DELIVERABLE D.T4.2.2

Setting up of emergency plans for the target heritage sites - Italy

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CONTENT

I. DESCRIPTIVE PART

I.1 General information

Plan name: Municipal Emergency Plan for the Historic Center

Plan area: Cattedrale Square, Viale Cavour and Corso Isonzo – Ferrara Historic Center

I.2. Site description and hazard analysis

The Municipal Emergency Plan is the design and organization of all activities and procedures to be adopted in case of catastrophic events. Ferrara is a Renaissance city of art, and the Emergency Plan serves to protect the historic centre. The Emergency Plan is an articulated and preventive system of procedures, organization, resources and information exchange that serves to prepare the municipal administration, the companies providing public services, the Civil Protection volunteers, the Fire Brigade as well as citizens and tourists in case of heavy rains in the old city centre.

The preparation of the Emergency Plan for the old town must take into account the risks that may affect it due to its physical characteristics. The historic centre of Ferrara is located in a flat area with very small differences in height but close to the river Po di Volano. The rather large area (over 400 hectares) is characterised by many impermeable surfaces. Among these, the main squares are all paved and with an outdated rainwater drainage system. The old town centre is still particularly liveable today both because it has been enhanced and redeveloped and because it is almost surrounded by Renaissance walls and tree-lined areas for over 9 kilometres, one of the most complete and articulated defensive systems in Italy.

The historic centre is full of attractive features such as the Town Hall, the Castle, the Cathedral, museums and public services as well as shops, hotels, bars and restaurants. Moreover, the pilot case of Ferrara, restricted to the areas of the squares and two main roads (Viale Cavour and Corso Isonzo), also touches a portion of mainly residential areas. This large historical and cultural heritage makes the definition of a Municipal Emergency Plan for the protection of cultural heritage an important tool against heavy rain and urban heat islands. It has now been demonstrated that heat islands and extreme rainfall have obvious repercussions on monuments and the historical fabric, causing for example the recession of limestone or marble facades, the soiling of the stone surface; the chemical leaching of medieval stained glass; or the corrosion of metals. Besides, the increase in humidity (quantity and distribution) in historical masonry adversely affects its stability and resistance, but the effects and damage that climate change has on vegetation (historical gardens and urban parks) must also be considered.

I. 3. List of historic buildings with instructions for their protection

Immovable monuments:

No.	**Characteristics of the historic object:** - name - location / address - short description with the specification of the most valuable elements	**Proposed method of protection** (Divided into threats if there are differences in proceedings)	**Necessary forces:** - number of people: what services, volunteers, who else? - equipment: belonging to whom / stored where?	**Estimated time needed for protection**
1	Historic center Cattedrale Square, Trento and Trieste Square, Municipio Square The most vulnerable elements of Ferrara's historic centre are the Romanesque-Gothic Cathedral (1135) and the Estense Castle (1385) as well as other prestigious architectural complexes, built in both the medieval and Renaissance part of the old town. In addition, public spaces such as the squares offer themselves to the passage of many residents and tourists becoming strategic places for the livability of the historic center. It is important to underline that the pilot case of Ferrara is particularly unusual because it considers as cultural heritage open public spaces such as squares. It is therefore a set of places that have no movable monuments or particular architectural elements to protect nor people to evacuate.	Using by rescue teams water pumping machines, fire trucks and sandbags to prevent further flooding. Local police stop cars and reorganize traffic flows to keep people away from risk areas. It is also possible to further implement the cognitive databases used to prepare the Plan itself. The knowledge about the historical and cultural heritage of the city increases the capacity for action and intervention in the emergency phase.	The rescue teams (fire brigade, local police, civil protection volunteers) currently enlisted and planned in the Emergency Plan seem to meet the needs of the city. In particular: 2 local fire brigades: with 2 specialized vehicle for 2 equipments and 1 mobile fire station, and 7 people. 1 emergensy responder by Civil Protection and Civil protection volunteers: with 1 specialized vehicle for 3 equipments and 12 people. 1 Local Police car for 1 equipment and 2 people.	Around 5 hours

Movable monuments: Not present on the pilot site

I. 4. Materials and equipment necessary for protection

The case study of Ferrara involves open public spaces, i.e. the historic squares of the city. In the historic squares there are no particular materials to be secured.

Fire trucks that belonging to Firefighters and Civil Protection to pump water, the-light tower to illuminate the flooded area and improve the visibility of rescue, sandbags, motor pumps, electric pumps and generator sets.

I. 5. List of the evacuation / protection order

The pilot case concerns historical squares of the city, therefore in the rescue and emergency phases special attention is given to the rescue of any tourists and citizens present as well as traders and employees in the offices and shops on the ground floors of the buildings overlooking the squares.

I. 6. List of rescue units, institutions and organizations that are intended to provide assistance

Firefighters

Civil Protection Volunteers

Local Police of the Municipality of Ferrara: 2 police officers

I. 7. Diagram of the alarm / notification system

The emergency due to flooding, caused by heavy-intensity meteoric influxes that are very concentrated in space and time, must necessarily be tackled in a preventive manner based on meteorological forecasts that are extremely difficult for events of this kind, but constitute the only tool that allows alerting those interested in land management. The main actions to be implemented following a forecast, warning or adverse weather event are:

1) ensure the reception and dissemination of civil protection alerts;
2) prepare the necessary controls to ensure the functionality of the equipment and systems within the competence of the bodies or technical structures responsible for the management of the water lifting systems, the sewerage network and the critical points of the road network such as underpasses;
3) inform the population both following an alert and during an event with the reporting of dangerous situations as well as any traffic disqualification of dangerous roads;
4) verify any events that involve an extraordinary concentration of population during the hours and areas potentially affected by the expected event;
5) carry out a monitoring activity, during an ongoing event and until the emergency is overcome, through forms of supervision or surveillance.

As a result of the aforementioned, the intervention model for possible emergencies due to exceptional rainfall consists of a preventive phase and an operational phase that describes the activities in progress as well as those of intervention following the flooding of a limited area.

The preventive phase is determined by the issuance of a yellow/orange warning for thunderstorms by the Territorial Safety and Civil Protection Agency which involves the activation of the attention/early warning phase. Upon receipt of the notice of the issuance of a Weather-Hydrogeological-Hydraulic Alert, the consequent procedure for the disclosure of the previous alert described is activated. The Coordinator of the Municipal Operative Center, if deemed necessary in relation to the expected effects, informs the Mayor and evaluates the possibility of activating, even in a reduced form, the Municipal Operative Center. The Mobility and Traffic Infrastructure Service of the Municipality of Ferrara provides for verification of the operation of the water lifting pumps possibly present in the road underpasses managed directly by the Municipality. HERA S.p.A. verifies the functionality of the trap doors in areas at risk of flooding with particular regard to those located near the underpasses; it checks the operation of the water lifting pumps that may be present in the road underpasses it manages. The Ferrara Plain Reclamation Consortium prepares the necessary controls to ensure the functionality of the equipment and the competence systems necessary for raising the water.

For the operational phase, the Terre Estensi Municipal Police Corps uses luminous information panels along the ordinary roads to inform users of any critical issues on the road network. The on-call staff, having received notice of exceeding a rainfall threshold, activates the subsequent disclosure procedure. The Terre Estensi Municipal Police Corps carries out a territorial defense action in the areas at risk of flooding with particular regard to the underpasses, to be considered as critical points to be monitored, along the inter-municipal road system. For the underpasses located in areas of property other than the municipal one, the manager will take care of their management and supervision. A list of subways that are believed to be considered critical is available.

The Terre Estensi Municipal Police Corps received information about the flooding of an underpass or a section of road contacting the available of the Mobility and Traffic Infrastructure Service to affix the appropriate signs and the closure to traffic on the road. In case of need the Associated Civil Protection Service of the Estense Lands or the available on duty activates the civil protection volunteering for monitoring and surveillance in areas at risk of flooding with particular regard to those located near the underpasses. These teams operate under the coordination of the Municipal Lands Corps Police Corps. At the same time information is provided on the activation of the voluntary service available to the on-call of the Regional Agency for Territorial Security and the Civil Protection Service Area Reno and Po di Volano.

Very intense meteorological events (even greater than 50-70 mm of rain), of short duration (hours or fractions thereof) and strongly localized, have produced in the past the flooding of sparse areas not necessarily connected to each other and with a related duration at the time of recovery of the efficiency of the drainage network, except for those places for which, due to their intrinsic characteristics, the direct intervention of operators equipped with water lifting pumps was necessary. In this case, the intervention model for which the Terre Estensi Associated Service is responsible provides the following description.

The Terre Estensi Associated Civil Protection Service or the available on duty, informed that an area is flooded with water drainage difficulties, goes to the site and proceeds with the following operations:

- it defines the extent and conformation of the flooded area;
- informs the Responsible of the Associated Service of Civil Protection of the Lands of Este as well as Coordinator of the Municipal Operative Center which, if deemed necessary in relation to the critical issues in place, informs the Mayor and assesses the possibility of activating, even in a reduced form, the Municipal Operative Center, the Terre Estensi Associated Service of Civil Protection or the available on call asks for the technical support of the Provincial Command of the Fire Brigade, of HERA SpA and the Ferrara Plain Reclamation Consortium.

Simultaneously with the intervention definition phases, the Terre Estensi Associated Civil Protection Service or the on-call staff ask the Terre Estensi Municipal Police Corps and the Municipality's Mobility and Traffic Infrastructure Service to arrange, each for their own competence, to regulate the mobility of vehicles and people near the affected area.

The intervention methodologies, agreed between the bodies responsible for the hydraulic management of the drainage and irrigation networks, can be traced back to:

A) if there is the possibility of draining water into a suitable neighboring area, in a nearby canal drain or directly into the sewer system, the Provincial Fire Brigade Command uses a sufficient number of hydraulic pumps to dispose of the excess water and restore normal conditions; the Provincial Fire Brigade Command may, if necessary, request the activation and operational use, under its direction, of the Civil Protection Voluntary Associations;

B) in the event that the conditions to dispose of the excess water do not exist because there is no suitable neighboring area, a nearby drain or efficient sewer system, it will be necessary to wait for the restoration of the efficiency of the sewer system and the natural decrease of the level of the flooding waters allow an effective intervention with the use of hydraulic pumps designed to restore normal conditions.

At the end of the emergency, the Terre Estensi Associated Civil Defense Service or the on-call staff draw up an intervention report.

I. 8. Operational Instructions

1. The emergency procedure begins when the Operations Room 115 informs the Local Police of the flooding of the areas.
2. The Local Police call the available Civil Protection technician to inform him of the emergency phase.
3. The available Civil Protection technician informs the Civil Protection Manager who starts the rescue teams and in particular the Fire Brigade.
4. The first Fire Brigade team arrives on the flooded area and restricts the area of intervention, forbidding access to people. In the meanwhile, they wait for the rescue teams with materials and equipment necessary for protection.
5. The Technical Manager of the Fire Brigade assumes the role of Technical Director of Rescue (Direttore Tecnico dei Soccorsi - DTS). The Fire Brigade team starts supervising the site and collecting data on the current event while waiting for the Civil Protection volunteers to arrive.
6. The Local Command Unit (Unità di Comando Locale - UCL) is established to organize and monitor the rescue activities.
7. The teams of Civil Protection volunteers arrive on-site and follow the instructions of the DTS by implementing the actions committed to them.
8. Sometimes the Local Command Unit meets to discuss the evolution of the rescue until the situation returns under control.
9. The rescue teams reorganize the equipment and materials to restore the area after the intervention.
10. The emergency phase ends with a debriefing meeting of the Local Command Unit.

I. 9. Organization of exercises and training in the field of cultural heritage protection.

The exercises and training for the protection of cultural heritage are planned every year.

II. GRAPHIC PART

The Ferrara Emergency Plan for the protection of cultural heritage can be evaluated positively. There are currently no deficiencies or shortcomings in terms of alert procedures, time taken for the rescue, materials and equipment for the rescue. However, the Municipality of Ferrara plans to implement urban planning tools to cope with heavy rainfall and heatwaves. The Municipality of Ferrara does not aim to implement the emergency plan but to improve the programmatic tools for the prevention of damage from natural hazards.The guidelines developed by the Municipal Administration in collaboration with Ancsa are aimed at improving the resilience of the historic centre and the pilot site of

the historic squares. The outcome is a set of urban planning and urban design actions at different scales with the aim of preventing flooding or at least limiting its impact. Namely: working on soil permeability, improving the continuity of floodable spaces, reshaping of road profiles, creation of rainwater conveyance systems in groundwater basins, etc. These actions and guidelines will be summarized in a master plan at the scale of the historic centre. It is oriented to prevent natural risk and not only to manage an emergency situation.