



PROJECT FICHE FOR THE INVESTMENT MEASURE

Municipality	VARNA
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1. Name of the investment measure

Prevention system for monitoring and control of the negative geodynamic processes resulting from intense precipitation as a climate change adaptation measure

2. Summary – general short description of the measure

The intense precipitation and its impacts on the negative geodynamic processes have been identified as a leading climate threat, which has the widest effect on Varna city territory. This logically predetermines the selected innovative measure, namely the implementation of a Prevention system for monitoring and control of the negative geodynamic processes, resulting from intense precipitation as climate change adaptation measure. The system will include three modules, which complement each other and represent a comprehensive solution to the landslide problem in the city, which during the recent years, as well as in the future, have been/will be strongly influenced by the more frequent heavy precipitation.

Module 1: Implementation of a pilot project to monitor the dynamics of the geodynamic processes and build instrumentation systems (IS) in landslide areas for monitoring – IS design and construction.

Module 2: Digitization of data for real time tracking and tracing of registered and newly activated negative geodynamic processes and risk areas on the territory of Varna municipality.

Module 3: Development of a Roadmap to mitigate the effects of the negative and disruptive geodynamic and gravity processes and phenomena along the slopes on the territory of Varna Municipality.

Module 1 and Module 2 provide an opportunity for building on and replication.

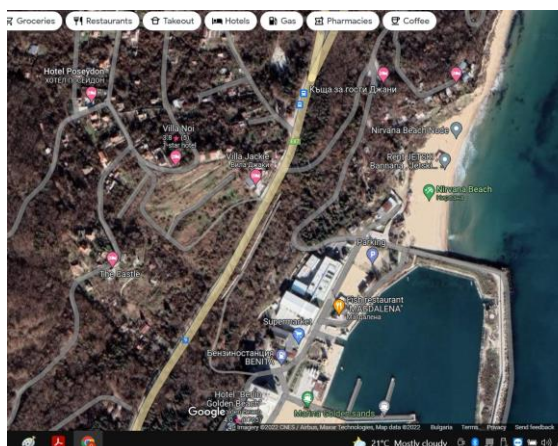
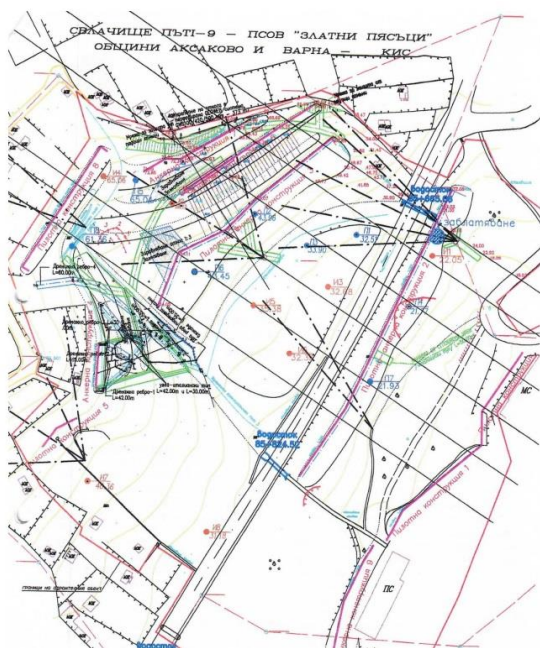


3. Object and place

Module 1: Implementation of a pilot project to monitor the dynamics of the geodynamic processes and build instrumentation systems in landslide areas for monitoring – IS design and construction.

The intervention site of the pilot project is a part of **Golden Sands landslide** - in the area above the Waste Water Treatment Plant (WWTP) and 1-9 road - Varna - Kranevo. The landslide occurred in 1997.

The landslide wave reached the pumping station of WWTP “Golden Sands”. All buildings and engineering structures within the landslide body were destroyed. It affected territories in two municipalities - Aksakovo and Varna.



The area has been selected due to the fact that the landslide is also active at present and is located in immediate vicinity of the Golden Sands resort and Golden Sands Nature Park.

Another suitable location for implementation of the measure is a part of Kabakum landslide in Chaika resort in the zone above Sunny Day resort.

Module 2: Digitization of data for real time tracking and tracing of registered and newly activated negative geodynamic processes and risk areas within the territory of **Varna municipality**.

Module 3: Development of Roadmap for mitigating the effects of the negative and disruptive geodynamic and gravity processes and phenomena along the slopes on the territory of **Varna Municipality**.

Module 2 and Module 3 will cover the territory of Varna municipality and the target groups, which will benefit from them, will be local, regional and national organizations,



NGOs, natural and legal persons.

The implementation of the selected measure provides an opportunity for control of a given territory, opportunity for replication in all other similar areas, as well as for provision of timely information about the risk areas within the municipal territory.

4. Activities

Module 1: Implementation of a pilot project implementation to monitor the dynamics of the geodynamic processes and build instrumentation systems in landslide areas for monitoring – IS design and construction (6-9 month implementation period).

- Developing Technical Design for as a minimum the following parts: survey, geotechnics, geodesy, Safety and Health Plan (SHP);
- IS design and building - piezometers and inclinometers will be installed to trace remotely the landslide depth dynamics and the groundwater level and transmit information to the services, involved with the undertaking of timely actions
- Construction supervision

State Approval Commission - within 1 month following issuance of Act 15 for establishing the approval fitness of the construction (part/ phase thereof)

Module 2: Digitization of data for real-time tracking and tracing of registered and newly activated negative geodynamic processes and risk areas on the territory of Varna municipality (6-month implementation period).

- Design and delivery of a software platform to meet the needs of Varna municipality, which will include:
 - Electronic register of the existing landslides and other risk areas on the territory of Varna municipality;
 - Map of the risk areas, subjected to erosion, abrasion, floods and other natural disasters
- Training of employees to work with the platform - within 1 month following the launching of the platform.

Module 3: Development of a Roadmap to mitigate the implications of the negative and disruptive geodynamic and gravity processes and phenomena along the slopes on the territory of Varna Municipality (6-month implementation period).

The Roadmap will set up preventive measures in short, medium and long term to reduce the harmful effect of the destabilizing factors resulting from the intense precipitation, risk mapping, restriction and rapid liquidation of the consequences of these processes; protection of the population, material funds and the environment from their impacts. Ways for financing these actions, obligations and responsibilities of the relevant local institutions will be identified. These will be developed in perspective and for a 5-year period, envisioning funding from the municipal budget up to 2% on annual basis.





5. Threat, with regard to which adaptation is performed

According to most climate change scenarios and conducted analyses, precipitation is expected to increase during the winter months, although significant decrease in the precipitation during the summer months is expected to compensate this increase. The scenario analysis indicates a trend for increasing the frequency of extreme events and disasters such as heavy rainfalls. The precipitation and the terrain elevation in Varna city have led to erosion of about 60% of the municipal territory. Varna shore is directly affected by erosion and abrasion. The analysis of the geodynamic state of the landslide areas along the Black Sea coast within the scope of Varna municipality with manifested landslides, erosion and abrasion processes shows that these exogenous phenomena continue their active operation both in places where they have already manifested themselves, as well as in places where they have been activated for the first time. As at 31.12.2021, 88 landslides with a total area of 33.5 sq. km have been registered on the territory of Varna city.

Given the nature of the implemented project, the location of Varna municipality, the topical problems and ways to deal with them, as well as the social, economic and environmental effect that these problems exercise on the public, the expert team of Varna municipality has chosen to examine the detailed landslides in urbanized areas as a natural disaster and a problem for Varna city and to suggest an option to limit the risk of their occurrence, as well as climate change adaptation measures.

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

The shared experience and methodology, provided by the colleagues in Norway at NVE – Bergen Regional Center (<https://nve.no/kart>), as well as the good practices, we have been familiarized with by the Norwegian Partners have been very useful for the preparation of the analyses and for the finalization of the proposed investment measures (especially with regard to the second module),

7. Innovation:

The measure selection process from the very beginning includes the idea of defining the opportunities for innovation and ends with the proposed innovation activities. An attempt is made in the report to establish the demand for innovative approach as a good practice.

The proposed measure, as well as the three modules of which it has been structured, are innovative since until today such activities have not been applied, drawn up and implemented on the territory of Varna municipality. There are no prepared strategic documents containing measures aimed at climate change adaptation and / or mitigation. There is a possibility to replicate the implementation of Module 1 in other areas of the territory.

8. Indicative budget of the project idea:

Market studies and consultations have been conducted to determine the projected value of the main activities. The projected market value is comparable to the market value: for inclinometers, piezometers and instrumentation.

As a result of the conducted market studies, the following conclusions were drawn: The





price established for the activities under the report is adequate to the average market prices, determined in accordance with the project's financial resource (**BGN 360 000, VAT not included**) and calculated on the basis of the actual costs, which would have been incurred by the participant appointed as a service provider.

The measure and the three modules are elastic - i.e. they allow building-on during the design process, accounting for the parameters of the allocated budget.

9. Project readiness:

As of now, only feasibility studies related to opportunities for implementation of the volume and content of Modules 2 and 3 have been carried out.

10. Procurement modes:

Module 1 – direct awarding pursuant to PPA, up to BGN 270 000, engineering

Module 2 and 3 – in a process of clarification for awarding a service under PPA

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

- Integrated Urban Development Plan - Priority 1, Measure 1.2. Climate change mitigation
- Green city action plan (GCAP) of Varna municipality with validity period until 2027 in the following sections:

Part IV. Measures for climate change mitigation, as well as for climate change adaptation and disaster risk reduction

5.9.2. Ongoing actions in Varna - the municipality has set up the objective to introduce preventive measures to tackle extreme natural disasters and mitigate the climate change impact.

12. Synergic effect and link to other implemented or planned projects in the urban area:

For the period 1996-2021, more than 10 emergency-drainage and reinforcement initiatives in different sections of I-9 road “Varna-Albena” have been implemented. The implemented facilities from the general reinforcement schemes under these projects guarantee the normal road operation, but not the construction in the individual properties. In the selection of the general reinforcement schemes under these projects, account has been taken of the existing development at the time of the conducting of the survey work pursuant to the statute of the designated areas.

Implemented projects and potential areas for replication of the IS system from the pilot project.

- "Project for reinforcement of Black Sea landslides. Reinforcement of a landslide in the area of Panorama stop –WWTP “Golden Sands” and I-9 road – Golden Sands resort;





- Project “Reinforcement of a landslide in Chaika resort, Kabakum neighborhood and rehabilitation of IV-90023 road “Varna - Golden Sands resort” - km 3 + 190 - km 3 + 901”¹ implemented under project: "Bulgaria - protection of the river banks and sea shores against the erosion and the associated with it landslide processes"
- In 2005, survey work for "Pisatel" landslide was performed, accompanied with a selection of a "general reinforcement scheme" and establishment of geodetic and piezometric networks. The implementation of the selected reinforcement scheme was started in 2007 and by 2011 the following activities were implemented:
 - "Reinforcement of landslide - IV-90023 road “Varna - Golden Sands resort” within the section from the Wooden Bridge to the end of Sunny Day resort.
 - Project No BG 98.10-05.01 "Reinforcement of landslide in St. Nicholas neighborhood"; Contracting Authority - Ministry of Regional Development and Public Works, Directorate for European Infrastructure Projects - 2005-2007.
 - Project "Reinforcement of I-9 road “Varna - Golden Sands resort, "Trakata” stop - general reinforcement scheme"; Contracting Authority: Ministry of Regional Development and Public Works, 2000-2001.

All abovementioned landslides are located on the urban territory of Varna municipality. Local reinforcement and drainage initiatives have also been performed in these areas, which have been implemented by owners of individual properties, related to and needed by the construction works taking place in them.

13. Results from the consultation meeting

The consultation meeting took place in Varna Hall of Varna Municipality on 30.06.2022. It was attended by 53 participants - politicians from the municipality; experts - representatives of the Directorates “Ecology and Environmental Protection”, "European and National Operational Programs", "Financial-Economic Activities", “Architecture, Urban Development and Development Planning”, “Engineering Infrastructure and Public Works”, the Chief Architect and regional architects; representatives of different institutions – Regional Inspectorate of Environment and Water – Varna, Regional Directorate “Fire Safety and Civil Protection” – Varna (RDFSCP – Varna), Geozashtita, Proektstroj, Geoproject, NTEF; media – Bulgarian National Radio (BNR), "Darik Radio" and TV “SCAT”.

The project team of Varna municipal administration shared and discussed with the expert community the proposal for an investment measure, which will be funded this year. The concrete ideas were considered and expert opinions gathered related to the implementation details and possibilities for replication of the measure on other sites. Different views were expressed by experts, including views related to landslide threats; need for provision of additional resources for behavioral measures to reduce the impact; steering in the necessary direction the water energy in the drainage channels; climate migration; technical infrastructure role; reinforcement of the sea shore; lack of standards in the regulation and of other standards related to the project idea topics.

The general opinion, based on the conducted consultation meeting, is that there is a clear need to implement the proposed measure, but in relation to the climate





change adaptation and mitigation, it is necessary both to replicate and implement the concrete investment measure in other city areas and to provide resources for the simultaneous implementation of a larger number of measures to enable a more successful adaptation and to achieve substantial mitigation of the climate changes.

14. Anything else, specific for this measure:

Additional benefits:

- With the implementation of the measure, a positive social response is expected to be achieved among the general public, since the problem of Varna city territory is extremely topical and widespread.
- The proposed innovative measure under "Predefined project No.3 Implementation of innovative climate change mitigation and adaptation measures in municipalities in Bulgaria" is coming on time to allow Varna Municipality to respond adequately to the climate changes, which are increasingly exacerbated with the lapse of time and to mitigate the effects from these changes.
- The aim of the measure is to help the public to adapt to the new climate specificities by minimizing the risk of damages and by making use of new opportunities.
- Through publication of information on the Varna municipality website popularization of the problem related to the climate changes and the fight against their implications is expected.

