





JOINT ACTION PLAN

Project: Effective prevention and mitigation of flooding consequences in the cross-border region Garmen – Bosilovo

June 2023

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I. Background

The Joint Action Plan is an activity implemented by the two project partners – the municipality of Garmen, Blagoevgrad Region, Republic of Bulgaria, and the municipality of Bislovo, Southeastern region, Republic of North Macedonia, under a project, financed by the European Union, in accordance with the rules of Interreg - IPA II CBC Bulgaria–North Macedonia programme, Project Title: Effective prevention and mitigation of flooding consequences in the cross-border region Garmen–Bosilovo.

The project is co-financed by national public contributions from both states - the Bulgarian Government, concerning the municipality of Garmen (Project Partner 1), and the Ministry of Local Self-Government in North Macedonia, concerning the municipality of Bislovo (Project Partner 2). The Managing Authority (MA) for the project is the Bulgarian Ministry of Regional Development and Public Works (MRDPW) under Subsidy Contract No. RD 02-29-232 /29.09.2022, within programme Interreg - IPA II CBC Bulgaria – North Macedonia Programme CCI 2014TC16I5CB006.

The present Joint Action Plan has been prepared by a service contractor, nominated by the Lead partner (PP1) - the municipality of Garmen, under service contract No. 102 / 28.04.2023, concluded following a single tender procedure, according to the applicable PRAG rules for Interreg - IPA II CBC Bulgaria–North Macedonia.

At the time of preparing this Joint Action Plan, the 2 partners have started, in parallel, the implementation of the small scale investments foreseen in the Subsidy Contract, namely construction works for : "Correction of a gully through the village of Garmen between quarter 63 and quarter 65 and correction of a gully through the village of Ognyanovo between quarter 48 and quarter 50", municipality of Garmen, as well as "Construction of atmospheric water sewers in the villages of Borievo and Bosilovo", municipality of Bosilovo.

II. Situation and prerequisites for joint planning

1. Similarities and differences between the partners

The 2 municipalities share similar risks of flooding, due to their similar climatic and hydrological conditions, as they are only 20 km apart in geographic latitude, they are both close to mountain areas, and face seasonal surface water streams from rain or melting snow, as the main factor of flooding. Both municipalities are relatively safe from river flooding. The river flooding factor is relatively higher in Bosilovo from the Ilovitza (Ilchovska) river.

The villages of Garmen and Ognyanovo are respectively 2,6 km and 1,4 km away from the larger Mesta river, therefore it is not a river flooding, but their proximity to mountains and exposure to temporary streams from the slopes that raise the flooding risk for the Bulgarian partner. The villages of Garmen and Ognyanovo is adjacent to mountain slopes and has relatively less time to react to sudden streams (flash floods).

The villages of Bosilovo and Borievo in North Macedonia, are very close to the smaller Strumitza river and to other even smaller local river tributaries, situated in a flatter area. Bosilovo and Borievo are 9 km away from mountains, therefore the flooding risk for the Macedonian partner is more related to raising levels of permanent water bodies, during excessive rains. The water bodies have a potential to threaten mostly agricultural land and agricultural buildings, therefore the small-scale investments under the project are targeted to protect residential properties inside the settlement, which is a less costly and immediate task, implemented in shorter time – building a concrete channel along streets in Bosilovo and Borievo.

The hydrographic network in the municipality of Garmen is Kanina River and the Varbitza River. The territory of the Garmen municipality is not defined as an area with a significant potential risk of floods. From the information on past floods in the Garmen municipality, there is a possibility of floods during heavy rains in the lands of Ognyanovo, Marchevo and Dabnitsa. The variety of relief and the shape of the watershed do not allow the simultaneous formation of a high wave in all parts of the basin of the Kanina River and the Varbitza River. As a result of prolonged rainfall with a high intensity, the most unfavourable consequences of an increase in river levels are at Ognyanovo, Marchevo and Dabnitsa. The proximity of the Padinite dam, which is 1 km north of Ognyanovo and retains a volume of 6 080 m3, could in the event of a breakthrough, affect the road from Ognyanovo to Ribnovo, certain residential buildings in Ognyanovo.

The hydrographic network in the municipality of Bosilovo is quite richly intertwined with several rivers, streams, artificial canals and reservoirs. There are 4 rivers in the Bosilovo area with certain flooding potential: the main river - Strumitza and its tributaries Turija, Vodochitza and Trkajna, as well as 4-5 smaller streams. The main recipient in the Municipality, with a regulated river bed, is the river Strumica, which stretches for 9.5 km in the Municipality. The left tributary of the river Strumica is the river Turia, with a length of the river bed in the Municipality of 7 km. The right tributary of the river Strumica is the Monospitovo canal with a 14 km river bed, which is regulated in length all the way to the Monospitovo Swamp. A smaller river channel flows into the Turia River - Petralički Azmak and Ilovichka Reka, 9.8 km long, which flows out of the reservoir. The Strumica River also flows into the Štuka River, which springs from the slopes of Mount Ogražden, with a riverbed length of 4 km. Smaller watercourses in the municipality are: Azmak, which passes by the villages of Gecherlija and Petralinci, accepting the stormwater that it brings into the river Turia, and Drvoška Reka, which passes through the village of Drvoš, but throughout the year it has a dry bed, so it serves more as a drainage channel. during torrential rains.

There are 6 dams/reservoirs in Bosilovo, 5 of which are classified as high dams – 20-30 metre, stone embankments with clay core – Ilovitza, Turija, Vodocha, Novoselka, Markova. The Ilovitza reservoir is filled by the Ilovicka River, which in the event of torrential rains fills it with large sediments, because there are no cascades built in the river to stop the sediment. Due to the filling of the reservoir with deposited material, its useful volume decreases. Flooding occurs during heavy rain and snow. Floods occur all over the year - March-June, September-November, February. According to observations, flooding occurs mostly in the late evening or early morning hours. The Municipal plan for protection against floods is focusing on measures for reducing the intensity of flooding by monitoring the condition of dams, controlled release of excess water

from the reservoirs during excessive rains, and improving the conductivity of the river beds, to convey the water from the dams, when it is released into the rivers and streams in emergency situations. It was particularly considered under the project, how to protect the residential areas from the small streams trespassing the villages, during increased levels in the surrounding water bodies.

The Bulgarian partner is facing relatively fewer flooding quantities, which can be countered with less investments, but the threats are more sudden and temporary. This leaves less time to react and, on the other hand, the lower frequency of disasters may result in underestimating the long-term technical condition of the flood prevention infrastructure during the long periods of absence of threats.

The North Macedonian partner is facing less sudden, but generally higher water quantiles, which are more regularly demanding for interventions and higher investments in improving the conductivity of small tributaries and controlling the retention capacity of nearby dams.

2. Overall purpose of the joint planning

The development of Joint Action Plan for disaster management and risk prevention, under project: "Effective prevention and mitigation of flooding consequences in the cross-border region Garmen – Bosilovo", Bulgaria is aimed at assisting the municipal authorities to react immediately and properly when a specific risk situation occurs, by the designation of operational steps to improve the cooperation between the two local bodies in managing emergency situation. The Action Plan brings these cooperation and coordination measures to the local level and more specifically will make use of the results of the overall project.

3. Specific aim of the joint planning

While every municipality does its own flood protection planning, as required by law, with the respective structures and allocation of responsibilities, the particular measures need to be continuously adapted to the local context.

Therefore, the focus of the joint action planning under this project, is in particular:

- to share the analyses of the causes of flooding in the respective area and the other partner's prevention measures, which are as similar as the climatic and hydrological conditions are;
- communicating the partners' observations on past disasters, such as the effectiveness of the already adopted reactions/measures how justified and adequate were the implemented measures, were they effective, were there any omissions which reduced the impact of interventions;
- what co-financing opportunities exist for the more costly investments, which the partners could benefit from, as they did under the current project.

As foreseen under the current project, the partners shall meet in Bosilovo for a training event, which is scheduled under the current project. This will be an opportunity to exchange information, practices and observations, as mentioned above.

4. Legal and methodological background to the Joint Action Plan

The Joint Action Plan is not a substitute to the partners' standalone actions plans, which are required by law. It is rather a commitment to further improve the process of their own planning, by including, possibly as annexes to their standalone plans, the following elements, pursuant to Directive 2007/60/EC of the European Parliament and the Council of 23 October 2007 on the assessment and management of flood risks. Since flood risk management plans are a long-term commitment, it is appropriate to harmonize them with the EU norms.

The national legal background for the Bulgarian partner is the Law on Protection from Disasters Art. 65a, and Art. 6d, para 5 of the Law on disaster protection. The national legal background for the North Macedonian partner is the Law on waters, Art 126, para 1 and 3.

According to Directive 2007/60/EC, the planning bodies should establish objectives focusing on the reduction of potential adverse consequences of flooding, in particular for:

- human health;
- the environment;
- cultural heritage and economic activity;
- if appropriate non-structural initiatives reducing the likelihood of flooding.

According to Directive 2007/60/EC, the planning bodies should categorise the planned measures for achieving the above-mentioned objectives. A list of most typical measures is presented in Annex 2, addressing the objectives listed above. According to Directive 2007/60/EC, the planning bodies should also consider, while developing Action Plans for flood risk management:

- the costs and benefits;
- the flood extent and flood conveyance routes;
- areas which have the potential to retain flood water, such as natural floodplains;
- environmental objectives (Art. 4 of Directive 2000/60/EC achieving good ecological potential, protect and enhance all artificial and heavily modified bodies of water;
- soil and water management;
- spatial planning, land use, nature conservation.

According to Directive 2007/60/EC, the planning bodies should address, in their flood risk management plans, all aspects of flood risk management, as follows:

- focusing on prevention, protection, preparedness;
- including flood forecasts and early warning systems and considering the characteristics of the particular river basin, or sub-basin;
- the plans may also include the promotion of sustainable land use practices, improvement of water retention as well as the controlled flooding of certain areas in the case of a flood event.

The national norms, as well as the Agreement between the Republic of Bulgaria and the Republic of North Macedonia on disaster cooperation, in force from 26.03.2019, provide a broader framework for planning. The consulted legal and other documents are presented in the Appendix. However, the present Joint Action Plan is targeted at immediate and specific actions, and its purpose is not to duplicate the actions already foreseen in existing legal acts, strategies and agreements.

5. Harmonizing with Directive 2007/60/EC

As long as the following structure and contents of the action plans is not reflected in the national rules, the content of the Action plans may be amended to comply with Directive 2007/60/EC:

Annex 1 – Content of a Flood Risk Management Plan

A. Flood risk management plans - Content pursuant to Directive 2007/60/EC

I. Components of the first flood risk management plans:

1. the conclusions of the preliminary flood risk assessment as required in Chapter II in the form of a summary map of the river basin district, or the unit of management referred to in Article 3(2)(b), delineating the areas identified under Article 5(1) which are the subject of this flood risk management plan;

flood hazard maps and flood risk maps as prepared under Chapter III, or already in place in accordance with Article 13, and the conclusions that can be drawn from those maps;
 a description of the appropriate objectives of flood risk management, established in accordance with Article 7(2);

4. a summary of the measures and their prioritisation aiming to achieve the appropriate objectives of flood risk management, including the measures taken in accordance with Art.7, and flood related measures taken under other Community acts, including Council Directives 85/337/EEC of 27 June 1985 on the assessment of the effects of certain public and private projects on the environment (1) and 96/82/EC of 9 December 1996 on the control of major accident hazards involving dangerous substances (2), Directive 2001/42/EC of the European Parliament and of the Council of 27 June 2001 on the assessment of the effects of certain plans and programmes on the environment (3) and Directive 2000/60/EC;

5. when available, for shared river basins or sub-basins, a description of the methodology, defined by the Member States concerned, of cost-benefit analysis used to assess measures with transnational effects.

II. Description of the implementation of the plan:

1. a description of the prioritisation and the way in which progress in implementing the plan will be monitored;

2. a summary of the public information and consultation measures/actions taken;

3. a list of competent authorities and, as appropriate, a description of the coordination process within any international river basin district and of the coordination process with Directive 2000/60/EC.

B. Components of the subsequent update of flood risk management plans:

1. any changes or updates since the publication of the previous version of the flood risk management plan, including a summary of the reviews carried out in compliance with Article 14;

2. an assessment of the progress made towards the achievement of the objectives referred to in Article 7(2);

3. a description of, and an explanation for, any measures foreseen in the earlier version of the flood risk management plan which were planned to be undertaken and have not been taken forward;

4. a description of any additional measures since the publication of the previous version of the flood risk management plan.

The following table provides a typical layout in a Flood risk management plan, displaying the connection between measures, objectives as set in the Directive and the intended effect of a measure

Annex 2 - Catalog of measures

EU	Types of measures	Objective			Effect on the objective				
EU aspect		Human health	Environment	Heritage Site	Economic activities	Avoidance of new risks	Reduction of existing risks	Reduction of adverse consequences during a flood	Reduction of adverse consequences after a flood
	Definition of priority and reserved areas in the spatial and regional plans	X	x	x	X	X			
	Determination or updating of the flood areas and formulation of usage restrictions	X	x	X	X	X			
	Adaptation of land use, or building regulations - removal of flood-sensitive uses or relocation to areas with a lower probability of flooding	X	x	X	х	x			
Measures	Flood-adapted construction and renovation - protection on buildings and infrastructure facilities	х	х	х	х	х	X		
for Avoidance of	Flood-adapted storage and handling of water- polluting substances		x				x		
Risk	Concepts, analyses to support the avoidance of flood risks	X	x	x	x	x	X		
	Flood-reducing land management	Х	Х	Χ	Χ		Х		
	Water body development and floodplain renaturation, activation of former wetlands	x	x	x	x		X		
	Reduction of surface sealing	Х	X	Х	Х		X		
Measures for Protection	Rainwater management	Х	Х	Х	Х		X		
against	Recovery of natural retention areas	Х	X	X	X		X		
Floods	Construction programmes for flood retention including dams	X	X	X	X		X		
	Upgrading, or new construction of stationary and mobile protective devices	X	X	X	X		X		
	Enlarging the flood discharge cross-section in the settlement area and floodplain area	X	x	X	X		X		
	Keeping the flood discharge cross-section free – cleaning maintenance	X	x	X	X		X		
	Establishment or improvement of municipal warning and information systems	х	x	x	X			X	
	Planning and optimization of crisis and resource management	x	x	x	x			X	
	Behavioural precaution	X	X	X	X		X	X	
	Risk provisions – financial	X		X	X				X
Recovery	Aftercare	X	X	X	X				X
and Review	Other measures in the area of restoration, generation and verification	Х	x	X	Х				X

III. Joint improvements in the partner's planning to harmonize with Directive 2007/60/EC

While the competent authorities for each river basin district (Basin directorates) should provide the municipalities with a summary map of the river basin district, as well as with flood hazard maps, and flood risk maps, it is often observed that:

- comprehensive digital maps of the river basin district, are inexistent;
- maps of the river basin district are not public, or are not interactive/user friendly;
- maps of the river basin district are in data formats not used by a municipality such as "kmz";
- maps of the river basin district, flood hazard maps, and flood risk maps are only available for high risk areas, not available for the respective municipal territory, if it is at low risk;
- there is no sufficient feedback from the municipalities regarding past floods, which delays the preparation by the national authorities of Preliminary Flood Risk Assessment (PFRA) and identification of areas with a significant potential risk of floods (APSFR);
- the development of flood hazard maps and flood risk maps for the identified flood risk areas (mapping) is in progress, without graphical data available to the municipalities when they need it;
- the existing Flood Risk Management Plans (FRMPs) of the national authorities, do not include useful maps for the particular municipality.

Note: In their joint planning, the partners must adopt and use the term 'flood risk' in accordance with its meaning in Directive 2007/60/EC, which is ,, the combination of the probability of a flood event and of the potential adverse consequences for human health, the environment, cultural heritage and economic activity associated with a flood event".

The existing municipal Operational plans on protection from floods, currently in force, may be subject to further amendments, in order to become more harmonised.

The following table outlines the requirements of Directive 2007/60/EC in the first column, which although applying primarily at member state level, are methodologically worthwhile to be followed at municipal planning level too, with the aim of more effective prevention in the future.

The table also identifies, in the second and third columns, the missing elements in the current municipal Operational plans on protection from floods. The fourth column contains proposed actions, which could be implemented jointly or severally by the partners, as applicable.

Content of the municipal flood protection plans	Municipality of Garmen – Project Partner 1	Municipality of Bosilovo – Project Partner 2	Proposed actions
1	2	3	4
Summary map of the river basin. (<i>Table Annex 1</i> , <i>Section I. Item 1</i>)	No	Yes	The municipality of Garmen may send a request to the Basin directorate of the West Aegean region, for specific data, needed for action planning, particularly for the basins of Kanina and Varbitza rivers. Installing the QGIS software, if necessary to use the hydrographic maps, if such are provided by the Basin Directorate.
Preliminary flood risk assessment (PFRA) in the form of a summary map of the river basin district, or the unit of management referred to in Article 3(2)(b), delineating the areas identified under Article 5(1) – where potential significant flood risks exist, or might be considered likely. (<i>Table Annex 1,</i> <i>Section I. Item 1</i>)	No	Yes	The municipality of Garmen may consider the methodologies for Preliminary flood risk assessments from rains, published by the authorities, e.g. http://www.moew.government.bg/static/media/upetiny/filebase/Water/PURN/PURN/E02022- 2027/Metodika.pdf pages $41 - 42$. It is recommended that the municipal planning staff read certain relevant sections of their national PFRA Guidelines, no matter that they are addressed to higher planning authorities. The PFRA is useful in clarifying the technical terms, legal provisions and provided sources of technical data, which may be useful for the municipal planning as well, especially in case of rain floods.
Flood hazard maps and Flood risk maps, at the level of the river basin district, provided by the competent authority (regional Basin directorate) to the municipality. (<i>Table Annex 1</i> , <i>Section I. Item 2</i>)	No (not at risk of river flooding)	Yes	Documentary records of past floods, in terms of scope, level and velocity of streams, dates, duration and damages. Without accurate feedback from the municipalities, regarding past floods, the Basin directorates cannot properly determine, summarize and map the hazards. As a result, the municipalities do not receive, in return, the data they need for their territory in graphic format.

Flood hazard maps	No	No	To the extent that such many may be
shall cover the	NO	NO	available only for high risk/probability
geographical areas			areas the municipalities may use the
which could be			maps prepared by the responsible
flooded according			authorities as graphic input in their own
to the following			nlans
scenarios:			
(a) floods with a			Since in many cases, the maps prepared
low probability, or			by the responsible authorities, are
extreme event			mostly generated by satellite
scenarios;			observations, they are not detailed to the
(b) floods with a			necessary municipal level.
medium probability			Therefore, the partners may use already
(likely return			available data, but in order to obtain
period ≥ 100			truly effective maps with practical and
years);			useful details, the municipalities should
(c) floods with a			collect their own data over time and
high probability,			make their own maps.
where appropriate.			Flood hazard mans are not a formal
For each scenario,			obligation of a municipality but if they
the following			are not relevant to their specific territory
elements shall be			the municipality may spend funds in
shown:			combatting threats which are highly
(a) the flood extent;			unlikely. On the other hand, many
(b) water depths or			threats may be more likely to a
water level, as			neighbouring municipality. usually
appropriate;			located on higher lands and, if prevented
(c) where			there, this will reduce the risks for the
appropriate, the			lower situated municipality.
flow velocity or the			r s
relevant water flow.			
(Table Annex 1,			
Section I. Item 2)			
Flood risk maps	No	Yes	Differentiate the risks and past floods
shall show the			according to their impact on: 1) human
potential adverse			health, 2) the environment, 3) cultural
consequences			heritage and 3) economic activity;
associated with			Flood risk mans should be based on
flood scenarios			Flood hazard mans as well as local
(low probability,			observations during past flooding
medium probability			
with return period			If the preventive measures against flood
≥ 100 years, and			risks are not based on a reasonable
high probability), in			probability of hazards, the measures
terms of the			may not be worth the spending of public
following:			runds. Respectively, the cost-benefit
(a) the indicative			analysis will not be balanced, i.e. the
number of			costs will outweigh the benefits.
inhabitants			
potentially affected;			

(b) type of economic activity of the area potentially affected; (c) installations which might cause accidental pollution in case of flooding and potentially affected protected areas; (d) other information. (<i>Table Annex 1</i> , <i>Section I. Item 2</i>)			
Make available to the public the preliminary flood risk assessment, the flood hazard maps, the flood risk maps and the flood risk management plans. (<i>Art.10 of Directive</i> 2007/60/EC)	Yes, partially	Yes	Making available to the public the preliminary flood risk assessment, the flood hazard maps, the flood risk maps and the flood risk management plans. This is to ensure involvement of interested parties in the production, review and updating of the flood risk management plans at all levels. Communication with the residents of the municipalities, i.e. to provide them with written instructions in case of floods, with contact information, designating the location of stocks of emergency equipment, supplies, tools, broadcasting of such information locally etc.
Description of the appropriate objectives of flood risk management, established in accordance with Article 7(2). (<i>Table Annex 1</i> , <i>Section I. Item 3</i>)	No	Yes, partially	 The appropriate objectives of flood risk management are: human health; the environment; cultural heritage and economic activity; if appropriate - non-structural initiatives reducing the likelihood of flooding. This classification is important, as long as it determines the inventory of measures (<i>see Catalog of measures – Table Annex 2</i>), as well as their cost and benefits.
A summary of the measures and their prioritisation	Yes	Yes	A particular concern in terms of joint planning is the tailoring of measures in a way that can satisfy more than one

aiming to achieve the appropriate objectives. (<i>Table Annex 1</i> , <i>Section I. Item 4</i>)		objective, or at least to avoid compromising one objective at the expense of another, e.g. to avoid measures for protecting an economic activity in a way that has clearly negative impact on the environment, or protect the environment irrespective of the negative effect on human health.
A description of the prioritisation and the way in which progress in implementing the plan will be monitored. (<i>Table Annex 1</i> , <i>Section II. Item 1</i>)		Monitoring is mostly related to regular control, by appointed staff, of the flood protection infrastructure, the condition of natural protection elements, the stocks of emergency supplies etc. in order to ensure their functionality. Secondly and more occasionally, the monitoring, must ensure early warning in case a measure is observed to be ineffective and needs replacement with another solution.
		Thirdly, this part of the plan should include monitoring during disasters, to collect and document data, allowing the municipality to evaluate the effectiveness of the planned measures

Conclusion: The partners may co-operate in collecting empirical data for their flood prevention planning, rather than rely on systematic analytical data which, if available, lacks the necessary detail to back up small scale planning. Therefore, the focus of joint planning should be rather on the adequate reaction to floods, than prevention, unless there is sufficient empirical data proving that investment in prevention will be cost-effective.

The adequacy of reactions in critical events could be discussed at the planned training events, and should concentrate on the communication with the residents of the municipalities, i.e. to provide them with written instructions in case of floods, with contact information, designating the location of stocks of emergency equipment, supplies, tools, broadcasting of such information locally etc.

Prevention measures could mainly focus on standalone activities which the residents could perform alone within their properties. Practical trainings may be organised, how residents could receive and how they can use for their own needs, or operate in the event of floods, the available public equipment, if stocks of such are made.

IV. Impact of the current project

The small-scale investments under the current project, financed under Subsidy Contract No. RD 02-29-232 /29.09.2022, Interreg - IPA II CBC Bulgaria – North Macedonia, CCI 2014TC16I5CB006, are ensuring the implementation of the partners' Operational plans on protection from floods.

The impact of the current project on the further joint planning has two aspects:

- The joint planning shall consider, and monitor, the effect of the current investments the 2 municipalities shall observe, evaluate and document the evaluation of the effectiveness of the investments being made the 4 open concrete canals with length 500 m in the village of Bosilovo, 120 m in the village of Borievo, 102 m in the village of Garmen and 25 m in the village of Ognyanovo. The lessons learned should be jointly reflected in the municipalities' Operational plans on protection from floods. The municipality of Bosilovo shall amend the data in the tables within their Operational plan, particularly those describing and quantifying the "Exposure of buildings, infrastructure and lands from overflowing riverbeds and torrents" and "Vulnerable buildings and infrastructure". The municipality of Garmen has no measured exposure in their Operational plan, such as number of houses, land plots and other property within a risk zone, or number of people, but since their investment has impact on the flooding zone, the Garmen municipality may, at least, amend their Map of flooding zones, which is listed as Annex 34 to their Operational plan. Moreover, the Municipality of Garmen could add measurements of the exposure to flooding risks to their next Operational plan, in the same form as the Municipality of Bosilovo has done in their current Operational plan on protection from floods;
- The joint planning shall tailor further measures, based on those already implemented, such as investments in similar, or other types of flood protection facilities, that the 2 municipalities could jointly plan and submit in a joint application for other projects.

Below are presented illustrations of the current project in the 2 municipalities:



Municipality of Garmen

Satellite image



Location of the main works, financed under the current project in Garmen – correction of a gully with length 102 m, in the village of Garmen



Location of the main works, financed under the current project in Garmen – correction of a gully with length 102 m, in the village of Garmen, 21st Str.



Summary map of the river basin of Mesta river on the territory of the Garmen municipality



Summary map of the smaller water bodies and river tributaries in the Garmen municipality

As it can be seen, the first of the two maps above does not display the gully causing flash floods in Garmen, while on the second map the shape of the gully which has been meliorated decades ago in its the last section towards the Mesta river, is not displayed accurately on the basin map, and is not matching the satellite image.

Although, in the Preliminary flood risk assessment (PFRA), elaborated by the competent authority, pursuant to Art. 3(2) of Directive 2000/60/EC, the territory of Garmen municipality is not determined as one with significant potential risk, there were previous flooding in Ognyanovo, Marchevo and Dabnitza, not attributable to rivers but mostly to rain torrents.

Municipality of Bosilovo



Satellite image Bosilovo







1-Stabilizing the embankment, Ilovitchka reka, 2-

2-Open channel for surface water, Bosilovo



Summary map of the river basin of Strumitza river on the territory of Bosilovo municipality, including the smaller water bodies and river tributaries

From previous floods, the municipality of Bosilovo considers, the following areas, as exposed to risk of flooding:

- along the Strumica river in the section Bosilovo-Robovo-Sekirnik;
- along the Turia river in the stretch Saraj-Turnovo;
- along the Vodochnica river in the lands of Monospitovo the village of Borievo;
- along the Ilovichka river to the confluence with the Strumica river;
- along the Drvoshka Reka torrent to the mouth of the Turia river;
- along the Shtuchka Reka torrent to the confluence of the Strumica river;
- along the course of the Azmak channel (lands of Petralinci) to the mouth of the Turia river.

V. Joint action planning for prevention and mitigation of flooding consequences

The planning of both partners, may be improved along the following directions:

Action guidelines	Rationale for the action	Action relevance to the project partner	
Creation of a geospatial database (extra data) - Web-GIS Application, in order to improve recording and modelling.	GIS tools are not intended to directly assist in emergencies, but in planning of measures, mitigating the risks of emergencies. Geospatial databases are mainly storing the data inputs made by the particular user. They combine object-relational data and allow spatial data storage and management. Such a graphic database, for instance, is PostGIS. It operates on the basis of <u>PostgreSQL</u> which is a relational database. It is not necessary to purchase, or install PostGIS, or PostgreSQL. Open source object-relational databases, are available as a service from a cloud provider (not installed by the user). Once PostgreSQL is enabled, then PostGIS can also be used, since usually it is already installed by the service provider. The only cost for the user, is to reserve the necessary memory in the cloud, which would cost 10-20 Euro per	Geospatial databases are a common need for any municipal governance. No significant costs are incurred, and the task can be performed with current staff. An adapted geospatial database can be structured in layers and serve multiple purposes/ activities of a municipality, depending on necessity.	
Recording the impact of	Understand the needs of	Both partners lack a	
interventions - whether	businesses:	events. providing detailed	
they performed effectively.	Understand what flood risk	spatial data, landscape data	
or not, in flood events	means for the residents,	and infrastructure data, as well	
	including what they should do	as analysis of the causes for a	
	in a flood, what they think is	particular flooding.	
	flood event:	Possibly the cause is not the	
	Understand the environmental	obstruction of waterways too	
	footprint of the measures $-$	many hard surfaces or	
	whether the natural potential	inadequate vegetation.	

	of flood prevention is adequately used to create better places to live, work and play, or oppositely - the infrastructure has negative impact on natural flow regimes and watercourses, or is not sympathetic to the environment, or to the needs of the local community, or does not provide an attractive habitat for wildlife in urban watercourses, or blocks evaporation from vegetation.	So far, the partners' Operational plans on protection from floods, are based on approximated assessments of risk areas, by the specialized authorities in crisis management, which are unlikely to have analysed all of the above. Encouraging self-help / awareness through better resident's understanding and awareness. After a flood event, the residents should be interviewed to collect data which should be analysed and documented in a geospatial database.
Combine the FRMPs with records and evaluation of the existing flood	Identifying areas suitable for purposeful inundation and water retention, in order to	Flood prevention plans should consider the full range of risks.
protection	prevent flooding elsewhere.	Poorly planned tree planting
infrastructures in the	Making more use of the natural	may have negative effects on
urban areas of the	environment, like wetlands.	flood risk prevention, if
municipality and other	Avoiding inappropriate	leaves/debris from trees block
order to determine the	flood risk areas.	Consider adequate planting to
areas prone to flooding	Developing maintenance	stabilise river banks without
and their "flood risk"	regimes of culverts & drains.	affecting the cross section of
	Adapting the infrastructure to	the waterways.
	protect biodiversity, heritage	Prevent further increase in impermeable surfaces in urban
	Revise the green system in	settlements
	flood areas.	Using Sustainable Drainage
		systems, where appropriate, to
		drain surface water – allow
		green strips between the
		managing runoff volumes and
		flow rates from hard surfaces.
Prepare and update	The existing maps in the	Both municipalities will
continuously, a detailed	FRMPs prepared by the central	benefit from maintaining their
flood hazard map, and a	authorities will never provide	own accurate and local maps
formats	neighbourbood concerning	If such data is systematically
	small waterways, vegetation.	collected, analysed and built
	hard surface areas, land use	into a system, it will also serve
	etc. since their purpose is to	as a roadmap for new projects,
	prevent large-scale floods from	municipal development plans,
	rivers, and dam failure.	setting priorities and indicators.

Identification of further	Typically, the distribution of	A more systematic mapping
projects, works and	investments is ranking as	and data management will
measures, categorization	follows, with the largest	contribute to more clearly
by type, function and	scale/expenditure projects on	determined, justified and
technical characteristics	top:	effective investments.
	- Rehabilitation works	Therefore, the partner's
	(maintenance and repair of	potential to jointly apply for
	flood protection facilities);	larger Interreg projects,
	- Cleaning works of	including under the CBC
	watercourses of rivers	programmes with Greece, will
	(vegetation, collapsed trees,	be improved.
	branches and leaves);	
	- Urgent projects;	
	- Dredging works (deepening	
	the waterbed);	
	- Alluvial removal works	
	(sediments along the	
	embankments).	
Sharing the partner's	There is a planned joint	Since the planned measures of
observations and analyses	training event for the partners'	the Garmen municipality are
of the causes of flooding in	project staff, which is	more focused on reactions to
the respective area and the	scheduled under the project.	floods, while the measures of
other partner's types of	The training shall take place in	Bosilovo municipality also
prevention measures	June-July 2023.	cover the prevention
	As long as this Joint Action	component, based on risk
	Plan was consulted with the	categorization, it would be
	partners, in the process of its	appropriate that the Bosilovo
	preparation, the training may	partner presents at the training
	the training takes place before	the approach of the Bosflovo
	the training takes place before	municipality in planning
	this Joint Action Plan is	prevention actions.
	formally submitted and	
Communicating the	Reviewing how justified and	Both partners have partially
nartners' observations on	adequate were the	implemented their initially
the effectiveness of the	implemented measures were	planned investments in
already adopted	they effective were there any	Debren Bulgaria and in
reactions/measures	omissions which reduced the	Monospitovo North
	impact of interventions	Macedonia with their own
	impact of interventions.	funding.
		The small-scale investments
		financed under the current
		project are of the same type –
		open channels in urban areas.
Co-ordinating future	Reviewing the financial	Both partners may participate
projects	opportunities to apply with	in Interreg CBC calls, not only
	joint projects, which the	between Bulgaria – North
	partners could benefit from, as	Macedonia, but also between
	they did under the current	Bulgaria – Greece and North
	project.	Macedonia – Greece.

VI. Institutional framework in the partners' states, related to managing the risks of floods

While implementing any joint actions, it is appropriate that the partners' plans are situated within the institutional context. It is presumed that the municipalities are fully aware of the legal requirements applying to their own operational plans for protection from floods. However, a joint action requires knowledge of the broader context – national strategies, public bodies involved in flood protection and their specific roles, in order to benefit from the existing solutions, avoid double efforts, not miss the opportunities for assistance, or fail to align the municipal plans with recently adopted new legislation.

In terms of flood protection, i.e. response to floods, the responsible public bodies are Directorate for Protection and Rescue - Republic of North Macedonia and Main Directorate "Fire Safety and Protection of the Population" – Republic of Bulgaria. The Directorate for Protection and Rescue - Republic of North Macedonia and Main Directorate "Fire Safety and Protection of the Population" – Republic of Bulgaria have the following obligations:

(a) provide consistent and continuous coordination for the management of emergency situations;

b) act as a national point of contact in relations with international organizations and nongovernmental organizations with responsibilities in the field of emergency situations;

c) inform the population through the mass media about the dynamics of the operational situation and actions taken.

In Bulgaria, the main framework forming the organization of disaster protection is the National Disaster Risk Reduction Strategy 2018-2030. It determines the strategic goals for reducing the risk of disasters. Municipal and District Disaster Protection Plans are dependent on the National Plan for Protection from Disasters (NPPD,) with regard to the risks included in it, which are to be managed at national level, the way in which they will be managed, as well as the measures at the national level to manage the dangers and risks. The institutions involved in disaster prevention and response are described in the disaster protection plans for each municipality. According to the Law on Protection from Disasters, municipalities must pledge funds for prevention and dealing with disasters - art. 65, para. 1, item 5, however the sums are not indicated. There are certain opportunities to request national funding - through a report on priority risk reduction activities – municipal, regional, national, this option is regulated in art. 65 para 1 of the Law on Protection from Disasters (LPD).

In North Macedonia, the municipalities draw up Plans for protection against natural disasters, these plans are similar to the Bulgarian Disaster Protection Plans. In the Republic of North Macedonia, there is a Crisis Management Centre (CMC) – a distinct state administrative body providing interdepartmental and international cooperation, consultation and coordination of crisis management; preparation and evaluation of a unified assessment of risks and hazards; offering measures and providing overall support to the Steering Committee and Evaluation Group. Regional crisis management centres have also been established. In North Macedonia, by analogy with Bulgaria, will abolish the Crisis Management Law and will adopt a law and a strategic document for assessing threats, risks and national security challenges, where: "Natural and manmade disasters, epidemics and climate change" are assessed as "indirect threats that are difficult to predict, but which can lead to a significant burden on security and other government institutions".

The Republic of North Macedonia has established a protection and rescue system regulated by the Law on Protection and Rescue. The law deals with the protection and rescue of people and property in the event of natural and technological disasters in peacetime, emergency or war. The law describes an interconnected system for planning, financing, coordinating, mitigating, preparing for and responding to natural and technological disasters. The law also regulates the distribution of responsibilities in accordance with the provisions of the Law on Local Government, which additionally gives responsibilities and obligations for protection and rescue, to the municipalities.

Another institution in North Macedonia, responsible for the implementation of protection and rescue activities, is Directorate for Protection and Rescue - Дирекција за заштита и спасување. The government appoints the head of the directorate. The similarity with such a structure in the Republic of Bulgaria is with the General Directorate "Fire Safety and Protection of the Population". The Directorate of Protection and Rescue (DPR) was established in 2005 by the Protection and Rescue Act. It is an independent state body created by merging the civil protection activities of the Ministry of Defence with the Inspectorate of fire protection at the Ministry of Internal Affairs of the Republic of North Macedonia. It consists of four sectors with 11 departments, four independent departments and 35 local offices for protection and rescue. Its competence and scope of activity are regulated by The Protection and Rescue Law as well as the Fire Protection Law. In terms of powers and composition, however, there are significant differences that make coordination difficult without interstate agreements to create a mutual operational, integrated emergency management system, such as between Bulgaria and Greece and between Bulgaria and Romania.

According to Art.7 of Decree on the implementation of the flood protection and rescue measures (Уредба за спроведување на мерката заштита и спасување од поплави) the activities and actions in the organized implementation of the protection and flood rescue are undertaken in accordance with standard operating procedures adopted by the Director of the Directorate for Protection and Rescue.

In both countries, there is a potential need for the improvement of forecasting and risk management - methods for assessing risk at the local level, which requires not only analyses and data, but also a modern information environment - an object-relational database, in which the municipality can collects and processes data related to flood prevention in its regional context (demography, climate conditions, hydrology, forests, green systems in settlements, protected habitats and animal species, cultural and natural heritage, energy and transport infrastructure, enterprises, etc.).

Concerning the Evaluation and management of flood risks, in Bulgaria there are 10 institutions involved at central level. At regional levels, the overall evaluation and management of flood risks is delegated to 1 institution – the Basin directorate (of the West Aegean Region, concerning this project) and at local level – by the regional governors, the mayors, the owners of water storage or protection infrastructure.

Directive 2007/60/EC requires Member States to apply a long-term planning approach to flood risk mitigation at national level in three successive stages:

- Preparation of Preliminary Flood Risk Assessment (PFRA) and identification of areas with a significant potential risk of floods (APSFR) already available for the period 2022-2027;
- Development of flood hazard and risk maps for the identified flood risk areas (mapping) available for the period 2022-2027;
- Development of Flood Risk Management Plans (FRMPs), including Programme of measures to achieve the objectives of flood risk management not yet available as of June 2023.

In Bulgaria, the Flood Risk Management Plans (FRMPs) 2022-2027 are an update of the Preliminary Flood Risk Assessment (PFRA), on the basis of which the designated areas with a significant potential risk of floods (Note: concerning flooding from Mesta river, there are only 2 risk zones – Yakoruda and Hadzhidimovo) are also be updated. The foreseen measures in the FRMP 2022-2027 will again be aimed at reducing the adverse consequences of floods for human health, the environment, cultural heritage, technical infrastructure and economic activity, with the expectation that the number of green measures and measures for natural water retention. The update of the FRMP will consider the EC recommendations contained in the report on the implementation of the Floods Directive, relying on the participation of stakeholders and the public throughout the process.

In North Macedonia, the Flood Risk Management Plans (FRMP) are prepared by private service contractors, under contracts with the city administrations, therefore they are available mostly for larger urban settlements.

Appendix: List of Documents Consulted

- (1) List of Bilateral Agreements between the Republic of Bulgaria and the Republic of North Macedonia Source: <u>https://www.sobranie.mk/content/%D0%9F%D0%98%202022/2022-8.pdf</u>
- (2) Interreg Project of a Joint Plan between the Blagoevgrad District, Bulgaria and Southeast Planning District, North Macedonia, financed under Interreg in Bulgarian and Macedonian languages Source: <u>http://konce.gov.mk/wp-content/uploads/2021/08/Joint-Plan_BG_MK_EN_142_Final.pdf</u>
- (3) Directive 2007/60/EC of the European Parliament and of the Council on the assessment and management of flood risks
- (4) Bulgarian National Strategy for Disaster Risk Reduction
- (5) Bulgarian Law on Protection from Disasters
- (6) North Macedonian Law on Waters
- (7) North Macedonian Law on Protection and Rescue
- (8) North Macedonian Decree on the implementation of the flood protection and rescue measure
- (9) Bulgarian Preliminary Flood Risk Assessment (PERA), and maps to the new FRMP 2022-2027 Source: <u>https://wabd.bg/content/%d0%bf%d0%be%d1%80%d0%bd-2022-2027/</u>
- (10) Plan for Protection from Floods, of the Garmen Municipality
- (11) Operational Plan for Protection and Defence from Floods of the Bosilovo municipality