



DEveloping resilient, low-carbon and more LIVable urban Residential area – DELIVER

LAYMAN'S REPORT



NOVEMBER 2023

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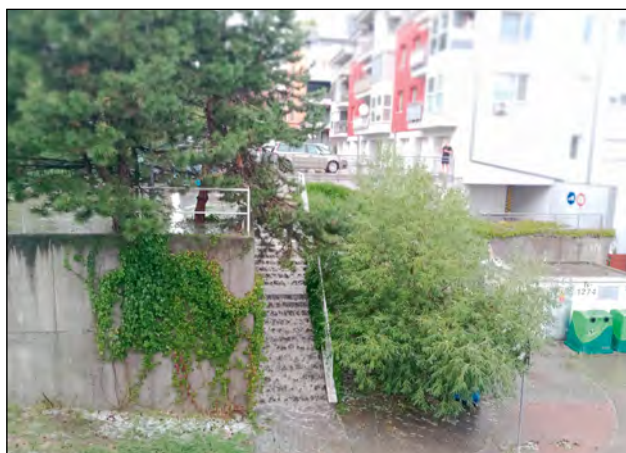
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INTRODUCTION

Extreme weather events, such as heat waves, prolonged droughts, or, conversely, an increased number of

flash floods, windstorms, and other extreme events, are showing us that climate change and its negative impacts for all areas of urban life have become a reality. These impacts of climate change, as projected by

various scenarios, will become increasingly pronounced, particularly in urban areas. Climate change therefore poses here challenges that need to be urgently addressed.



BACKGROUND AND THE SITUATION AT THE START OF THE PROJECT

Nearly one-third of the population of Slovakia lives in housing residential districts built from the mid-1950s onwards. Although panel housing estates vary depending not only on the years in which they were built, but also on the location itself,

they all have the following characteristics: high levels of urbanization, generally high population density, a lack of quality green spaces, and poor-quality public spaces.

According to various studies, the demand for energy consumption in

buildings accounts for around 40% of total energy consumption. In the case of panel buildings, this percentage is significantly higher.

Bratislava Municipality Karlova Ves Dlhé Diely can be characterized as:

- A very densely populated municipality with mostly panel residential and public buildings. These buildings are not energy-efficient or climate-resilient.



Monitoring



Action plan



Refurbishment



Awareness



Legislation

During the process of the renovation of facades, the protection of biodiversity was not taken into account sufficiently, and the number of birds and bats has been decreased significantly.

- A municipality with a high share of private cars and unsustainable mobility.
- A municipality with poorly functional green spaces that would cool the environment and mitigate the effects of climate change, especially during heat waves.

In Karlova Ves, panel systems were used for the construction of not only residential buildings but also schools and preschools. The technical properties of these materials are considered to be subpar, particularly their poor thermal insulation properties, leading to significant heat loss during the winter and excessive heat gain during the summer. This renders heating in these buildings highly energy-intensive.

Most panel buildings have already undergone the principal renovation, e.g. window replacement and facade insulation. However, these activities have been carried out with varying quality and the protection of the protected animals living in the cracks in the panels and attic openings (such as swifts and bats) have not been taken sufficiently into account. The insulation of facades also destroyed a large number

of swift nests, which cannot rebuild their nests because the facade is smooth and they need a rough surface to attach their nesting material (mud).

Additionally, a significant portion of rainwater from roofs and surrounding areas is drained into the sewer system, leading to drought of the vegetation and, conversely, an increased risk of flooding following heavy rainfall events

Climate change requires solutions that are not only innovative but also demonstrative, serving as an example for other similar residential districts. How to assess climate

resilience in the built environment? How to prepare a strategic document for mitigation and adaptation to climate change in cities, but also to realize adaptation and mitigation measures on the buildings and also in public space? How can nature-based solutions and measures supporting biodiversity be prioritized in the renovation of buildings, public spaces and greenery? The project DELIVER: DEveloping resilient, low-carbon and more LIVABLE urban Residential area dealt with these areas.

GET INSPIRED

Within the project, the Climate Action Plan of the Bratislava-Karlova Ves Municipality for the years 2020-2030 was developed. In this plan, the municipality committed itself to gradually reducing emissions of CO₂ by 2030 and to prepare for the negative impacts of climate change.

The strategic material can be found on the website www.karlovaves.sk in the section *Zverejňovanie, Strategické dokumenty*: <https://lnk.sk/ef07> in Slovak language.

Klimatický akčný plán Mestská časť Bratislava-Karlova Ves 2020 – 2030

Krátená verzia
jún 2020

BASIC INFORMATION ABOUT THE PROJECT

Project name: DEveloping resilient, low-carbon and more LIVable urban Residential area

Project number: LIFE17 CCA/SK/000126

Duration: June 15, 2018 - December 15, 2023

Total cost: 2 446 523 EUR

- EU contribution: 1 467 913 EUR
- Co-financing from the state budget, Ministry of the Environment SR: 793 367 EUR



Coordinating Beneficiary and Associated Beneficiaries:

- | | | |
|--|---|--|
| <ul style="list-style-type: none"> ● Bratislava-Karlova Ves Municipality – coordinating beneficiary | <ul style="list-style-type: none"> ● BROZ – Bratislava regional nature conservation association ● CI2, o.p.s. | <ul style="list-style-type: none"> ● IEPD – Institute for passive houses ● CDI – Institute for Climate and Development |
|--|---|--|

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www.odolnesidliska.sk/en

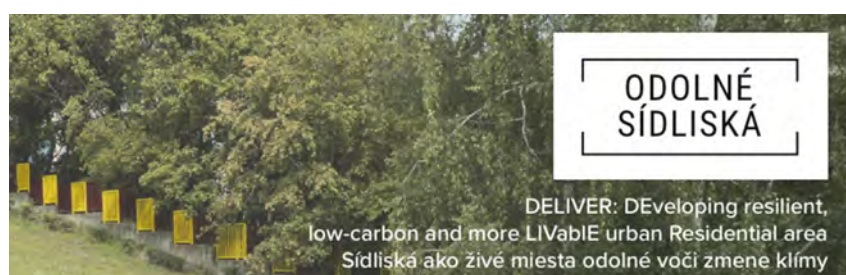
PROJECT OBJECTIVES

The main project goal is balancing adaptation and mitigation efforts in residential areas consisting of prevalently prefabricated buildings with the aim to increase their climate resilience, to reduce the carbon footprint. It will result in higher health and living comfort for local citizens, greater property protection, saving of financial resources of citizens and municipalities and in higher biodiversity.

- Project objective 1: To raise the knowledge base in the area of common consolidated climate resilience and carbon footprint assessment and monitoring progress in the urban residential areas consisting of prevalently prefabricated buildings (hereafter referred to as residential areas).
- Project objective 2: To promote and demonstrate the integrated adaptation and mitigation approach (enhancing synergies and reducing antagonisms) with emphasis on eco-based climate solutions and biodiversity promotion, demonstrated in the residential areas of the Bratislava Municipality Karlova Ves.
- Project objective 3: To increase the inclusion of residents into the process of combating the climate change to strengthen residents' climate safety and the promotion of biodiversity.
- Project objective 4: To propose changes and improvements in the national climate legislative environment.
- Project objective 5: To increase awareness and promote project DELIVER approach to enable other cities in the EU with similar

climate problems access to project results.

„The main project goal was balancing adaptation and mitigation efforts in residential areas consisting of prevalently prefabricated buildings with the aim to increase their climate resilience.“



MAIN PROJECT ACTIVITIES AND RESULTS

1. Monitoring

Do you know how resilient your building, municipality, village, or city is to climate change at the moment? How are they prepared for the impacts of climate change? Until now, there has been no simple tool to measure resilience to climate change at different levels and scales. There has also been no tool to measure the effect of proposed adaptation and mitigation measures, which has led to uncertainty in the decision-making process or in the preparation of projects.



Monitoring

1.1. KLIMASKEN tool

Klimasken is an online tool for evaluating the climate resilience of cities, municipalities and buildings in terms of greenhouse gas emissions and adapting to the possible impacts of climate change (adaptation). The tool is composed of several dozen indicators designed on the basis of analysis of professional sources, own experience of the professional team, recommendations of international institutions and practical testing in the Slovak Republic and the Czech Republic.

After entering all the necessary data, the system creates a „climate label“, which allows to clearly assess the development and condition of individual areas of the city, municipality or building and their preparedness for heat waves, drought, torrential rain or extreme weather events. It is also possible to compare cities, municipalities and buildings over time and between the individual tested areas and buildings.

KLIMASKEN evaluates:

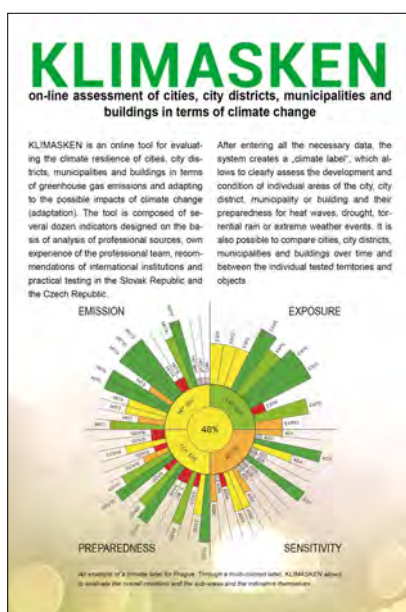
- Exposure to climate change: What is the state and evolution of the environment in which the city, municipality or building is located in terms of the most important manifestations of climate change: rising temperatures, heat waves, precipitation, drought or extreme weather events? *The exposure includes ten indicators (nine for basic assessment and one more for advanced assessment).*
- Sensitivity and adaptive capacity: What is the vulnerability of a city, municipality or building to the effects of climate change? How is the city, municipality or building prepared, what are the properties of individual systems and areas in the city, municipality or building? *The sensitivity includes sixteen indicators (eight for basic assessment and eight more for advanced assessment).*
- Greenhouse gas production and reduction (emissions): How does a city, a municipality contribute to climate change? What are the direct or indirect greenhouse gas emissions in the city, municipality? How do individual areas contribute to emissions? *The mitigation includes fourteen*

Assessment of climate resilience, CO₂ emissions reduction and effectiveness of adaptation measures

indicators (four for basic assessment and ten more for advanced assessment).

- Readiness to implement adaptation and mitigation measures: What measures is the city or building owner taking to address the consequences of climate change or reduce greenhouse gas emissions? How do these solutions manifest themselves in everyday life?

The adaptive capacity includes sixteen indicators (seven for the basic evaluation and nine more for the advanced evaluation).



GET INSPIRED

The tool is available at the website:

<https://www.klimasken.sk/en/> in three language versions (Czech, Slovak and English). Registration is easy and there is no charge for using the tool.

An information leaflet is available at

<https://odolnesidliska.sk/home/>; <https://lnk.sk/knen>

2. Action plan

In the context of developing a strategic document on climate change mitigation and adaptation, it is important to emphasize an integrated approach to the use of individual adaptation and mitigation measures, with an emphasis on supporting nature-based solutions and promoting biodiversity. This can be achieved by providing an overview of possible adaptation and mitigation measures for residential areas in the individual sectors.



Action plan

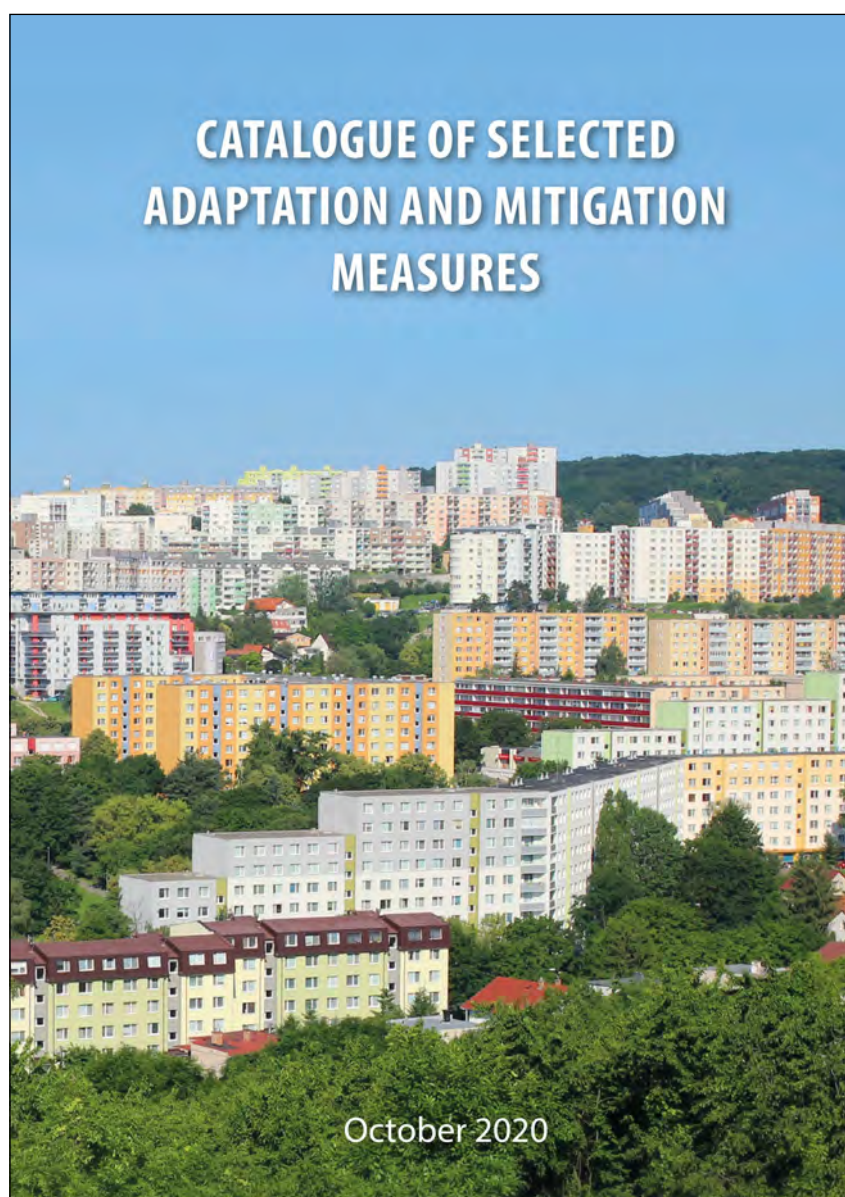
2.1 Catalogue of selected adaptation and mitigation options

The document offers a clear and brief description of the recommended measures that will contribute to better orientation in the area of mutual relations of mitigation, adaptation and biodiversity. Its aim is

to present mainly synergic measures that have both adaptation and mitigation impacts (positive or negative) and help in this way local authorities to find appropriate solutions and measures for mitigation of or adaptation to climate change.

The unique feature of the publication is the inclusion and description of only those measures that simultaneously relate to both

Elaboration
of a strategy
document on
mitigation
and adaptation to
climate change



adaptation and mitigation in the urban environment, whether with positive or negative impact. Due to the importance of preserving and supporting biodiversity from the point of view of climate change and the provision of ecosystem services, the impact of relevant adaptation and mitigation measures on the development of biodiversity is also described. The overview includes only those measures that are implemented in the residential area of the city or have a direct impact on the territory of the residential part of the city.

Each measure mentioned in this publication contains a brief general description of the measure, a description of its mitigation impact (positive or negative), adaptation impact (positive or negative) and impact on biodiversity (if relevant).

GET INSPIRED

Catalogue is available in print version in the Community Centre for Climate and Biodiversity and it is available in electronic version at the website

<https://odolnesidliska.sk/download/>
in the section Download

Project Outputs:

<https://lnk.sk/lvwd>



Monitoring



Action plan



Refurbishment



Awareness



Legislation

3. Deep renovation of public buildings and public open spaces revitalisation

At present, there is a lack of successful realisations as well as lack of the specific examples of the adaptation and mitigation measures carried out during the deep renovation of buildings and reconstruction of public spaces. Climate change requires solutions that are not only innovative but also demonstrative, serving as positive examples for other similar residential districts.

3.1 Deep renovation of public buildings

Thanks to the support of the project DELIVER, two public buildings in Bratislava Karlova Ves, have undergone a deep green renovation: the building of the Kindergarten Kolískova 14 and the Primary School A.Dubčeka on Majerníkovej 62 street. The goal was not only to significantly reduce energy consumption, but also to ensure the quality of the indoor environment, improve the surrounding microclimate, preserve natural resources by using rainwater, and support the biodiversity in the school and kindergarten areas.

The buildings use renewable energy sources through solar and photovoltaic panels installed on the roof.

In addition to high-quality insulation of the roof and facade, overheating is prevented by effective shading of windows with external lamellar blinds or fixed sunbreakers, green walls made of a net with climbing plants, and vertical systems with winding plants. Ventilation is provided by controlled ventilation with heat recovery, which allows heat to be recovered from the exhaust air. A unique solution in the kindergarten is the intake of clean air from the renovated internal atria with realized climate ponds and planted greenery, which supports biodiversity and also serves as a natural air purifier.

The comprehensive renovations of both buildings should serve as a prototype model for the renovation of similar public buildings in Slovakia.



Refurbishment



Kindergarten Kolískova 14 after deep renovation



Atrium of the Kindergarten Kolískova 14 after revitalization



Primary School A.Dubčka after deep renovation

3.2 Public space revitalization

A comprehensive approach was tested in the revitalization of a public space Kaskády to use green infrastructure to mitigate the negative impacts of climate change, such as expected periods of drought, summer heat waves, and subsequent heavy rains. It is one of the few public green spaces in the Dlhé Diely

space Kaskády has the character of blue-green and grey infrastructure. The blue-green infrastructure supports infiltration of rainwater from paved walkways and the surrounding sloping terrain.

Grey infrastructure will be used in the form of two underground retention tanks, where rainwater is collected from part of two surrounding apartment buildings (from roofs and terraces).



Public space Kaskády before revitalization



Public space Kaskády after revitalization



Bratislava-Karlova Ves Municipality. However, despite his favourable location, this space does not use its potential sufficiently. Although this area suffers from a lack of water in the summer and is therefore very dry, at the same time during heavy rainfall, rainwater accumulates inappropriately in the lowest places.

The sustainable urban drainage system constructed on the public

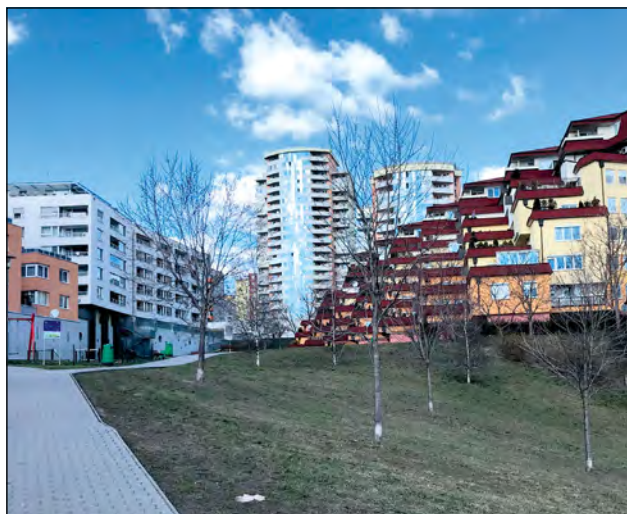


The revitalisation of the public space Kaskády improved the micro-climatic conditions in the area, supports biodiversity in a densely built-up urban area by creating wetland habitats and planting native species of tree and shrub vegetation. By revitalizing the open space, the park became more climate resilient area and attractive for the inhabitants of the Municipality. Within the DELIVER

project, the first two phases of water retention measures were successfully implemented. Thanks to this, the

Bratislava-Karlova Ves Municipality was able to apply for additional financial resources from other sources

and was able to implement the final third phase as well.



Public space Kaskády before revitalization



Public space Kaskády after revitalization

Deep renovation of buildings and revitalization of public spaces including nature-based solutions and biodiversity protection

GET INSPIRED

The Brochure *Climate resilient development: Innovative solutions and measures in public spaces and buildings* is available in the Community Center for Climate and Biodiversity and is available for free download in the electronic version on the webpage: <https://odolnesidliska.sk/download/> in the section Download /Project Outputs: <https://lnk.sk/kvgt>



4. Consulting, education, awareness raising

At present, it is crucial to increase public participation in the process of combating climate change in order to enhance their climate resilience and to promote biodiversity. This will also increase the climate security of inhabitants themselves.



Awareness

4.1 Interactive map Green, Climate-Resilient and Nature-Friendly Karlova Ves

As part of the interactive map Green, Climate-Resilient and Nature-Friendly Karlova Ves, the outputs of mapping vulnerable locations, as well as implemented measures to increase the climate resilience of the

municipality and protect biodiversity, are published. Map results are divided into 3 areas:

- Climate-resilient Karlova Ves
- Green Karlova Ves
- Nature-friendly Karlova Ves



Monitoring



Action plan



Refurbishment



Awareness



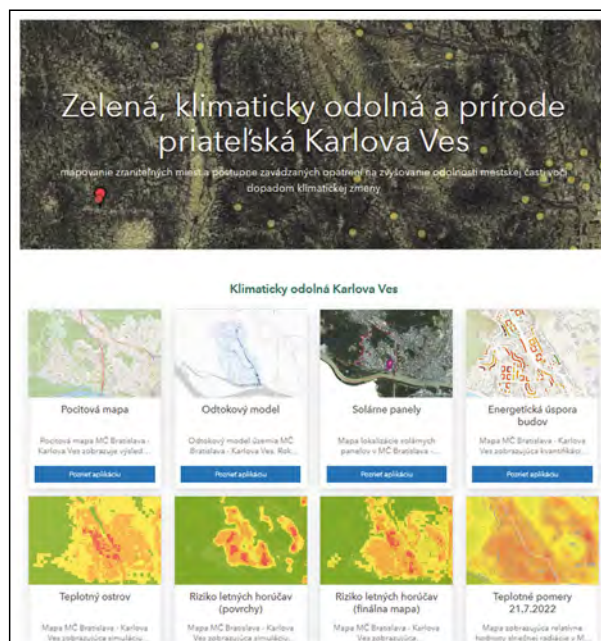
Legislation

Public awareness
raising and
engagement of local
communities

GET INSPIRED

The map in Slovak language is available
on the website:

<https://mapy-karlovaves.hub.arcgis.com/>



4.2 Community Education Centre for Climate and Biodiversity

A significant action during the deep renovation of the building of the Primary School A.Dubček on

Majerníkova 62 street was the reconstruction of one part of the heat exchanger station into the Community Education Centre for Climate and Biodiversity. The centre is open as a space for education in the environmental field with a focus on climate

change. It also serves as an consultancy and educational centre for the interested public in the implementation of the renovation of residential buildings, public buildings, and public spaces. The centre is divided into several zones, both indoors and outdoors.

The presentation room with a capacity of 20-30 people is available to organize educational lectures, workshops, and seminars dedicated to ecology and climate change.

The exhibition in the inner atriums of the school consists of information panels and functional prototypes of interactive 3D models, as well as a space dedicated to the promotion of biodiversity, the cultivation of plants and herbs, and demonstration of sustainable rain-water management.



In the sports and recreation area Majerníkova 60-62 near the Primary School A. Dubčeka, **an educational information trail** was built dedicated to various examples of how to support biodiversity – the diversity of animal and plant species. There is also a gazebo for outdoor educational activities with a demonstration of rainwater harvesting. A community school herb garden has been built near **the gazebo**, and there are several elements to support biodiversity throughout the area (insect hotels, hedgehogs' hiding place, etc. - see the map).



GET INSPIRED

To learn more about the centre in Slovak language, visit the Bratislava-Karlova Ves Municipality webpage: <https://www.karlovaves.sk/zivotne-prostredie-a-projekty/komunitne-centrum-pre-klimu-a-biodiverzitu/> The leaflet for educational trail in English is available on the webpage <https://odolnesidliska.sk/download/> in the section Download Project Outputs: <https://lnk.sk/jxoy>



5. Legislation



Legislation

Reaction to climate change requires to propose changes and improvement of effectiveness in national legislation, norms, standards and methodologies. These proposals should enable changes at national and local level towards strengthening climate resilience by applying

good practice principles in renovation of buildings and revitalisation their surroundings.

To reflect the approach and experience gained during the project implementation as much as possible also at the national level, the selection and analysis of the relevant legislation have been carried out, especially related to the of the Act on Spatial Planning and Building Regulations (Building Act) and the Nature and Landscape Protection Act. A proposal of recommendations

inspired by foreign experience as well how to modify those Acts and a proposal for sectoral standards on rainwater management have been prepared.

Strategies, standards, methodologies and supporting policies

Photos: archive of the Bratislava-Karlova Ves Municipality



The publication was prepared within the project DELIVER: Developing resilient, low-carbon and more LIVable urban Residential area, code LIFE17 CCA/SK/000126 – LIFE DELIVER, financially supported by the European commission, from the financial instrument for the environment: the LIFE program, from the "Climate Protection" sub-programme.

More information about the DELIVER project can be found on the website: <https://odolnesidliska.sk/home/>



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