czech legislation and can serve as a good example for similar studies.

Barriers

Barrier type	Barrier role	Comments
Legal obligations / restrictions	Secondary barrier	Due to water management restrictions, urbanization is limited to some areas. This leads to some reluctance byt a part of the local community.
Attitude of decision makers	Main barrier	A political change in the city lead to less resources to maintain this project. Urban priorities shifted.

Drivers

Driver type	Driver role	Comments
Past flooding events	Main driver	Events exceeding the limit of the open channel
Organisation committed to it	Main driver	The willingness to create a demonstrator city in defining rules for greener infrastructure.

Success factors

Success factor type	Success factor role	Comments
Existing staff and consultant knowledge	Main factor	Decision support for city authorities and the building politics in terms of sustainable stormwater management were provided
Available support tools	Secondary factor	For the sewer network evaluation, a model from the Drainage Masterplan from 2005 was available

Transferability

The same approach is applicable to any other city, as long as the urban planners are comitted to it.

Sources

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Drainage Area Study of the city of Hradec Kralove, Czech Republic, and its utilization for urban planning

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