

DELIVERABLE D.T4.1.3

Report on the results from the pilot action 1 -
preparation strategies for the historic centre
in Italy

Draft

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With the advice of ANCSA





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I. PLANNING ACTIVITIES

1. Topic (main objective of the exercises):

Checking the suitability and effectiveness a preparation strategies - The Hydraulic Risk Management Plan for heavy rainfall

The perimeter of the pilot site includes open spaces, squares, where people meet and move. Places are vulnerable to the impacts of climate change due to their artificial nature and almost completely paved and consequently waterproofed. This feature makes it necessary to constantly maintain and clean the water collection sewer system.

Open spaces, monuments, buildings and people are increasingly subjected to the following risks: flooding, heavy rains, raising of average temperatures due to global warming.

Extreme weather events are possible: heavy rain that result in major damage to cultural heritage.

The pilot site includes museums and historic buildings rich in artwork.

The main goal strategy is the prevention of the flooding for open spaces and squares within the perimeter of the pilot site and reduce the discomfort of citizens and tourists.

2. Specific objectives:

Specific objectives:

- 1) Evidencing possible critical steps in the procedure that should be overcome;
- 2) Improving the cooperation of emergency services (Civil Protection, Fire Brigades);
- 3) Verify and get over possible interferences between the rescue actions and the presence of commercial activities, citizens and tourists
- 4) Check knowledge of procedures.

3. Characterize the strategy being tested

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

At the local level the rescue and safeguard operations are coordinated by the Municipal Operative Center assisted by the Associated Service of Civil Protection Terre Estensi. The Hydraulic Risk Management Plan for heavy rainfall is dated 2015 and it has been drawn up by the Municipality of Ferrara, Consorzio di bonifica Pianura di Ferrara, Hera, Provincia of Ferrara, the Fire Department, which identifies the risks, the areas involved and the actions to be taken for risk prevention and problem solving.



The color code provides for the yellow alert phase, for the orange alert prealarm phase, for the red alert alarm phase.

The Associated Service of Civil Protection Terre Estensi organizes and manages a 24/7 availability service, which together with the Municipal Operative Center, which includes the decision-making levels of the entire inter-municipal structure summarized in the trade union responsibilities, constitute the operational garrison to allow a timely activation of the response of the local civil protection system. The available on duty, which therefore acts as a sentinel in the territory, is solely responsible for informing those who, within the municipal structure each for their own responsibilities and competences, decide which actions to implement to prevent and cope with a possible situation emergency as well as citizens, with the tools made available by the Administration.

DISCLOSURE PROCEDURE FOR WEATHER-HYDROGEOLOGICAL-HYDRAULIC CIVIL PROTECTION

The disclosure procedure for Weather-Hydrogeological-Hydraulic Civil Protection foresees that the Agency for Territorial Security and Civil Protection will transmit, via e-mail, the Weather-Hydrogeological-Hydraulic Alert, for adverse weather conditions or for emergencies hydraulic such as, for example, the flood of the Po river, when in the macro-area where the Inter-communal Land Estensi Association is located (zone D / sub-area D1) the color code (level of criticality) is at least yellow. The Agency for Territorial Security and Civil Protection transmits a text message simultaneously with notification of the issuance of the Weather-Hydrogeological-Hydraulic Alert to the cell phone supplied with the available caller.

The Terre Estensi Municipal Police Corps receives the e-mail relating to the Weather-Hydrogeological-Hydraulic Warning sent by the Agency for Territorial Security and Civil Protection to the address cro.terrestensi@comune.fe.it. The Terre Estensi Municipal Police Force will notify the available on-call by telephone and will forward the e-mail received at allerta.pc@comune.fe.it to the following recipients at their e-mail address:

- Mayor of the Municipality of Ferrara
- Mayor of the Municipality of Masi Torello
- Mayor of the Municipality of Voghiera
- Cabinet Chief of the Municipality of Ferrara
- Secretary of the Mayor of the Municipality of Ferrara
- Deputy Mayor of the Municipality of Ferrara in charge of the coordination of Civil Protection activities
- Commander of the Terre Estensi Local Police
- The Directors of all the Departments of the involved Municipalities
- Press Office of the Municipality of Ferrara



The on-call staff, after having read the communication, will send an SMS to the groups named SMS ALLERTA, SMS ALLERTA1 and SMS ALLERTA2, stored in the service cell phone, containing the following indications:

- Civil protection alert no.
- Criticality level: yellow / orange / red
- Activation Phase of: attention / pre-alarm / alarm
- Type of event, for example: rain / thunderstorms, snow, frost, ice, wind, sea state, hydraulic criticality, full river Po, etc.
- Event duration, for example: from 10/11/17 to 11/13/17
- Any other information deemed useful, for example: 50 mm of rain, full of expected full 1.70 m, wind 75 km / h, 20 cm of snow, ect.

The available on call activates the procedure to publish the news of the Weather-Hydrogeological-Hydraulic Alert on the home page of the website of the Municipality of Ferrara in order to inform the citizens of the expected event and so that they can implement the self-protection measures through a specific communication model. The Terre Estensi Associated Civil Protection Service or the available on duty accesses the space dedicated to the Municipality of Ferrara in the alert portal of the Territorial Security and Civil Protection Agency and, using the same format described above, sends an e-mail to all citizens registered on the alert portal to inform them of the expected event so that they can implement self-protection measures. At the same time, the same message is sent to the users who follow the social networks (Facebook and Twitter) managed by the Associated Service of Civil Protection Terre Estensi. The available on duty publishes the news of the Weather-Hydrogeological-Hydraulic Warning on the App TELEGRAM in order to inform the registered users of the Shipyards and Civil Protection channel.

In the event of an alert relating to thunderstorms, the on-call caller will send, via e-mail, the communication received also to the company that performs the control and maintenance of the installations relating to the road underpasses. Simultaneously with the sending of the e-mail mentioned above, the on-call staff will send an SMS to the group called SMS RAIN, stored in the service cell, containing the following indications:

- Civil protection alert no.
- Critical level: yellow / orange / red - Activation Phase of: attention / pre-alarm / alarm
- Type of event: rain / time duration
- Event duration, for example: from 10/11/17 to 11/13/17
- Every other information deemed useful, for example: 50 mm of rain

Only in the period November 15 - March 31, how active is the Municipality's Snow Plan (Piano Neve), the on-call staff will send the same SMS sent to the groups named SMS ALERT, SMS



ALLERTA1 and SMS ALLERTA2 to the group called Piano Neve, stored in the mobile of service as well as to forward the e-mail received relative to the alert to the address piano.neve@comune.fe.it. The available on call and the Terre Estensi Associated Service of Civil Protection daily consults the website <https://allertameteo.regione.emilia-romagna.it> on working days, at around 12.00, which is the official source of communication for the system of warning of the Emilia Romagna region. The available on duty also consults on Saturdays and public holidays, at about 12.00, the site <https://allertameteo.regione.emilia-romagna.it>. At an event in progress, the available on call consults the site indicated above based on the progress of the event itself. When an event is underway, the snow thresholds are exceeded, the Agency for Territorial Security and Civil Protection sends a text message and an e-mail in which this circumstance is notified. The available sender sends a text message to the groups named SMS ALLERTA, SMS ALLERTA1 and SMS ALLERTA2 once they have learned of the overcoming of the rainfall thresholds in the event of a storm. The available on duty publishes the news on the home page of the website of the Municipality of Ferrara and on the App TELEGRAM with the same procedures previously described for the disclosure of the alerts.

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.

4. Name and address of the place of exercise / pilot site:

Central square of the city: Piazza della Cattedrale

5. Situation description:

A thunderstorm hit the city of Ferrara. The rain gauges record the fall of 36 mm of rain in 20 minutes that causes the flooding of several areas of the city center. Among these areas there is the Cathedral Square, the basin and the entrance hall of the Duomo. Being all open spaces fully paved and waterproof

the rainwater runoff occurs only through the mixed sewerage network, which are undersized for this kind of events, and the area object of the testing is flooded.



6. Concept / assumption for exercises:

Hour	Description of the situation's development	Action taken	Other info
2 hours in advance	A thunderstorm hit the city of Ferrara. The rain gauges record the fall of 36 mm of rain in 20 minutes that causes the flooding of several areas of the city center. Among these areas there is the Cathedral Square, the basin and the entrance hall of the Duomo.	Due to the difficulty of the mixed sewerage system to dispose of the large amount of rainwater that has fallen in a very limited amount of time, the emergency procedure starts.	The local Police Headquarters receives, among others, the report of the flooding of the Cathedral Square.
1:00 pm	There are numerous calls to Operation Room 115 that signal the flooding of the Piazza della Cattedrale.	Ops room 115 contacting local police. The Local Police are already informed and are on their way to the flooded area.	
1:05 pm	The Cathedral Square is flooded.	The local police call the on-call civil protection technician and inform him of what is happening and, in particular, tell him about the flooding of the Piazza della Cattedrale.	
1:07 pm	The available Civil Protection technician calls the Civil Protection Manager and informs the Civil Protection Office.	The first fire brigade team arrives on site and, in agreement with the local police, proceeds to ban the flooded area, the access roads and the area used for the disposal of emergency vehicles.	The Head of Civil Protection informs the Mayor who decides to convene the Municipal Operations Centre (Centro Operativo Comunale - COC).
1:15 pm	The flooded area is off limits to people.	The second fire brigade team arrives on site with a motorized fire truck. The Technical Officer of the Fire Brigade assumes the role of Technical Rescue Director (Direttore tecnico dei soccorsi - DTS).	The fire brigade staff starts supervising the site and collecting data on the current event via electronic device (area size, amount of rain, damage, etc.). The data is sent to the operations centre and uploaded to a WebGIS platform (Ferrara AIB).
1:17 pm	The intense rainfall persists.	The staff of the Civil Protection Office arrives on site.	
1:20 pm	The intense rainfall persists.	The Local Command Unit (Unità di Comando locale - UCL) is established.	



1:25 pm	The intense rainfall persists.	The Technical Director of Rescue with the Head of the Civil Protection Office carry out the reconnaissance of the flooded areas, the sewer pipes still active and the sensitive elements, establishing an order of priority of intervention.	It is decided to activate at least two teams of civil protection volunteers, equipped with equipment (motor pumps and electric pumps) for the drainage of the water basin and the flooded entrance hall.
1:30 pm	The intense rainfall persists.	Fire brigade teams prepare the intervention equipment.	The local police modify the road network in Corso Martiri, regulating the alternating one-way transit.
1:40 pm	The intense rainfall persists.	On the instructions of the Technical Director of Rescue, the fire brigade teams carry out the laying of the motor-pumps in order to bring water into the sewerage system identified by the municipal technical services.	
1:50 pm	The intense rainfall persists.	The teams of civil protection volunteers arrive on site and follow the instructions of the Technical Director of Rescue by implementing the actions entrusted to them.	
2:00 pm	The intense rainfall persists.	The positioning of the motor pumps, electric pumps and generator sets is complete.	
2:15 pm	The intense rainfall persists.	Coordination meeting at the Local Command Unit.	
2:30 pm	The intensity of the rain decreases.	The Technical Director of Rescue asks the Head of the Civil Protection Office to bring the volunteer light-tower.	
2:50 pm	The intensity of the rain decreases.	The light-tower trailer arrives on site.	
3:30 pm	The rain ceases.	The intervention continues until the stagnant water is completely drained.	
3:45 pm	The flood are decreasing and the situation is under control.	The local police modify the road system.	
3:50 pm		The Fire Brigade and the Civil Protection Department check whether there is any damage or dangerous situations.	
4:00 pm	Light-tower is lighting.	The draining is finished, the teams begin to tidy up the equipment and materials used.	
4:30 pm	Complete reactivation of the roads and return of the rescue teams.	A debriefing meeting at Local Command Unit	



7. Planned forces and resources:

No	Emergency responders	Vehicle / equipment	Number of equipment	Number of people
2	Local fire brigade	Specialized vehicle	2 + 1 mobile fire station	7
1	Civil Protection and civil protection volunteers	Specialized vehicle	3	12
1	Local Police	Car	1	2

Other entities planned for exercise:

Municipal technicians, associations of various kinds, professional associations (8 people)

The way of alerting / informing emergency forces and resources:

Telephone call, alert at the municipal emergency offices of type A

Codes in the plan

Preventive checks

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

The management of the interference of citizens and tourists with the implementation of the rescue procedure.

The presence of the scaffolds and the working area for the intervention of restoration of the Cathedral, which may make more difficult the access to the Cathedral for the possible evacuation of the cultural objects or protection interventions and slowdown all the rescue activities.

9. Ways and means of simulation:

All the actions are described in Table in Chapter 6.

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

a) The preparatory training briefing has been held in November 19th 2019, at 5 p.m. and it has been directed from The Fire Brigade staff, The local Civil Protection and the Project Protecht2save Staff

b) Briefing on site: December 10th 2019 at 2.00 p.m., directed to (participants): Politicians, Citizens, Stakeholders, Associations

11. Date of the exercises:

Date 2019, December 10th, Hour started 1.00 p.m., Hour completed 4.30 p.m.



Some pictures of the simulation day are following:

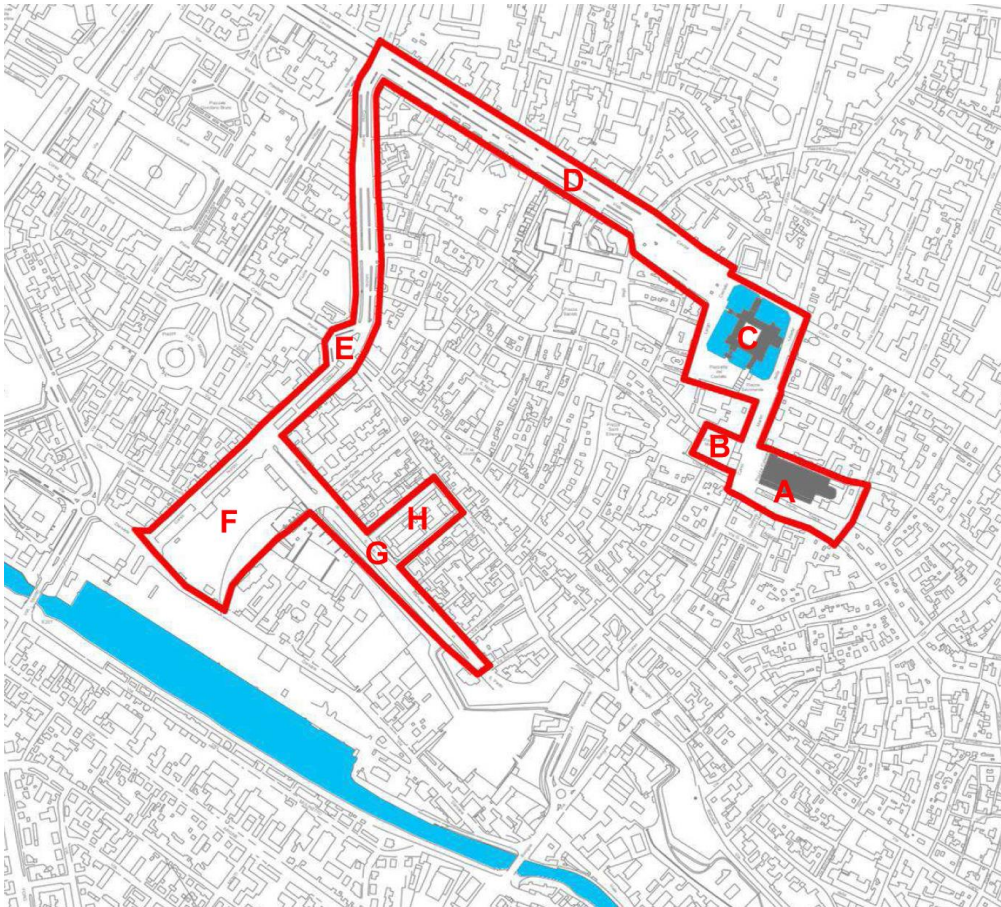




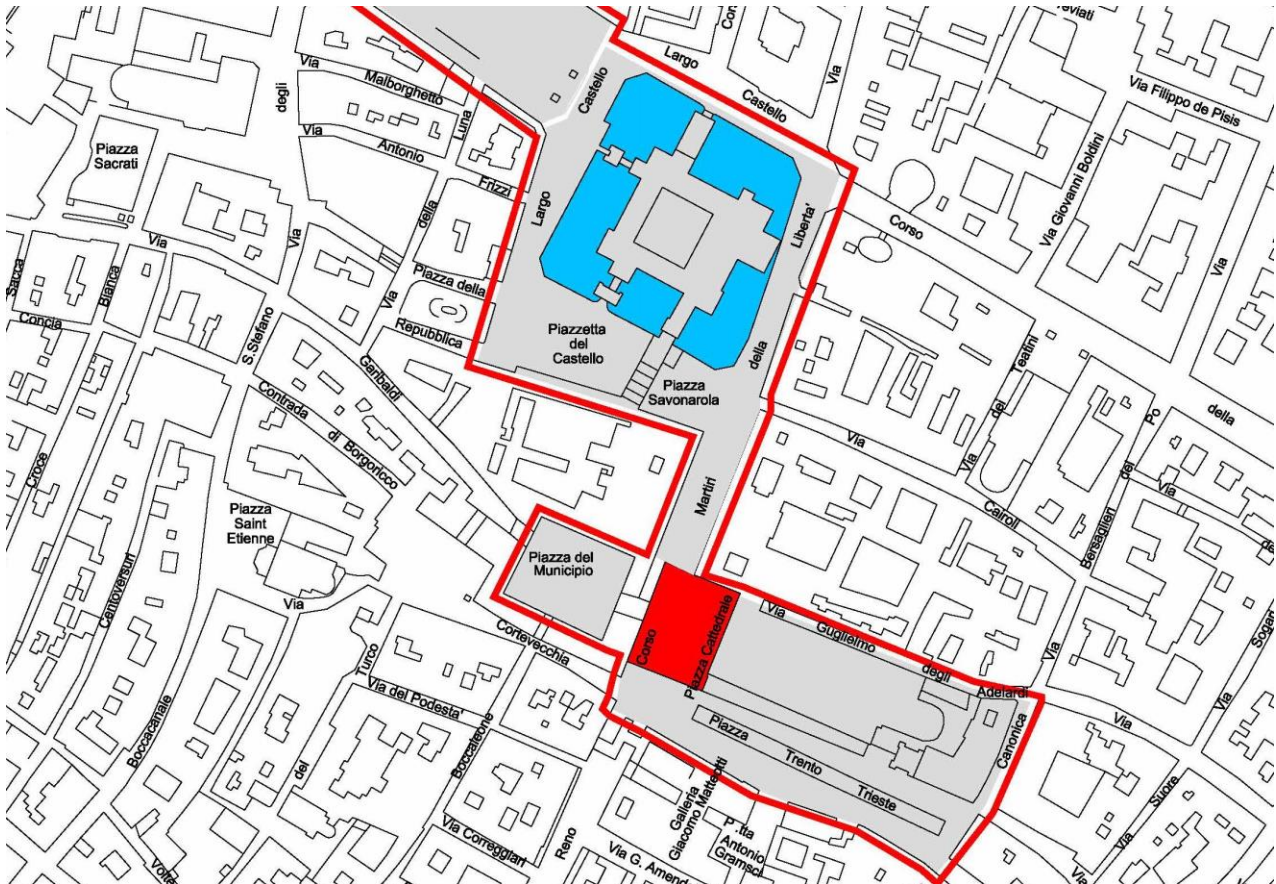


12.A sketch of the situational area of the exercises - in attachment

AREA A: Cathedral Square (Piazza della Cattedrale)



- A - Cathedral Square and Piazza Trento Trieste
- B - Piazza del Municipio
- C - Estense Castle
- D - Viale Cavour
- E - Corso Isonzo
- F - Ex Mof - Dock
- G - Via Rampari di San Paolo
- H - MEIS - National Museum of Italian Judaism and the Shoah



13. List of functional persons of the exercises:

Firefighters:

- 1) Deputy Director Massimo Fratti - Technical Rescue Director
- 2) Special Coordinating Director Luca Quintabà - Head of the Local Command Unit, Advanced Command Post with Planning function
- 3) Team Leader Expert Tiziano Braga - Rescue Operations Manager
- 4) Firefighter Coordinator Francesco Faccini - Local Command Unit Officer with planning and cartography support function (Topography Applied to Rescue)
- 5) Expert Firefighter Federico Cervellati - Member of the Firefighters team
- 6) Firefighter Antonello Fanelli - Member of the Firefighters team
- 7) Voluntary firefighter Francesco Serralungo - Member of the Firefighters team

Civil Protection Volunteers:

- 1) Coordinator Ugo Pazi - Rescue Alpha Dogs Ferrara ODV
- 2) Team Leader Gabriele Bariani - VAB Voghiera
- 3) Team Leader Stefano Chierici - AGESCI
- 4) Team Leader Lauro Mantovani - GEV Ferrara
- 5) Operator Rodolfo Buzzoni - VAB Voghiera
- 6) Operator Fiorenzo Franchi - Estense Dog ODV
- 7) Operator Antonella Rambaldi - Estense Dog ODV
- 8) Operator Alessandro Robustini - Estense Dog ODV
- 9) Operator Bruno Tunioli - AGEPro
- 10) Driver Mario Ramari - AFF



- 11) Driver Stefano Matteucci - AFF
- 12) Driver Daniele Villani - Estense Dog ODV

For the Civil Protection Office of the Municipality of Ferrara:

- 1) Luca Capozzi
- 2) Sergio Riccio
- 3) Roberto Riccelli
- 4) Gabriele Cresi

For CNR-ISAC (Lead Partner):

- 1) Alessandra Bonazza
- 2) Alessandro Sardella
- 3) Paola De Nuntis

For the Municipality of Ferrara:

- 1) Fulvio Rossi
- 2) Alessandra Piganti
- 3) Claudio Tassinari
- 4) Luca Roversi
- 5) Beatrice Galassi

For the Local Police of the Municipality of Ferrara: 2 police officers

For the National Association of Historic-Artistic Centres

- 1) Marika Fior
- 2) Alberto Bolognese

They were there:

- 1) Alan Fabbri - Mayor of the City of Ferrara
- 2) Nicola Lodi - Deputy Mayor
- 3) Alessandro Balboni - Deputy Mayor in charge of European Projects



II. ANALYSIS OF EXERCISES

1. Notes on the implementation of the assumption

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

The simulation hypothesis is to verify the improvement of emergency cooperation services and to verify the knowledge of the procedures to be implemented in case of natural risks.

The exercise highlighted that the various rescue groups (firefighters, local police, civil protection, volunteers) work synergistically and expeditiously without hindering each other. Therefore, it is assumed that the knowledge of the emergency procedures is full by all the bodies that intervened.

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 most critical aspect of the site where the exercise took place is the possibility that it is particularly crowded with citizens and tourists, making the arrival of the rescue teams particularly difficult. It is also true that the type of event (a very strong storm) significantly limits the presence of the population in that area.

In any case, access to the site (from Corso Martiri) does not seem to be particularly difficult for the arrival of the rescuers since it is a large urban avenue, with limited traffic and no parked cars.

3. Comments and final conclusions regarding the suitability and effectiveness of preparation strategies to crisis situations

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



The preparation of rescue groups and planned rescue activities seem to be adequate for the needs of the post-event emergency phases. In particular, the WebGIS procedure of the Fire Brigade which is used to map the event in real-time seems to be very interesting. The Fire Brigade (Provincial section of Ferrara) are equipped with electronic devices that allow the detection and sending to the command center of all the information necessary to build a detailed knowledge framework on the type and effects of the event. This information builds an information database (Ferrara AIB) which feeds knowledge on the consequences of disasters and allows to constantly improve strategies and rescue plans. Consequently, this provincial database allows lowering the risk levels of the territory.

In any case, we suggest thinking about an alternative procedure to the one followed. If the existing drains are unusable, a tanker lorry/purge into which the pipes are to be conveyed must be provided.

If the quantity of water to be disposed of is very large, a second alternative hypothesis could be to spread the pipes of the pumps until reaching the moat of the Estense Castle. In this way the water can be conveyed directly into the moat of the Estense Castle thus discharging into a large collection tank in direct communication with the Po di Volano river.