

DELIVERABLE D.T4.1.5

Report on the results from the pilot action 5 -
Emergency plans for heritage sites involved in
Croatia.

Draft

10 2019

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I. PLANNING ACTIVITIES

1. Topic (main objective of the exercises):

Checking the suitability and effectiveness of evacuation plans in emergency phase -

Evacuation plan for a Museum of the City of Kaštela

(the name of the evacuation plan being tested)

2. Specific objectives:

- a) checking did museum staff and city services are familiar with procedures in case of immediate threat of cultural goods
- b) checking the coordination of the relevant protection and rescue services
- c) checking how successful will be the implementation of the existing evacuation plan

3. Characterize the evacuation plan being tested

(What does it involve? What forces and resources it involves?, etc.)

The evacuation plan examines the readiness of competent and relevant services in case of natural disasters and their impact on cultural heritage. Given the geographic position and the climatic characteristics of cultural heritage in the spatial scope of the project, the most prominent scenarios of threats are: floods caused by tidal waves, and streams caused by intense precipitation as well as fires that are common in this part of Dalmatia in the summer months. In the protection of cultural heritage in danger of threats, coordination of civil protection organizations and responsible institutions involved in the protection of cultural heritage should be rapidly and efficiently established. Evacuation procedures need to be established under peaceful conditions and ensure good knowledge in order to respond timely to them. The evacuation plan includes assessing possible risks and consequences as well as defining the capacity and concrete measures for their implementation.

The Headquarters for protection and rescue of the City of Kaštela is in charge for the development of evacuation plan. The Headquarters coordinates all available flood protection capacities and provides material resources for flood protection (protective



barriers, sandsacks...). The Headquarters forms an intervention team to familiarize themselves with the current situation on the ground. The following units are then put on standby in accordance with the priorities identified:

- first priority: Volunteer Fire Departments Mladost, Gomilica and Kaštela, Facility for communal activities in the City of Kaštela.

The Headquarters also activates and coordinates local organizations such as volunteer fire departments, local organizations for cultural heritage protection and religious organizations. In case of emergency, the Civil Protection Force will be activated. The tasks of the Civil Protection Force are to collect information on the functioning of the electricity, water and telecommunications systems related to the endangered infrastructure, and to collect information on road traffic. The Civil Protection Force then activates local volunteer fire departments, which jointly analyze the current situation and, with a view to the extent of the damage, decide on the extent of protection and rescue measures.

The Facility for communal activities in the City of Kaštela is in charge of integrating all available human and material resources in flood protection, rehabilitation of areas, sand removal, cleaning of public areas etc.

Considering that the evacuation plan is being implemented in the area of protected cultural heritage, it is necessary to involve relevant experts in the field of protection and rescue in this process. This is the responsibility of the Special Purpose Civil Protection Unit of the Split-Dalmatia County - Water Rescue Team. This team is tasked with saving the population, animals and material and cultural assets from the water. In this case, the protection and rescue refers to movable heritage that is stored in the Museum of the City of Kaštela.

4. 1. Characteristics of the facility - Kaštel Sućurac - Muzej grada Kaštela

a) Name and address of the place of exercise / pilot site: Muzej grada Kaštela - Nadbiskupska palača, Trg Gospojske Štrade 1, 21212, Kaštel Sućurac

b) Number of floors: 3; including those underground: 0

c) Number of emergency exits in the facility: 1



- d) Access to the facility enabling the use of fire-fighting equipment: **Easy** / Hard
- e) Does the facility meet the technical (legal) requirements for evacuation: Yes / **No**

4.2. Characteristics of the facility - Kaštel Gomilica

- a) Name and address of the place of exercise / pilot site: Kaštel Gomilica
- b) Number of floors: 1-4; including those underground: 0
- c) Number of emergency exits in the facility: 0
- d) Access to the facility enabling the use of fire-fighting equipment: Easy / **Hard**
- e) Does the facility meet the technical (legal) requirements for evacuation: Yes / **No**

5. Situation description:

For the City of Kaštela, floods and fires due to the drought were identified as the two most important risks.

Due to abundant and short-period of rainfall, the dry watercourses located on the Kozjak slopes begin to spill, and large amounts of water flow to Kaštela.

The danger of flooding further reinforces the powerful jugo that blows from the sea to the mainland, raising the sea level and causing the flooding of the waves to the area covered by the Plan.

Large amounts of water without an adequate drainage system are leaking through stone streets of the old Gomilica i Štafilić reservoirs and outstretch into the buildings. Some of the buildings in Kaštela are protected cultural heritage, such as the Archbishop's Palace which is part of the Museum of the City of Kaštela as well as Kaštel Gomilica and other kaštela's. Movable cultural heritage is also in danger of the aforementioned risks since this cultural heritage is stored in these protected objects. The protection of movable cultural heritage due to its pronounced value is very important in the emergence of risk and the creation of evacuation plans.

In addition to floods caused by tidal waves and heavy rainfall, evacuation plans should also be drawn up in the event of a fire due to the drought. Namely, although the outside walls of the protected buildings are firm stone, other construction elements are made



entirely from wood. During the summer in the situation with lack of rain and high temperatures wooden infrastructure is most vulnerable to fire. Risk of fire in urban settlement protected as cultural heritage rises exponentially in summer period.

Fires In the area of Kastela City most often occur in the summer months due to long periods of droughts. Since the occurrence and lasting of this periods is increasing, fires spread over a short period of time by vegetation and strong winds that make it difficult to control fires. In such conditions, fires can quickly spread to urbanized parts of a settlement where cultural heritage becomes potentially endangered. The main threat in this conditions is collapsing of wooden construction holding roof or staircase causing casualties and endangering static of the building which in the end threats do destroy valuable historic site. For this reason, it is necessary to include a plan for the protection and rescue of cultural heritage in the event of fire in the evacuation plan.

6. Concept / assumption for exercises:

Heavy rain and tidal threat

- a) Evacuation of people: Yes / No
- b) Evacuation of movable cultural heritage: from the whole facility / **part of the facility**
- c) Evacuated property (what and how much?): in agreement with the competent conservation office; cultural heritage with the highest status of protection has the right of priority, and then heritage with lower status of protection
- d) Assumed duration of evacuation: 4 hours

Hour	Description of the situation's development	Action taken	Other info
09:00	The amount of precipitation per square meter exceeds the average for that year; the water from the basin at the foot of Kozjak begins to sink toward the shore. At the same time, jugo from the sea further aggravates the situation, and increases tidal waves	Monitoring situation	
09:30	Weather conditions do not calm down,	Emergency services are	Determining the danger



	and water threatens homes as well as cultural heritage objects. Emergency services are being alarmed.	being alarmed as well as local population and local organizations.	of flooding and water seeping into the objects. Alarming all relevant institutions from Kaštela and the surrounding area
09:45	The arrival of fire brigades from the Kaštela city (DVD Mladost, DVD Gomilica, DVD Kaštela). Organization of civil protection unit.	Determination of parameters for setting temporary measures; setting up temporary embankments to get the time to relocate mobile cultural heritage	Consultation with other crisis management bodies, call to act - all relevant institutions, organizations and civils from Kaštela City.
10:00	Coordinated decision of the museum management, relevant cultural institutions and firefighters on the urgent evacuation of movable cultural assets pre-determined by the conservation office and Head of the Rescue Operation.	Mobilization of civil organizations and volunteers in the immediate environment: civil protection society, cultural organizations, local religious community	Audio signals (sirens), electronic media with call to mobilization, digital media (social networks) alarms and messages
10:20	Head of the Rescue Operation allocates the responsibilities among arriving units for the evacuation of cultural assets on the ground floor of the museum.	Grouping of smaller units and giving instructions on the order of relocation of cultural assets (conservation guidelines)	
11:30	Significant amounts of water were found in the basement and ground floor of the museum.	After evacuation of endangered movable cultural heritage, local fire brigades pump water from the basement and ground floor of the museum.	



12:30	Determining the status of further endangerment at all levels of the museum.	Local fire brigades, the conservation officer and Head of the Rescue Operation determine the status of other floors of the museum that were not directly influenced by water, and endangerment of the movable cultural heritage.	
13:00	Establish further guidelines in the event of inclement weather.	Coordination of institutions in the cultural sector with protection and rescue services	

Fire through the drought

Evacuation of people: **Yes** / No

b) Evacuation of movable cultural heritage: from the whole facility / **part of the facility**

c) Evacuated property (what and how much?): in agreement with the competent conservation office; cultural heritage with the highest status of protection has the right of priority, and then heritage with lower status of protection

d) Assumed duration of evacuation: 5 hours

Hour	Description of the situation's development	Action taken	Other info
10:00	Due to the drought and high temperatures high risk of fire is confirmed	Monitoring situation	
10:40	Emergency services are being alarmed, causte - fire in protected urban site,	Emergency services are being alarmed as well as	Determining the danger of fire and possible



	settlement populated by citizens.	local population and local organizations.	casualties. Alarming all relevant institutions from Kaštela and the surrounding area
10:55	The arrival of fire brigades from the Kaštela city (DVD Mladost, DVD Gomilica, DVD Kaštela). Organization of civil protection unit.	Determination of parameters for the specific site and the situations on the field.	Consultation with other crisis management bodies, call to act - all relevant institutions, organizations and civils from Kaštela City.
11:00	Coordinated action on the site, firefighters and civil protect unit conduct action of the extinguishing the fire and search for the possible causilties. Aim is to minimize impact on the fire on the wooden infrastructure and stop fire from spreading as soon as possible to minimize further devastation.	Mobilization of civil organizations and volunteers in the immediate environment: civil protection society, local community	Audio signals (sirens), electronic media with call to mobilization, digital media (social networks) alarms and messages
11:20	Head of the Rescue Operation allocates the responsibilities among arriving units for the evacuation on the cultural site.	Grouping of smaller units and giving instructions on the order of relocation of cultural assets where it is possible (conservation guidelines)	
12:30	Fire is restrain to a single building and there are injured citizens. The action to protect the rest of the site are taken and injured are taken care of.	After localizing of the fire and mobilization of the citizens from the heritage site local fire brigade takes precautions measures to prevent fire as well as combustion	Consultation with other crisis managemen bodies, organizations and civils from Kaštela City.



		insurance measures.	
13:40	Determining the status of further endangerment at all levels of the site.	Local fire brigades, the conservation officer and Head of the Rescue Operation determine the status of other buildings on the site directly influenced by fire and water used in fire fight., and endangerment of the immovable cultural heritage on the site.	Consultation with other crisis management organization and Haed department of Museum of Kastela City
15:00	Establish further guidelines in the event of inclement draught.	Coordination of institutions in the cultural sector with protection and rescue services	

7. Planned forces and resources:

No	Emergency responders	Vehicle / equipment	Number of equipment	Number of personel
1	Volunteer Fire Department- Kaštela	Fire truck	1	73 operative firefighters
		Tank	1	
		Specialized vehicle	2	
		Motor pump 1600 l/min	2	
		Electric submersible pump 400 l/min	1	
2	Volunteer Fire Department-	Specialized water vehicle	2	10 operative



	Gomilica	Electric pump	1	workers
		Suction-pressure pump	1	
		Water pump UP1	1	
		High pressure pump	1	
		Absorbing dam	2	
3	Volunteer Fire Department - Mladost	Tank	4	123 firefighters (80 operative and 43 executive firefighters)
		Portable pumps	3	
		Electric submersible pump 220 V	3	
		Submersible turbine pumps	1	
		Fire truck	1	
		Hydraulic rescue tool	1	
		Specialized vehicle	1	
4	Facility for communal activities in the City of Kaštela	Sandbags	200	-
5	Civil Protection Force of City of Kaštela	-	-	20
6	Association of local population for the preservation of cultural heritage „Podvorje” from Kaštel Sućurac	-	-	10
7	Croatian war veterans association from Kaštela	-	-	10
8	City society of the red cross „Kaštela”	-	-	5
9	St. Jeronim organization	-	-	5
10	Organization for the promotion of tourism and protection of cultural and natural heritage „Ostrog”	-	-	5
11	Organization for the preservation and promotion	-	-	5



	of cultural, intangible and natural heritage „Garguj”			
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The way of alerting / informing emergency forces and resources:

The County Center 112 and the Regional Office of the State Protection and Rescue Directorate of Split are responsible for alerting and informing the Mayor / Chief of the Headquarters for protection and rescue of the City of Kaštela and Split-Dalmatia County about the imminent danger.

Alarming and informing will be done with electronic sirens as well as through electronic media and modern mobile communication technology in order to establish timely intervention with as many volunteers and members of protection and rescue organizations as possible.

8. Significant remarks regarding conducting exercises
(field conditions, occurring threats, medical protection, etc.)

A specific order of protection and rescue has been established in case of flood and fire occurrence in the area of the Kaštela City.

Upon receipt of the notification of an imminent threat, the Headquarters of the Protection and Rescue of the City of Kaštela shall be called, which becomes the competent operating body.

9. Ways and means of simulation:

Simulation of the evacuation plan will be carried out with the aim of preparing relevant institutions and organizations, as well as the local population for the implementation of such a plan in case of floods and fire. The simulation will be conducted and monitored by Headquarters for Protection and Rescue of the City of Kaštela. Headquarter will coordinate all institutions and organizations involved. If necessary, the evacuation of the movable heritage will be carried out, which includes museum replicas and other material heritage.



10. Training briefing regarding involved organization and course of the exercises:

a) Date: 07.09.2019., hour: 09:00,

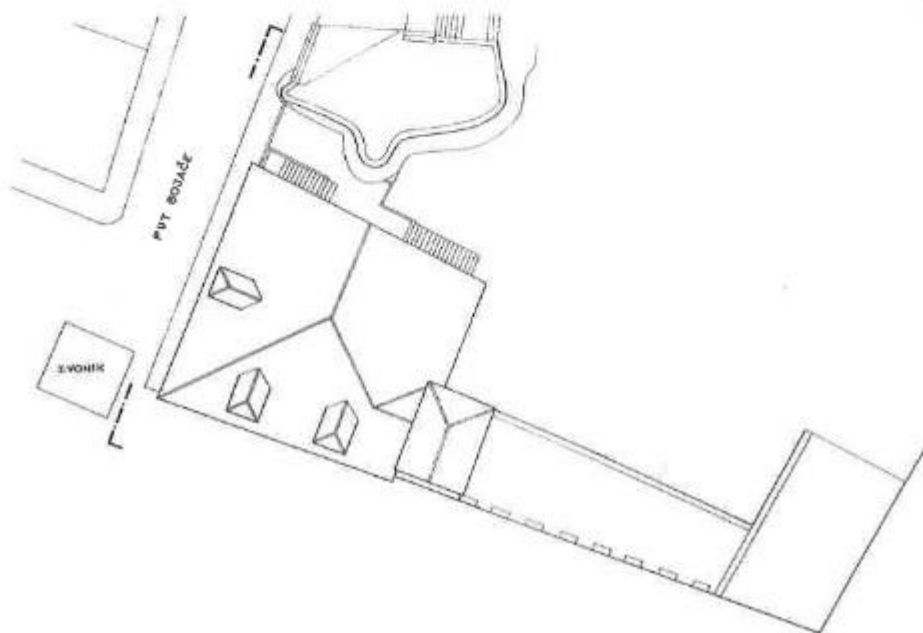
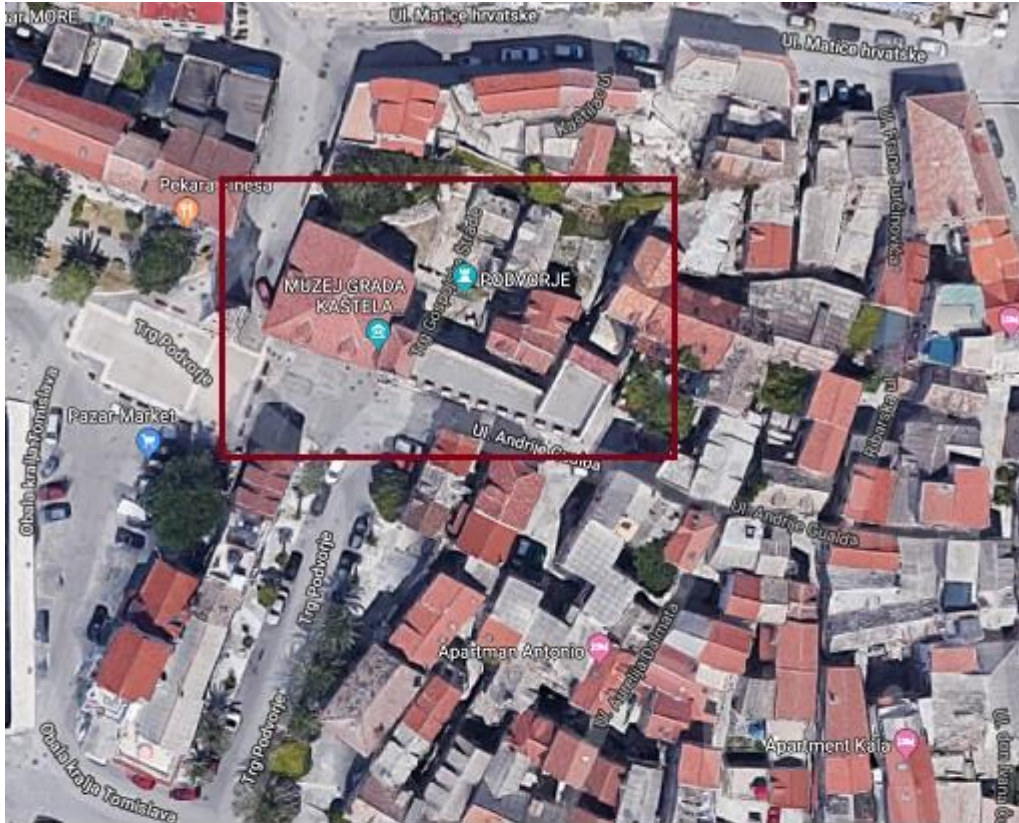
b) Whom it is directed to (participants): relevant regional and local institutions related to cultural heritage protection and preservation, local volunteer organizations, local self-government unit leaders...

11. Date of the exercises:

Date: 07.12.2019, Hour started: 09:00, Hour completed: 15:00

12. A sketch of the situational areas of the exercises - in attachment

Museum of Kastela City, pilot site Kaštel Sućurac



Pilot site Kaštilac, Kaštel Gomilica





13. List of functional persons of the exercises:

- Exercise manager - Milivoj Taslak, Commander of the City of Kaštela operational force
- Head of the Rescue Operation - Goran Vrbatović, Head of Rescue Operation



II. ANALYSIS OF EXERCISES

1. Notes on the implementation of the assumption

(compare the assumption with the actions taken during the exercise)

Since two pilot areas were identified in the City of Kaštela, two evacuation exercises were also carried out to check the effectiveness of the previously defined evacuation plan in different spatial and temporal conditions.

The first evacuation took place at the Episcopal Palace in the historic center of Kaštel Sućurac where the Kaštela City Museum is located. Evacuation was carried out in accordance with the defined evacuation plan and there were no significant changes to the evacuation plan during the implementation on the field. However, in relation to the initial plan, the staff responsible for carrying out the evacuation were the museum staff, who, given their knowledge of the material and matter, had defined the necessary steps. During the evacuation, the material assets in the museum were in danger and were mobilised for the purpose of its protection, in accordance with conservation decisions. The evacuation was carried out within the forecasted time period with positive results.

At the same time, an evacuation exercise was carried out at the Kaštilac fortress in Kaštel Gomilica, which, given its location, was threatened by the negative effects of tidal waves. However, the historic core of Kaštilac is also extremely threatened by fire, and during the evacuation exercise, a fire was extinguished. One person was injured during the fire and an injured person was evacuated by the exercise. This activity was not foreseen according to the original evacuation plan.

Given that more than one risk was identified at the site, Head of Rescue Operation initially prioritized the rescue activities. In this case, priority was given to the rescue of the injured person, which could not be carried out before the fire was extinguished. As the fire appeared at the entrance to the facility, a fire boat was hired to extinguish the fire from the sea. After extinguishing the fire and evacuating the injured person, and after ensuring the safety, the firefighters carried out the activity of pumping water as a result of the tidal waves and fire extinguishing. The continuation of the evacuation was therefore carried out according to the previously proposed plan.

During the evacuation exercise, the responsible persons and services were:

- Milivoj Taslak - Commander of the City of Kaštela operational force;
- Matko Bralić - Commander of the DVD Kaštel Gomilica;
- Ivan Elez - fire sergeant and commander of the DVD Kaštel Gomilica;
- Goran Vrbatović - Head of Rescue Operation
- Zdravko Pintarić - captain of the boat Sv. Florijan.

Figure 1. Evacuation exercise in the Kaštela City Museum (Kaštel Sućurac)



Figure 2. Evacuation exercise in Kaštilac (Kaštel Gomilica)





2. Assessment of the preparation of the place / facility in the event of a crisis situation

(possibilities and conditions for carrying out rescue operations)

The assessment of the object or location at risk is very important in the planning and implementation of the evacuation. In determining the status of the site, the experts and competent services in charge of the evacuation have the most important role.

In the case of the City of Kaštela, the site assessment and evaluation was carried out by museum staff and DVD Gomilica members who were also responsible for the implementation of evacuation plan. Based on the assessment, it was identified that the location of the museum in the city of Kaštela represents great potential for negative consequences from potential risks. There has been identified very short distance from the coast and this location in the coastal area results from the human impact of coastal embankment and the extension of the entire coastal area. That is why the strong influence of the sea, which is especially visible during the intense fluctuations of the tides in the Kaštela Bay, is greatly expressed. In addition, the poor condition of the utility infrastructure has been identified in this area, which makes it difficult to regulate precipitation, especially when it is intense in a very short time. Therefore, due to its location, the area of the museum is also threatened by floods caused by torrential flows that are result of intense rainfall.

The assessment of the location was of particular importance in the case of the evacuation of the Kaštilac fort located on the islet, since the entrance to the fort was only possible via one bridge. In this case, it was necessary to determine the state of the site, and based on that, to define further actions and activities within the implementation of the evacuation plan. The fortress located on the island requires more complex protection and rescue operations, especially in the case of the evacuation of people. The biggest problem is the connection of the island to the mainland, which runs over a stone bridge. Considering that, when designing an evacuation plan, it is necessary to include the activity from the sea, which means the use of fire boat. Since the entrance to the Kaštilac was affected by the fire in the exercise, the evacuation services were forced to include a fire boat which ultimately extinguished the fire and allowed access to the endangered site.



3. Comments and final conclusions regarding the suitability and effectiveness of evacuation plans in crisis situations

(which information should be changed, corrected, added, etc.)

Since the importance of the preliminary assessment of the site and its vulnerability was determined by conducted evacuation exercises, the said activity should be included in the evacuation plan. The same should be done at the beginning of each evacuation, in order to define further actions in the implementation of evacuation according to the determined situation. Before each evacuation, it is also necessary to define a team of experts and competent operational forces that will participate in the evacuation, as well as the superior managers who will be in charge of implementation. The team of experts, together with the Head of Rescue Operation, will define all actions and determine the services that will be in charge of implementation based on a predefined situation. In relation to the originally defined evacuation plan, it is therefore necessary to adjust the competent services and operational forces in accordance with the exercise. In the case of Kaštela, the implementation of evacuation did not involve the local population and relevant local associations, which was foreseen by the original plan. The locals did not participate in the evacuation exercise in order to carry out the simulation as realistically as possible and to obtain a realistic representation of the problem, which implies accessing the sites and saving the endangered heritage and tangible items in specific conditions. Moreover, the original evacuation plan anticipated only evacuation in the case of flood due to heavy rainfall and tidal waves, while the evacuation exercise on the field also included rescue in the case of fire and evacuation of injured people. Accordingly, the evacuation exercise involved not only pumping of water from the ground and underground parts of the building, but also fire extinguishing and rescuing an injured person. The fire boat was also activated to extinguish the fire from the sea, since approach from the land to the building was endangered by fire. Although not all of the above activities were included in the originally defined action plan, the evacuation exercise proved that the evacuation plans should take into account all potential risks that may arise in a particular area. Given that the City of Kaštela represents a highly endangered area from several potential risks, it is necessary to include implementation measures and activities as well as competent services in the evacuation plans for cultural heritage sites in the area of the City of Kaštela in the case of occurrence of any potential risks. Based on the evacuation exercises carried out, it is therefore recommended to carry out a detailed assessment of the location and



conditions of the cultural heritage site itself and to identify the situation and major problems at the site itself. Based on this, it is recommended that decisions to be taken, take into account all potential threats and their consequences. It is also important to prioritize all endangered objects in the facility and to define detailed guidelines for conducting the protection and rescue process.