



PROJECT FICHE FOR INVESTMENT MEASURE

Municipality	Ruse
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1. Name of the investment measure

Creation of innovative zones aimed at combating the heat island effect on urbanized territory – anti-heat island.

2. Summary – general short description of the measure

The identified threat resulting from the climate changes for Ruse Municipality is a heat island on urbanized territory.

Object of intervention is an open pedestrian underpass on Tzar Osvoboditel Blvd. in the central city part, which represents a key pedestrian corridor with high-volume passenger traffic.

The investment project represents the establishment of an *anti-heat island* consisting of combined climate change mitigation and adaptation measures in the region: reduction of the heated surface by replacing a part of the concrete pavement with grass joints; vertical greening to create natural thermal insulation; natural and artificial shading and cooling through water pulverization; construction of an irrigation system and a drinking water fountain.

The envisaged activities are aimed at reducing the urban heat island effect, lowering the temperatures on the intervention site, transforming it from a transit area into a recreational area.

The investment measure is targeted towards building on a complete infrastructure project, implemented under the ODP 2007-2013 through the introduction of the abovedescribed measures for mitigation and adaption to the heat island effect.

3. Object and place



Object of intervention is an open pedestrian underpass on Tzar Osvoboditel Blvd., which is a part of a roundabout with a 30-meter radius, defining the traffic organization in the crossroad area, as well as the organization of the pedestrian flows.

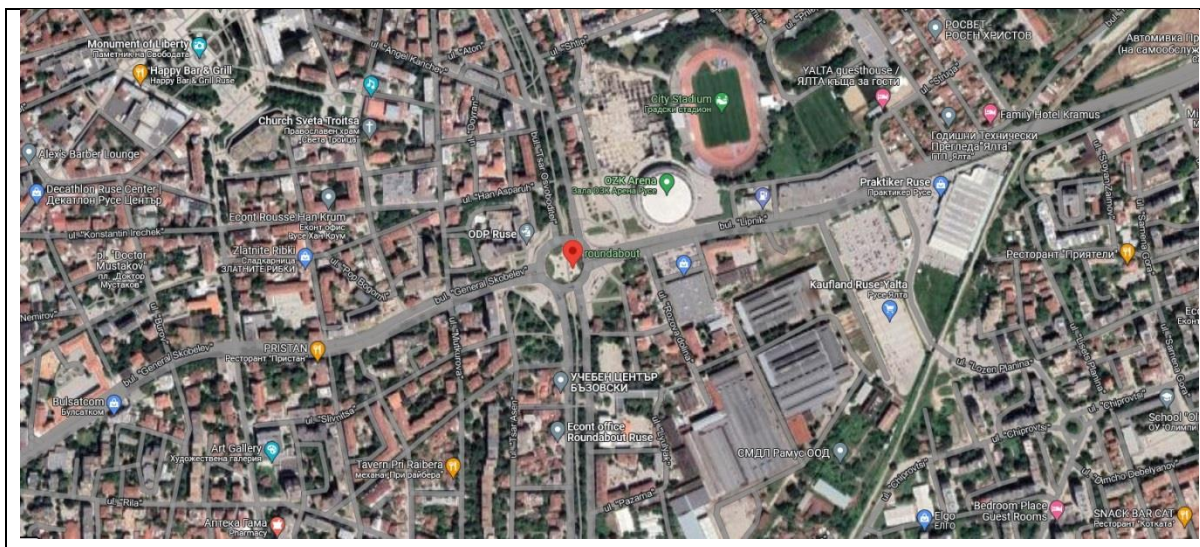
The site represents an open square with six entrances and 2.5 dca area. It is located on a key place in Ruse city, representing a pedestrian connection for a sports hall, a city stadium, a Vocational High School for Construction, Architecture and Geodesy “Penyo Penev”, District Directorate (DD) of the Ministry of Interior, Mr. Bricolage and Kaufland shops, as well as a main road artery connecting 4 residential neighborhoods.

The passenger traffic is intensive. The location is strategic and safe with an accessible environment, which is an additional prerequisite for transforming the site from a transit area into a recreational area. The green part between the road lanes along Tzar Osvoboditel Blvd. is organized as a city park. In order not to interrupt the green path in the crossroad area, the approaches to the underpass are implemented with ramps with a width of 9.60 m and 5% gradient, which provides access both pursuant to the requirements of Decree No 4 on accessible environment, as well as for cyclists. In this way, the roundabout is organized as a natural development of the park and it remains uninterrupted in the crossroad area.

The approach on the side of sports hall shall consist of variable-width stairway shoulder developed amphitheatrically with a ramp passing diagonally to provide access to people with disabilities offering a slope and rest places, as well as an additional ramp for cyclists, adapted to the concept of the cycle network in the city.

The other two approaches consist of a 4.45 m wide stairway with railings on the vertical sides, and with a guardrail in the central part, as well as of lifts. The walls are lined with limestone tiles and the ceilings are covered with latex paint.





4. Activities

The investment measure shall include the following specific activities:

- Perforation of the concrete foundation and removal of a part of the paved surface replacing it with grass joints while this intervention will in no way affect the integrity of the constructed cycle route. This will increase the green area of the square and respectively with the reduction of the paved surface the heated surface is reduced.
- Vertical greening of the wall covering the perimeter of the formed square area by installing a net and by planting climbing plants of the following species: Hedera helix – variety; Gold Child; Parthenocissus tricuspidata; Lonicera japonica. The species composition of the vegetation complies with the specific climatic characteristics of the region and the selected species do not pose a threat to the natural biodiversity. The spread of the climbing plant species and covering the concrete surface of the wall act as a natural insulation, which will contribute to the reduction of heat island effects.
- Construction of pergolas and planting of climbing plants of Wisteria sinensis species for creating natural shaded areas in 3 of the designated areas of the square area.
- Construction of combined shading and cooling installations, by water pulverization. Through the combined cooling approach, the facilities simultaneously act as an adaptive measure for combating the heat island effect as well as transform the transit pedestrian passage area into a place for leisure and socialization. At the base of the facilities, provision is made for insertion of seats and sockets for mobile devices charging. The power supply of the charging sockets and the envisioned built-in lighting shall be provided by solar panels installed on the roof and by batteries for the storing of the received energy.
- Construction of a water pipeline connection to the combined facilities, potable water fountain and irrigation system to ensure the sustainability of the envisaged vegetation.

*After finalization of the activities related to construction & installation works (CIW), subsequent vegetation maintenance will be included under **Action 622** (Maintenance of green areas and ornamental vegetation) in the budget of Ruse Municipality.*



5. Threat, with regard to which adaptation is performed

Ruse municipality has initiated the introduction of certain climate change mitigation activities such as activities related to energy efficiency and renewable energy sources, waste management schemes or electric transport introduction. However, the administration has no experience regarding planning and implementation of climate change adaptation measures in the urban development.

The current strategic documents of Ruse municipality do not directly address threats and measures caused by the climate changes. Such measures are set out in the Municipal Integrated Development Plan (MIDP), which is under finalization.

The identified threat to which the proposed adaptation measure is targeted is a heat island in the urbanized territory of Ruse city.

For the purpose of the project, a detailed meteorological reference is prepared for the period 2017 - 2021. Upon analysis of this information, long periods of high temperatures, accompanied by the lack of precipitation define the threat related to the heat island effect in the urbanized territory. The average sunshine duration is 2,000 hours per year and it is bigger than that of the country due to the lesser degree of average cloudiness. The temperature regime of the municipality is typical for a moderate continental climate - with a hot summer and a cold winter. Specific to the area is the presence of a maximum consequent number of hot days (e.g. 6 and more) with a maximum temperature of 32°C, 5 and more days with a maximum temperature of 3°C, 3 and more days with a maximum temperature of 3°C, 2 and more days with a maximum temperature of 40°C. The average annual precipitation is 585 mm (for Bulgaria it is 650 mm). The hailstorms are typical during the warm half of the year, as well as the intense rainfalls.

Information on the risk groups with endangered health and life, caused by the heat island effect on territory of Ruse Municipality, has been retrieved from the database of the National Statistical Institute (NSI).

The most vulnerable persons with regard to the occurrence of a sunstroke are:

- Babies and young children – they are slower in relation to heat adaptation;
- Elderly people - slower adaptation to heat than others;
- People with accompanying medical conditions - usually cardio-vascular diseases, lung diseases, kidney diseases, diabetes, mental illnesses, alcoholism, etc. ;
- People receiving certain specific medicines;
- Sportsmen;
- People working outdoors, who are exposed to physical strain under sunshine.

The data are presented by gender, age groups, locality and cause of death, relevant to the climate changes and in particular the diseases referring to the most vulnerable groups affected by the heat and sun stroke for Ruse city. The annual data are presented in absolute numbers and per 100 000 population for the period 2010-2020.





6. Used experience from Norway and/or from the Report on good practices:

The report of the Norwegian Partner Organization (KS) and the Western Norway Research Institute (WNRI) as well as the study trips to Norway with the presented good practices presented and examples for addressing specific threats have led the team to consider the most appropriate and region-relevant threats and the appropriate measures to cope with them. Key importance for the determination of the appropriate investment measure is the strategy presented in the WNRI report of Vitoria-Gasteiz -Spain. Their efforts are focused on the increase of the green areas and the biodiversity in an urban environment, where the contribution to the reduction of the urban heat island effect is considered to be an important common benefit. The presented example for cascade greening of facade walls has contributed to the building on the idea for implementing adaptation measures and for the supplementing of its combinative nature (cascade greening of the concrete walls on the intervention site) in Ruse municipality. The interventions in Trnava city – Slovakia, in a very precise way, are included in the final version of identifying a pilot measure for Ruse city. Trnava example represents a more direct approach to tackling thermal stress and the urban heat island effect mitigation. The concrete and asphalt are replaced by grass joints and vegetation and a fountain is built, thus the neglected urban terrain is turned into a leisure zone. Afforestation enhances the air quality around the buildings, reduces the pollution levels and contributes to the carbon sequestration having while a cooling effect.

7. Innovations:

Use of combined mitigation and adaptation measures to the urban "heat island" effect - building of an anti-heat island. The innovation is expressed in the combination of the specific activities, which mutually complement each other and reinforce the effect of the rest. The replacement of a solid pavement with grass joints and greening in combination with the vertical landscaping and the water facilities constitute a single entire complex that has not been implemented in a similar place on Ruse territory, but also in other settlements. The pilot innovative nature of this combination will serve as an example for its implementation on other similar locations in Ruse and other settlements.

8. Indicative budget of the project idea:

All envisaged activities are expected to fall within the scope of the budget of Ruse Municipality under the project. A detailed bill of quantities shall be drawn up (value according to an approved budget) – BGN 402,872 (VAT included).

9. Project readiness:

A market study has been carried on the readiness for implementation of the structural elements envisaged in the measure.

10. Procurement mode:

Public competition pursuant to the Public Procurement Act (PPA).





11. Compliance with the municipal policies – plans, strategies:

Under MIDP – Measure 2.2. Urban area improvement and spatial development of the settlements

Section VIII it.3 from Main groups of measures for achieving the objectives included in the Ambient Air Quality Program (2021 - 2026).

12. Synergic effect and connection with other implemented or planned projects in the urban area:

The envisaged intervention builds on investment measures carried out under the "Integrated Urban Transport System of Ruse City", component 3 financed under CAP 2007-2013. Upon implementation of landscaping measures to the site (open roundabout underpass), the envisaged vegetation has not been intended to ensure shading of the open site. The pavement heating during the summer months along with the lack of adequate vegetation further increases the "heat island" effect. The envisaged measure is intended to build on the infrastructure site by introducing practices for adaptation to the heat island effect identified after its implementation.

Landscaping and grassing of public transport stops (10 pcs.), which are owned by Ruse Municipality, is envisaged. The funds are included in the municipality budget for 2022.

13. Results from the consultation meeting

Date and venue of the meeting: 04.07.2022, Ruse city, 6 “Svoboda” Sq., St. George Hall.

Participants: Mayor of Ruse Municipality - Mr Pancho Milkov, Deputy Mayor "Territorial Development" - Mrs Magdalena Ilieva, Chief Architect – Mr. Ivan Enimanev, representatives of the Chamber of Constructors, Chamber of Architects, Ruse University “Angel Kanchev”, the Director of the Regional Inspectorate of Environment and Water (RIEW), experts from Ruse municipal administration, representatives of the business, media, students and citizens, the project team.

Expressed opinions:

- Select carefully the vegetation species to be planted on the site by considering high plants – trees;
- The grass joint is not a suitable surface for a pedestrian underpass – interruption of the route of the cycle lanes and of the passenger flow should be avoided;
- The selected object is appropriate and will become a place not only for recreation but also for meetings of the young people in the city;
- Envision construction of such combined facilities on the Ruse quay as well;
- Include in the early childhood educational system studying and educating on protection of the environment and its resources.
- Include in every discipline in the curricula and turn into a behavioral norm themes such as: climate change, innovative solutions to cope with them, adaptation, environmental protection, increase of the green areas in an urban environment - greening of roofs, facades, etc.
- Facilitate the procedures for project coordination and contractor selection in accordance with PPA.





- Ruse municipality should increasingly partner with the non-governmental sector

Summary: Responsible and innovative thinking in terms of environmental protection and climate change adaptation since early childhood. Change in curricula of the secondary and higher educational institutions, as well as in regulations. Innovation in the construction sector - increasing the number of the green buildings. As regards the identified site, selection of the most suitable plant species and adding suitable trees that will be resilient to the atmospheric conditions, which are specific for the area. The grass joint should not impede the passenger traffic. In the future, emphasis should be placed on the natural shading with vegetation species. Wider dialogue of the municipal administration with the non-governmental organizations.



14. Anything else, which is specific for this measure:

The envisaged set of activities, comprising the overall adaptation measure, contributes to the achievement of *additional benefits*:

- The greening and the water availability contribute to the mitigation of the impact on the climate changes;
- It is expected that these measures will also contribute to the reduction of the levels of fine particulate matter through pulverization systems and biodiversity increase.
- The expected social benefits are linked to the expanded use of this space on the part of more social groups, in this connection - for recreation and leisure.

