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Flash Flood in West Attica (Mandra, Nea Peramos) November 15, 2017

Dr. **Efthymis Lekkas**
Dr. **Michalis Diakakis**
PhD c. **Emmanuel Andreadakis**
MSc **Nafsika-Ioanna Spyrou**
MSc **Marilia Gogou**
MSc **Katerika-Navsika
Katsetsiadou**
Dr. **Phoebe-Demeter Speis**
MSc **Argyris Georgakopoulos**
Dr. **Efthymios Nikolopoulos**
PhD c. **Georgios Deligiannakis**



About

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Publishers:

Dr. Efthymis Lekkas
Dr. Nikolaos Voulgaris
Dr. Stylianos Lozios

Technical Editing:

PhD c. Spyridon Mavroulis

Communication:

PhD c. Spyridon Mavroulis (smavroulis@geol.uoa.gr)
MSc Alexia Grambas (agram@geol.uoa.gr)
MSc Katerina-Nafsika Katsetsiadou (knafsika@geol.uoa.gr)

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Scientific Mission

Of the National and Kapodistrian University of Athens, Faculty of Geology and Geoenvironment, Department of Dynamic Tectonic Applied Geology

Contributors

Dr. Efthymis Lekkas, Dr. Michalis Diakakis, PhD c. Emmanuel Andreadakis, MSc Nafsika-Ioanna Spyrou, MSc Marilia Gogou, MSc Katerika-Navsika Katsetsiadou, Dr. Phoebe-Demeter Speis, MSc Argyris Georgakopoulos, Dr. E. Nikolopoulos, PhD c. Georgios Deligiannakis



GENERAL DATA

On 14-16 November due to intense instability in the upper atmosphere caused rain and storms in much of the country. Mandra was affected by storms in the early hours of Wednesday 15 November. The study of meteorological and satellite data showed a storm feedback in a very limited area around Mount Patara in the early hours of the 15th and until noon the same day.

The precipitation, which occurred in the mountainous parts of the area, caused a flash flood in the water basins of the area, namely the streams flowing in the plain of Nea Peramos and the lowland area of Mandra and the Mandra Industrial Area. These torrents triggered the alluvial ripples formed by the sediment supply within the Quaternary, resulting in flooding with a large amount of sludge (shown below). The flooded areas by water lie on the geological formations of the floods.

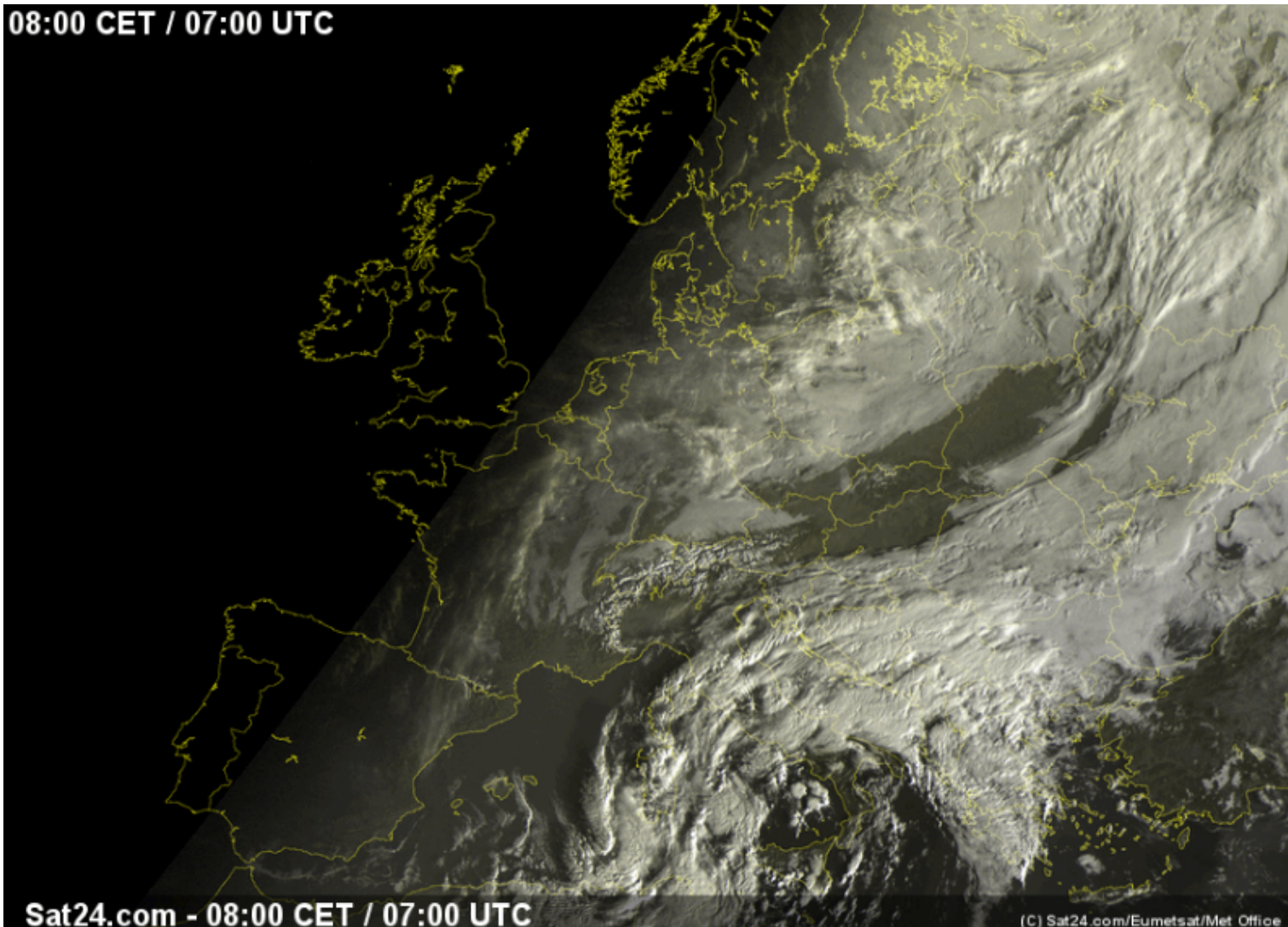
The development of the settlements perpendicularly to the flow of water and on these alluvial ridges cut off the smooth drainage of water to the sea, causing water to flood the settlements.

The development of road and rail axes perpendicular to the flow is also estimated to have cut off smooth run-off, resulting in the extent of floodwaters being amplified in width.



SATELLITE IMAGE OF THE WEATHER SYSTEM 15/11/2017

08:00 CET / 07:00 UTC

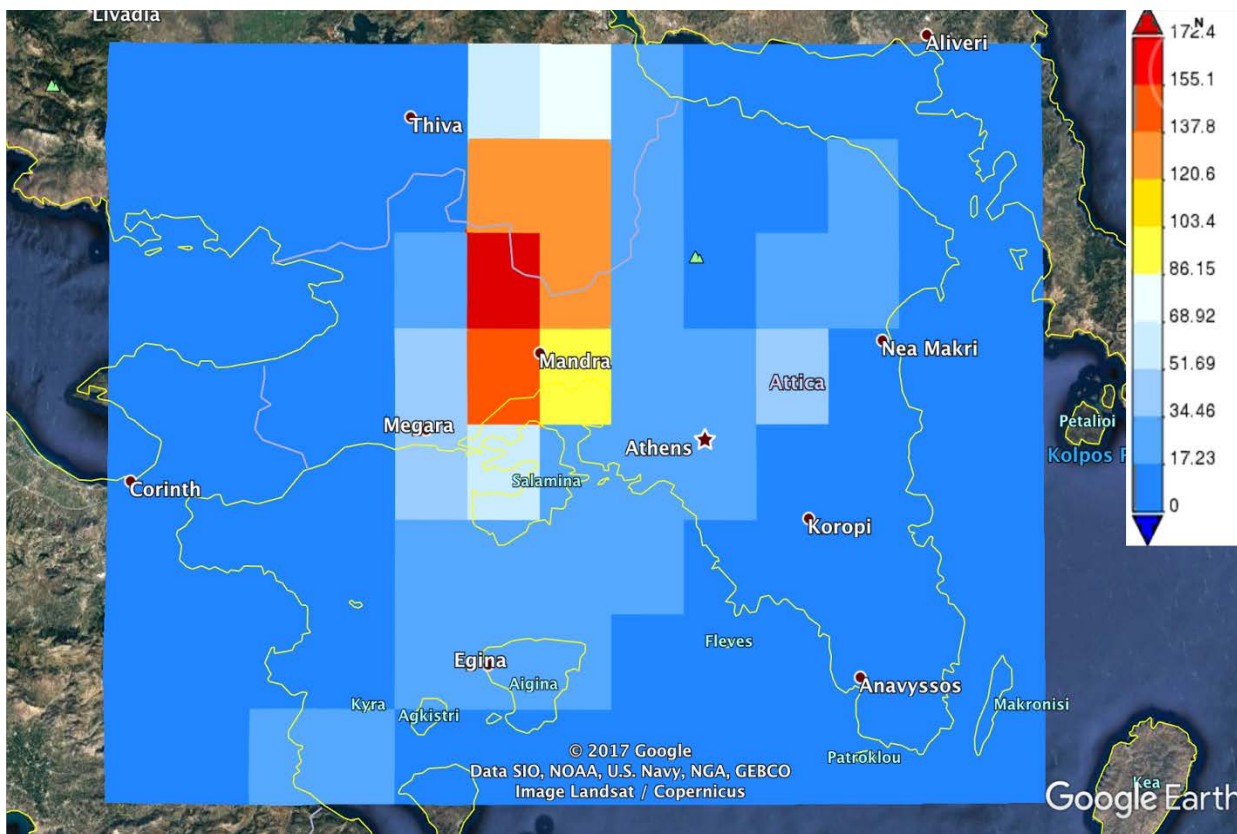


Sat24.com - 08:00 CET / 07:00 UTC

(C) Sat24.com/Eumetsat/Met Office



METEOROLOGICAL DATA: RAINY ASSESSMENT OF NASA SATELLITE IMAGE

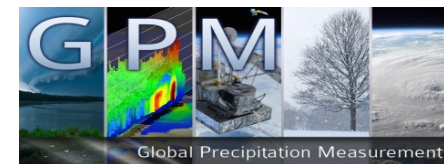


The analysis shows a significant limited spatial spread of the storm as regards the intensity of the rainfall.

The lowland areas received significantly lower rainfall than the most mountainous. It is estimated that the inhabitants of the affected areas accepted lower rainfall than that which fell in the mountains and led to a significant runoff of the streams.

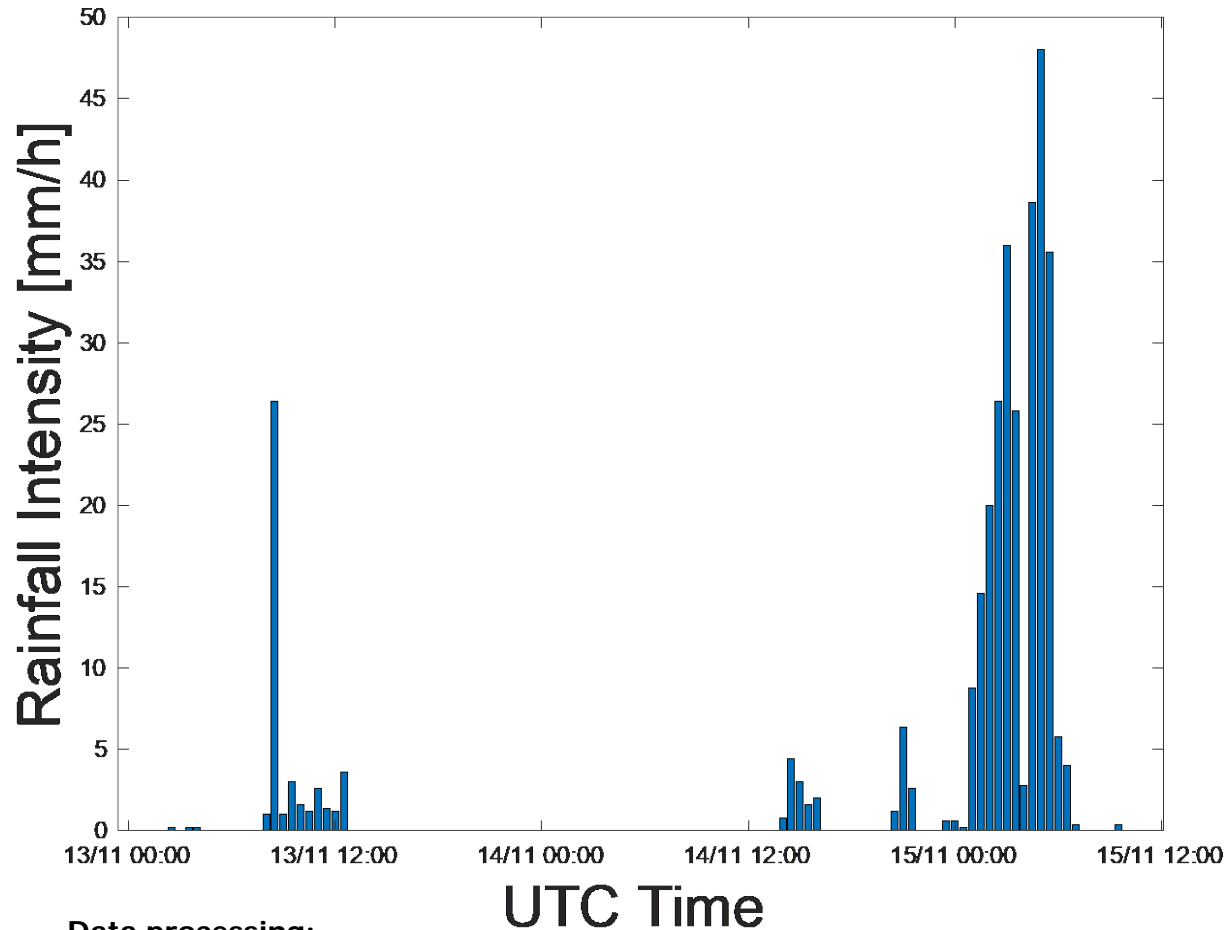
Data processing:

Dr. Efthymios I. Nikolopoulos
Assistant Research Professor
Department of Civil & Environmental Engineering
University of Connecticut





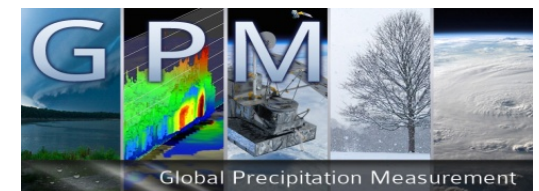
METEOROLOGICAL DATA: RAINY ASSESSMENT OF NASA SATELLITE IMAGES



The storm that caused the flash flood that hit the West. Attica was characterized by a short duration and intense locally selective intensity of precipitation. These two characteristics are typical of the storms that cause flash flood in Mediterranean. The result of rainfall calculation of IMERG (Integrated Multi-satellite Retrievals for GPM) based on NASA, has captured all the spatio-temporal features of the storm and shows its extreme event. According to these initial estimates, the upstream area of Mandra received ~ 150mm of rainfall in about 7 hours (from 00:30 to 30:30 on 15 November 2017), an amount corresponding to about 40% of its annual rainfall area.

Data processing:

Dr. Efthymios I. Nikolopoulos
Assistant Research Professor
Department of Civil & Environmental Engineering
University of Connecticut





HISTORICAL FLOOD DATA





FLOOD IN MANDRA'S SETTLEMENT, 27/2/2015



Successive storms occurred in West and North West Attica. Stronger in the mountainous regions, Mount Father and Myrini. On December 27, 2015, at 20:30, they hit Mandra and caused flooding in the water basins of the area, particularly the streams flowing through the settlement. Material damage to buildings and infrastructure and materials was observed.







E 962 (ROAD NETWORK, NATIONAL ROAD), 15/11/2017





ROAD NETWORK AND INDUSTRIAL INSTALLATIONS DOWNSTREAM TO THE E962, 15/11/2017





EFFECTS (LANDSLIDES, SCREES, DISPERSED FLOW ETS) NEA PERAMOS - MANDRA, 15/11/2017





DAMAGE BUILDINGS AND INFRASTRUCTURES - MANDRA, 16/11/2017





DAMAGE BUILDINGS AND INFRASTRUCTURES -MANDRA, 16/11/2017





DAMAGE BUILDINGS AND INFRASTRUCTURES - MANDRA, 16/11/2017





NEA PERAMOS, DOWN TOWN, 15/11/2017 WATER MARKS AND DAMAGE IN HOUSES





DEBRIS - MUD FLOW, MANDRA (MUD, SCREES, ROCKS ETS, 16/11/2017)





OBJECTS, MANDRA 16/11/2017





STRUCTURAL DAMAGES IN BUILDINGS AND INFRASTRUCTURES, MANDRA, 16/11/2017





JUNCTION OF NEA PERAMOS, NERAKI AREA, 15/11/2017





NEA PERAMOS, NATIONAL ROAD, 15/11/2017





NEA PERAMOS, UPSTREAM OF THE NATIONAL ROAD – SLAB COVER, 15/11/2017





NEA PERAMOS, DOWNSTREAM OF THE NATIONAL ROAD - SLAB COVER, 15/11/2017





NEA PERAMOS, DOWNSTREAM OF THE NATIONAL ROAD, FOLLOWING THE SLAB, 15/11/2017





NEA PERAMOS, UPSTREAM OF THE NATIONAL ROAD, GOOGLE EARTH (BEFORE)



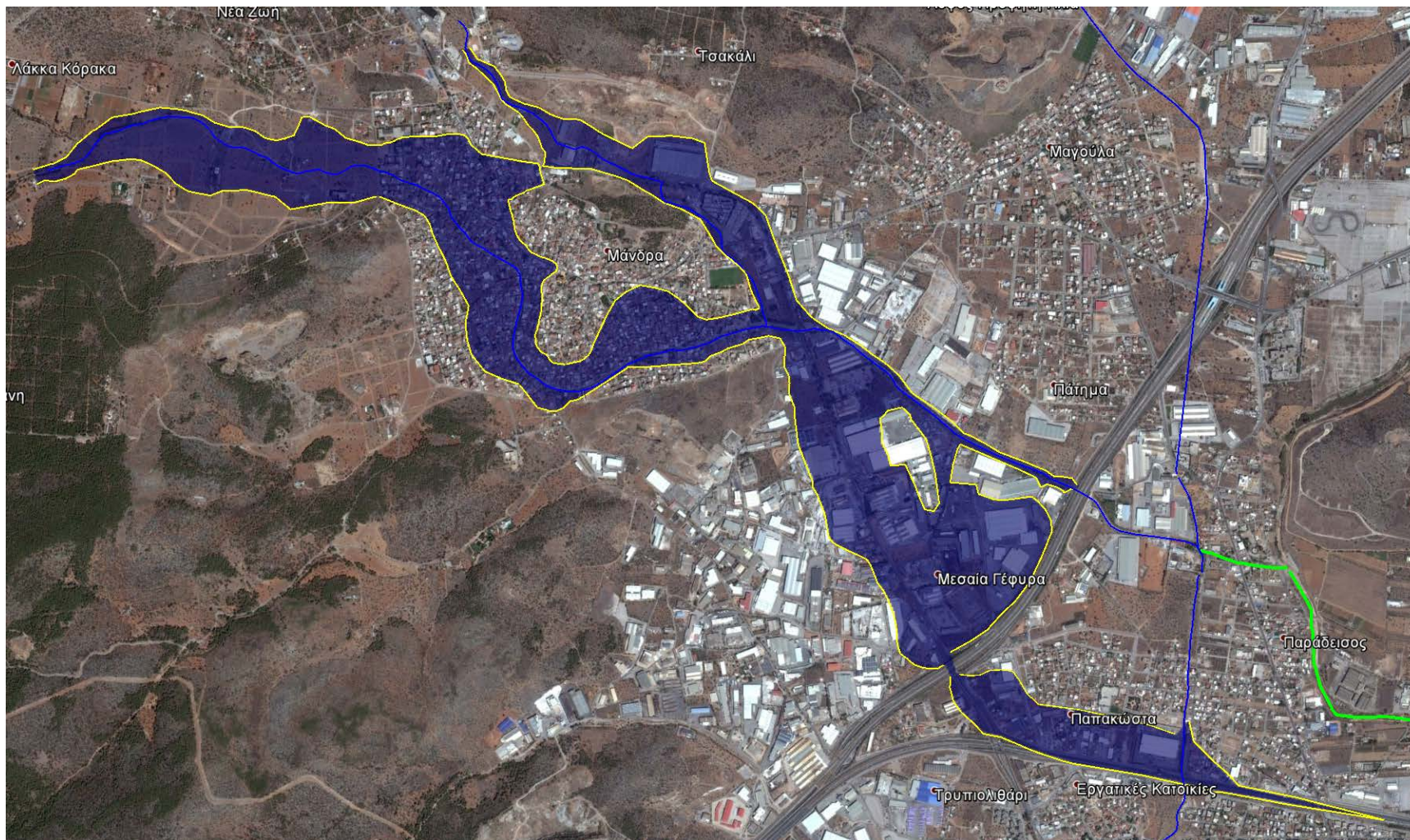


NEA PERAMOS, DOWNSTREAM OF THE NATIONAL ROAD, 15/11/2017 (AFTER)





FLOOD ZONE IN MANDRA' S SETTLEMENT AND IN THE INDUSTRIAL AREA – 15/11/2017



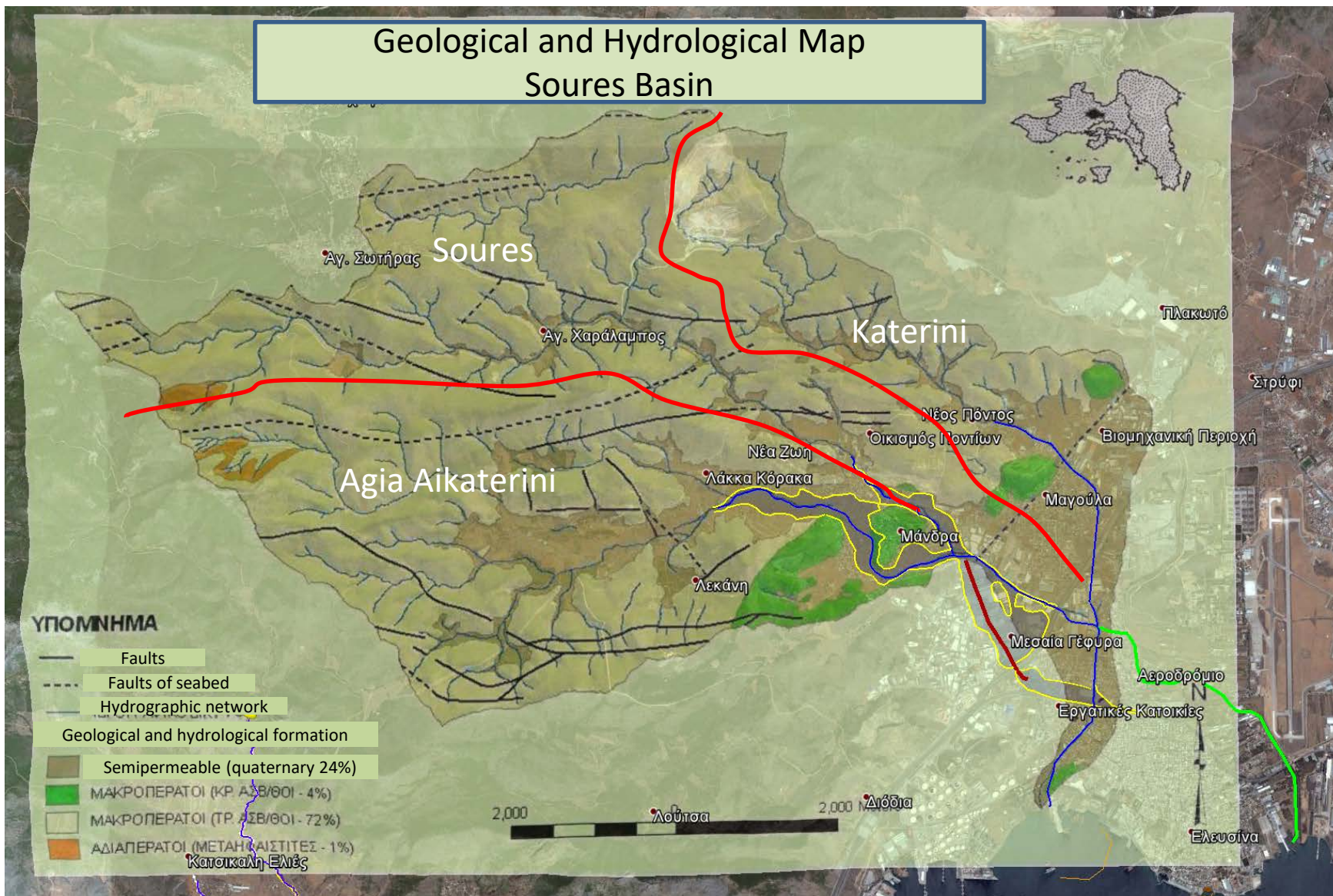


FLOOD ZONE IN MANDRA – 15/11/2017



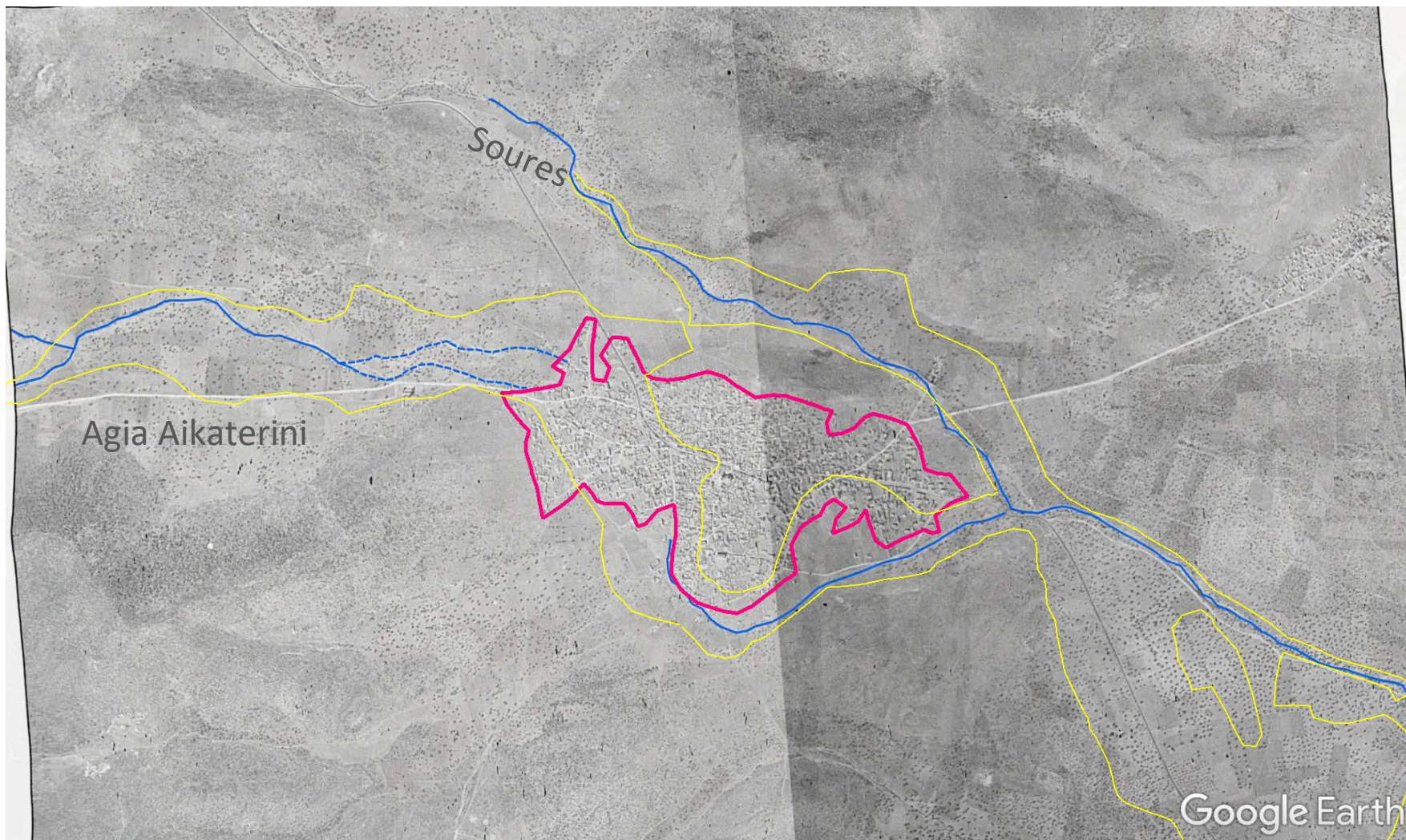


FLOOD ZONE 15/11/2017 – HYDROLOGY AND PETROLOGY OF THE SOURES BASIN



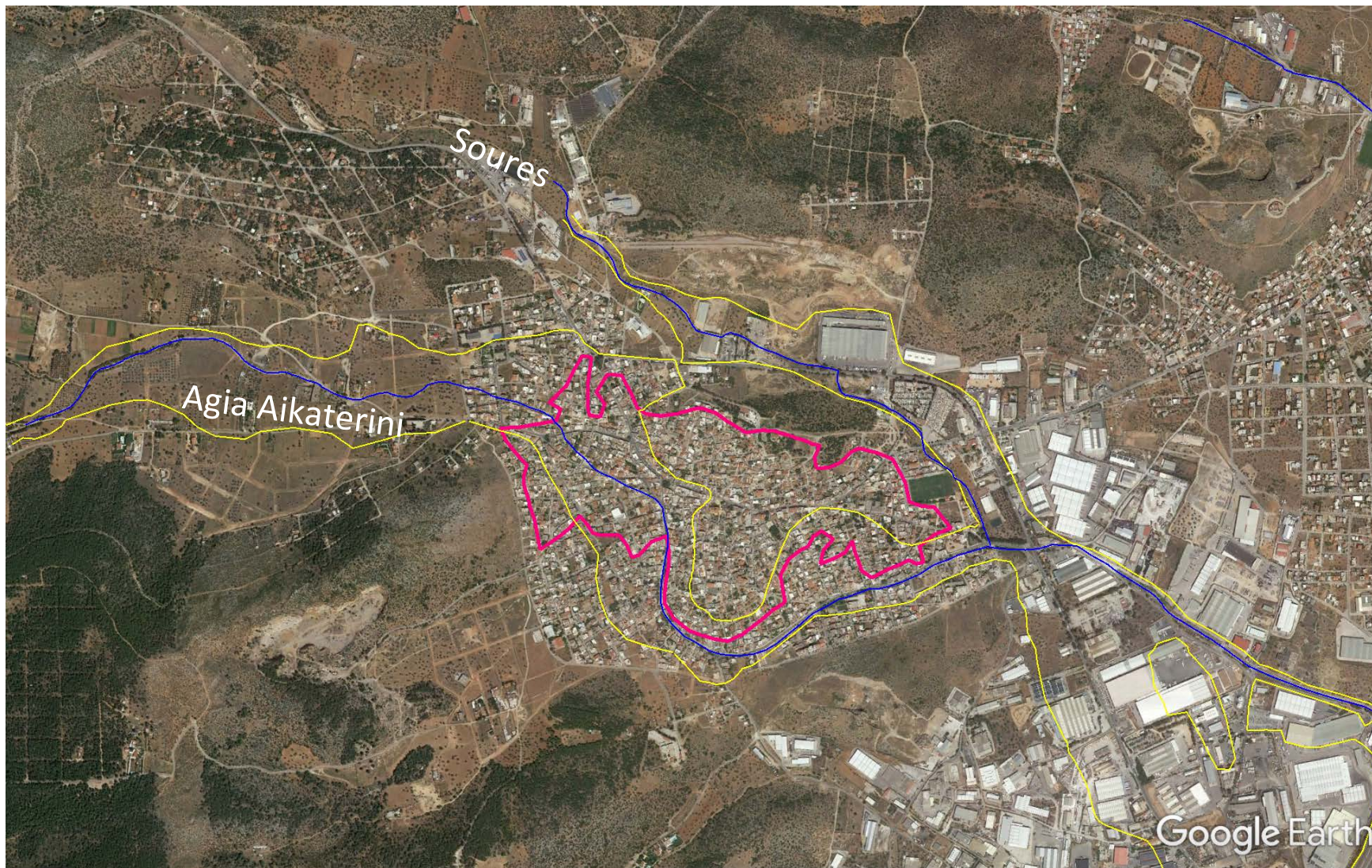


FLOOD ZONE 15/11/2017 AND MANDRA'S BOUNDARIES 1945





FLOOD ZONE 15/11/2017 AND MANDRA'S BOUNDARIES 1945





SOURCES STREAM, 16/11/2017



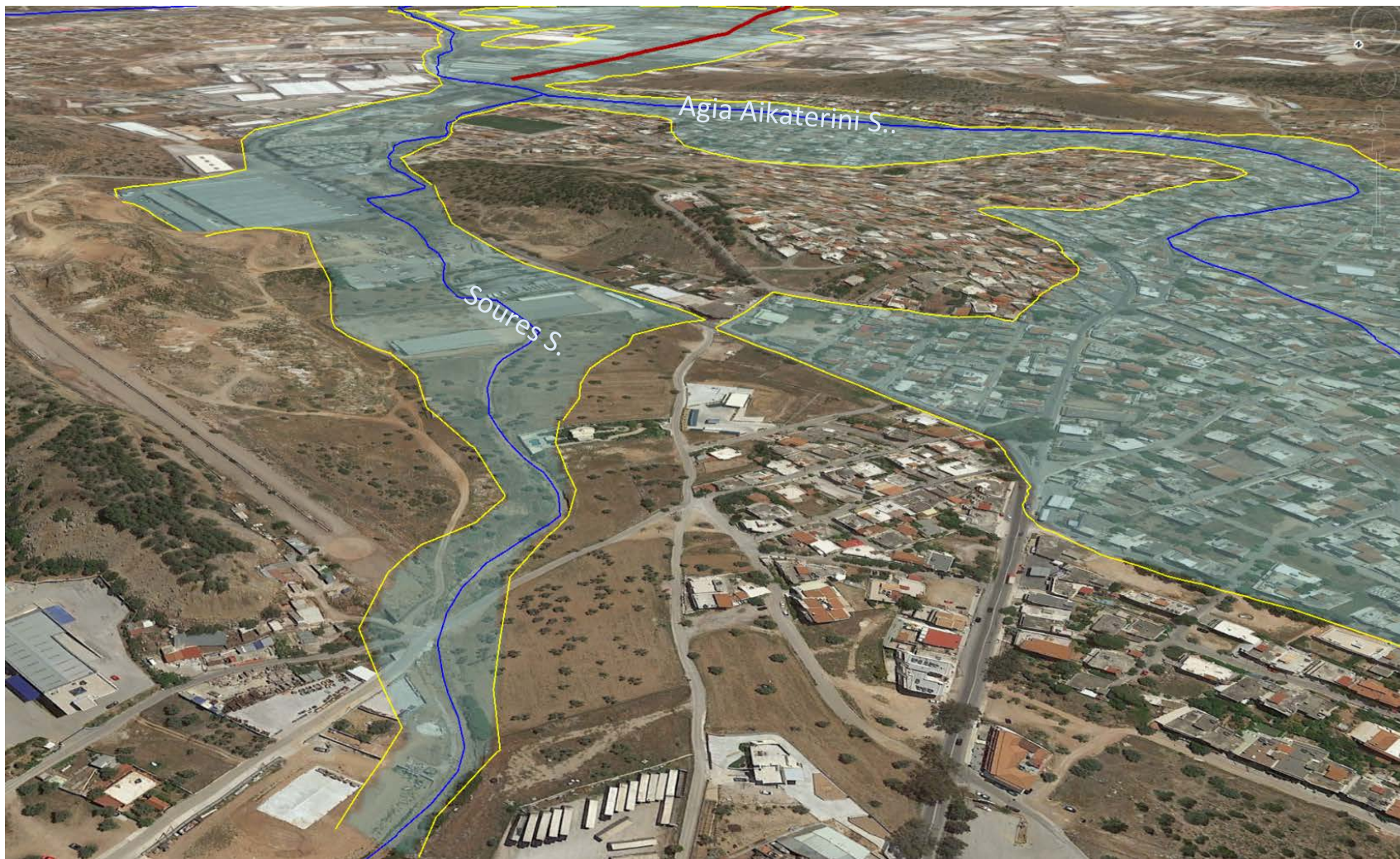


SOURCES STREAM, MANDRA' S CEMETERY, 16/11/2017





SOURCES STREAM, 15/11/2017





AG. AIKATERINI STREAM, UPSTREAM OF MANDRA, 16/11/2017





AG. AIKATERINI STREAM, UPSTREAM OF MANDRA

The stream of Ag. Aikaterini discharges the southern mountainous part of the basin upstream of Mandra. It ends at the western boundary of the settlement.





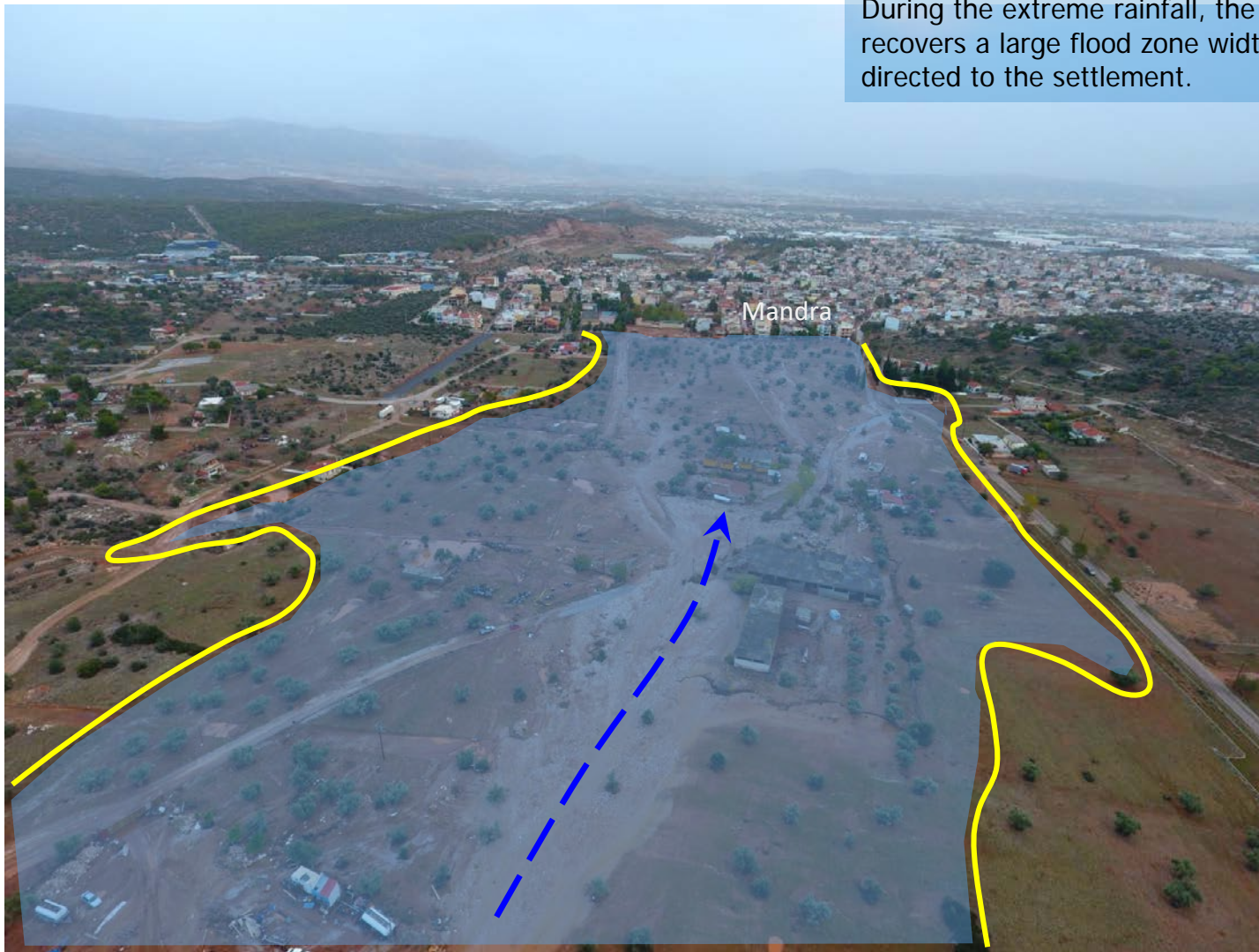
AG. AIKATERINI STREAM, UPSTREAM OF MANDRA, FLOOD FIELD 16/11/2017



The stream of Ag. Aikaterini discharges the southern mountainous part of the basin upstream of Mandra. It ends at the western boundary of the settlement



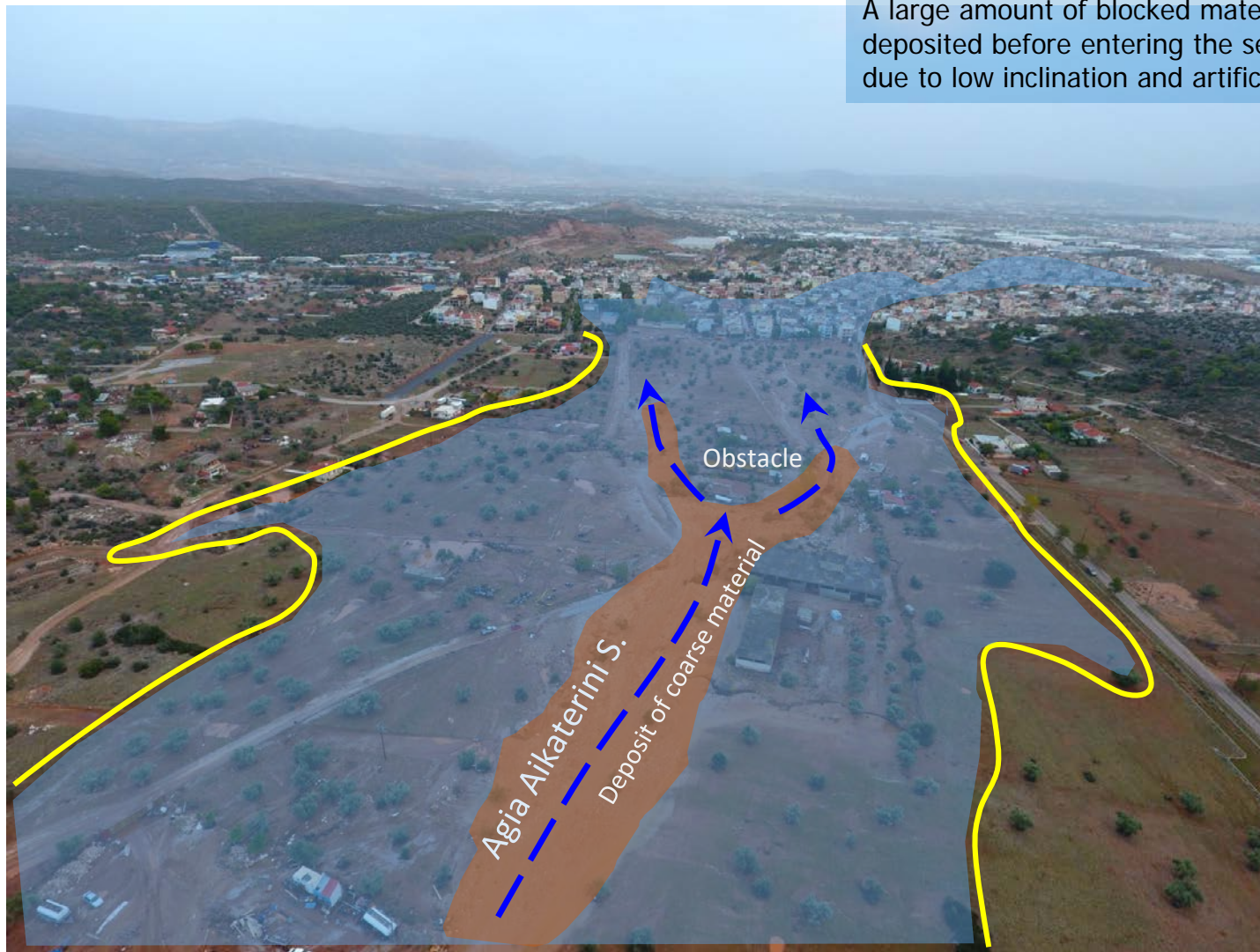
AG. AIKATERINI, UPSTREAM OF MANDRA, FLOOD FIELD 15/11/2017



During the extreme rainfall, the stream recovers a large flood zone width, and it is directed to the settlement.



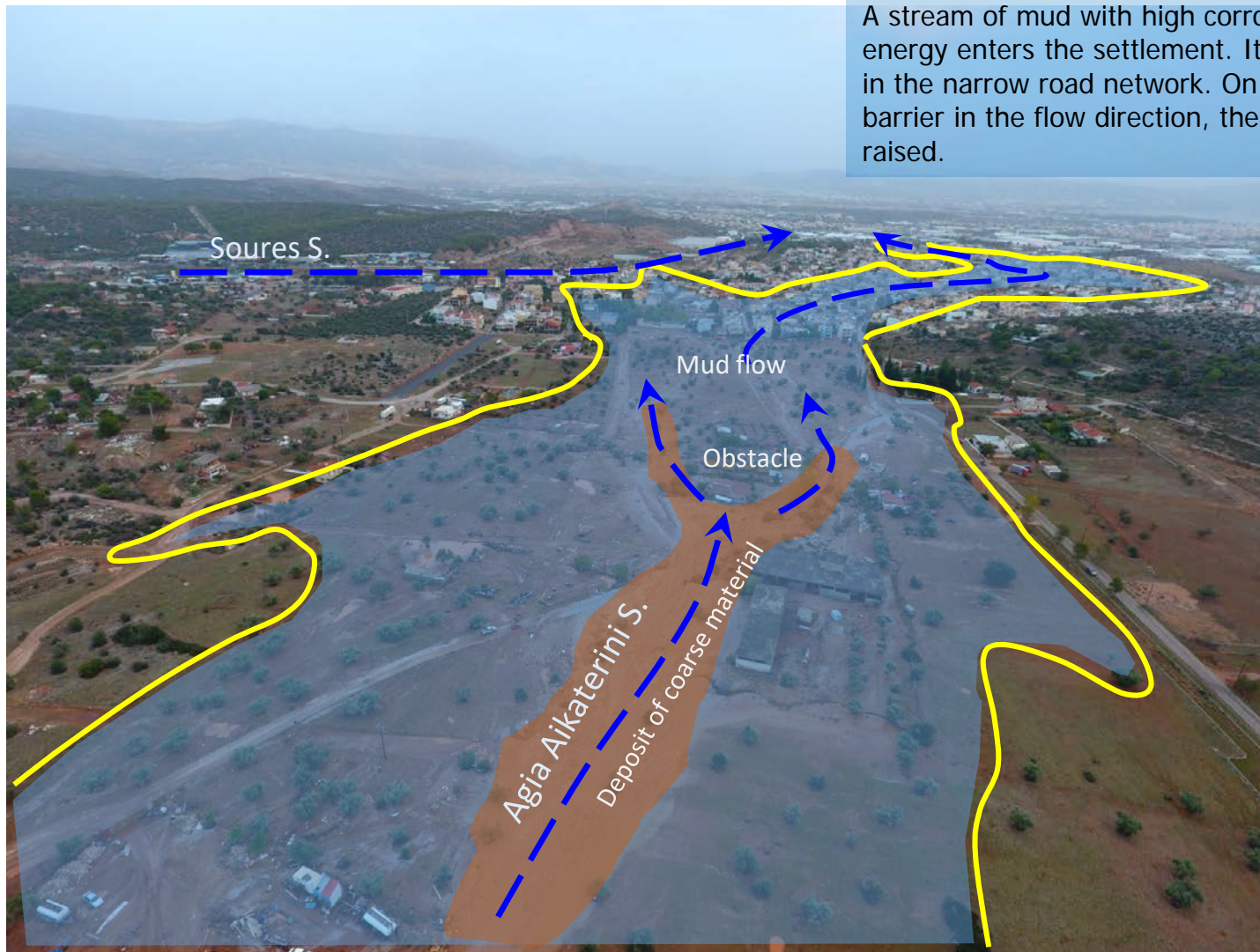
AG. AIKATERINI STREAM, UPSTREAM OF MANDRA, FLOOD FIELD 15/11/2017



A large amount of blocked material is deposited before entering the settlement due to low inclination and artificial barriers.



AG. AIKATERINI STREAM, UPSTREAM OF MANDRA, FLOOD FIELD, 15/11/2017



A stream of mud with high corrosive energy enters the settlement. It is caught in the narrow road network. On each barrier in the flow direction, the level is raised.



AGIA AIKATERINI, UPSTREAM OF MANDRA, 16/11/2017



The Ag. Aikaterini contributed to flow to the village of Soures southeast of the settlement. The same happened with flood runoff.



AGIA AIKATERINI, UPSTREAM OF MANDRA, 16/11/2017





AGIA AIKATERINI, UPSTREAM OF MANDRA, 16/11/2017

Mandra

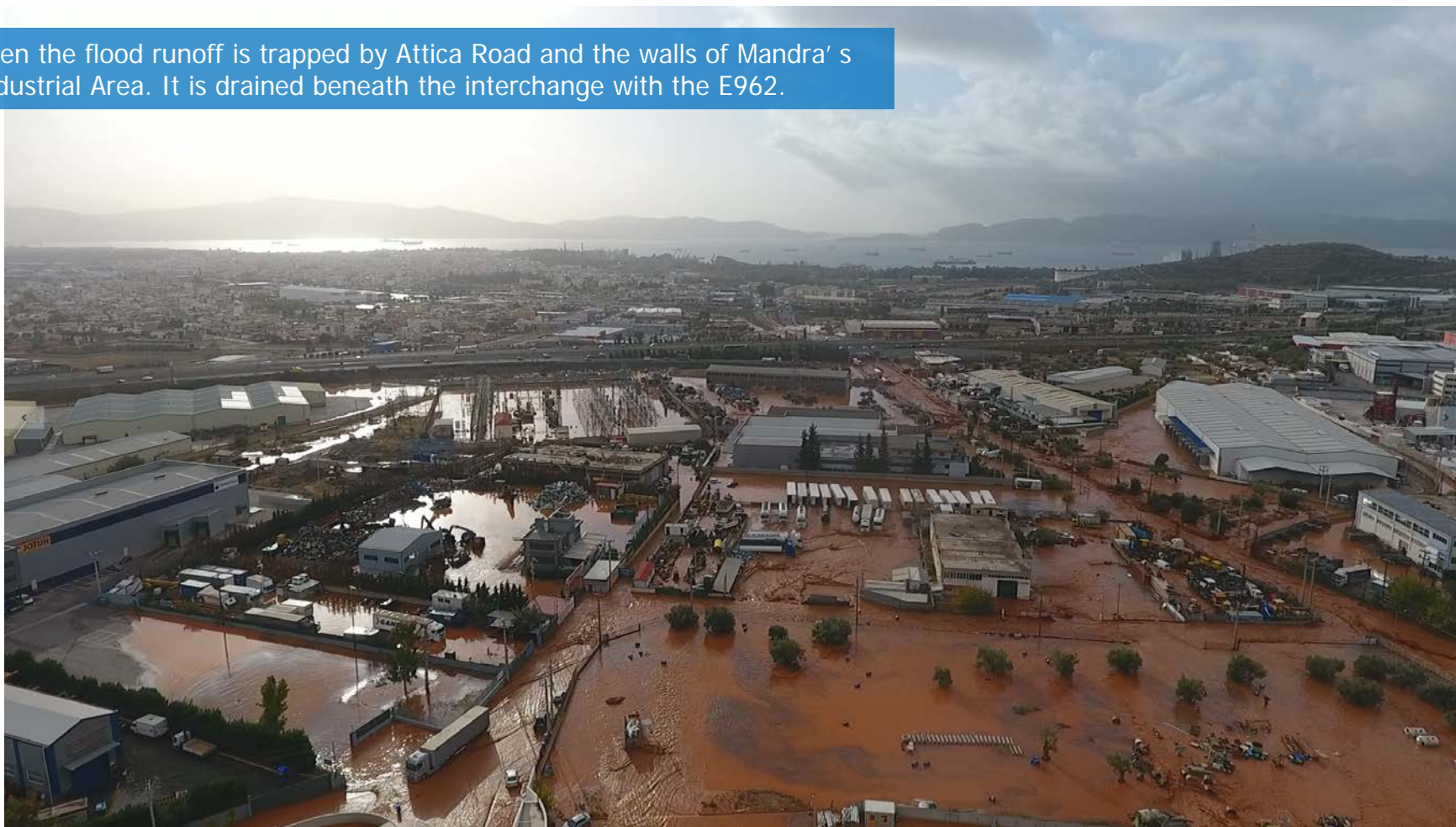
The main part of the floodwaters left the formed Surrey bed and followed the highway of the Elefsina - Thiva National Road (E962). It flooded Mandra's Industrial Area.





INDUSTRIAL AREA OF MANDRA AND ELEFSINA, 15/11/2017

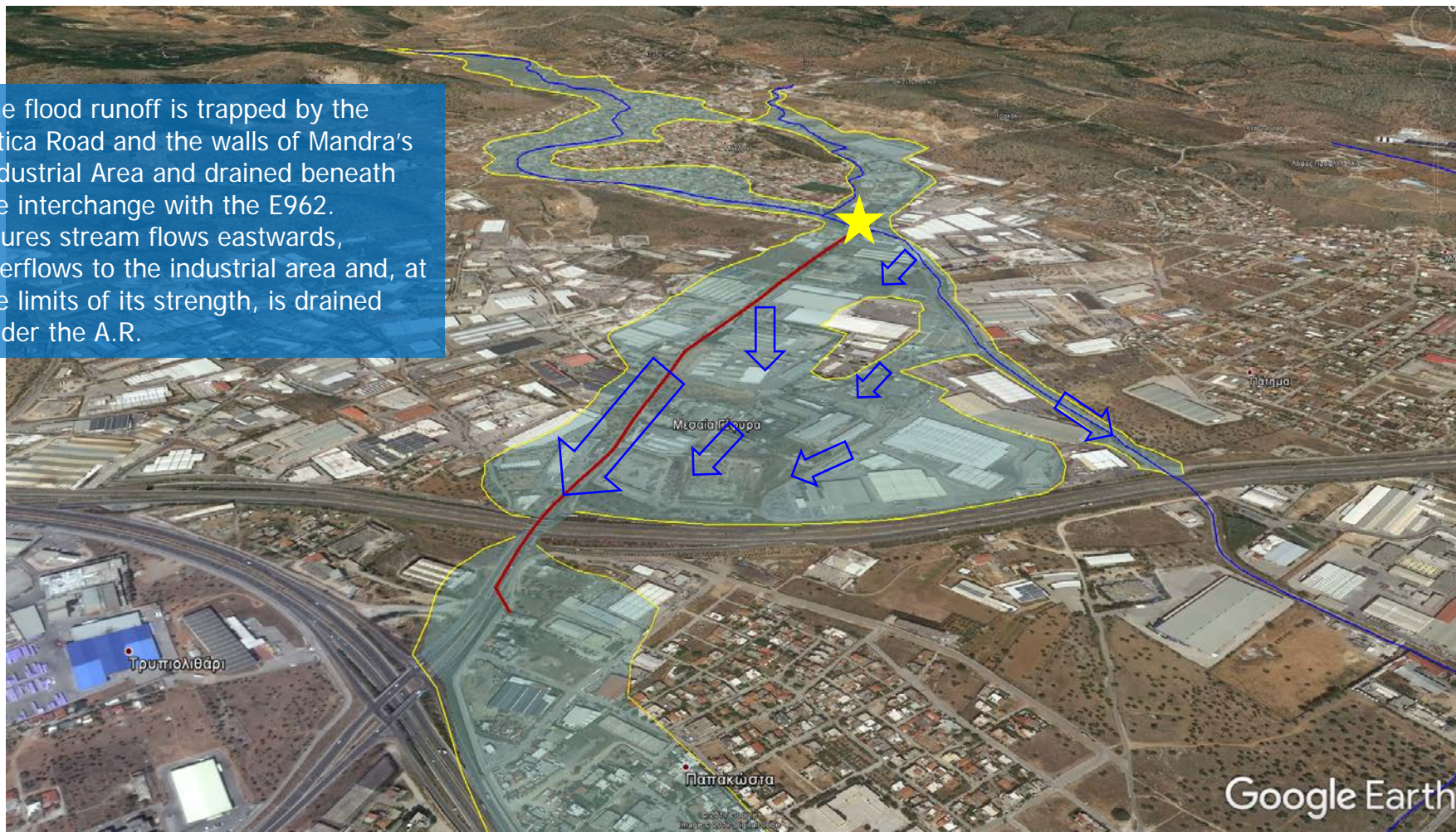
Then the flood runoff is trapped by Attica Road and the walls of Mandra's Industrial Area. It is drained beneath the interchange with the E962.





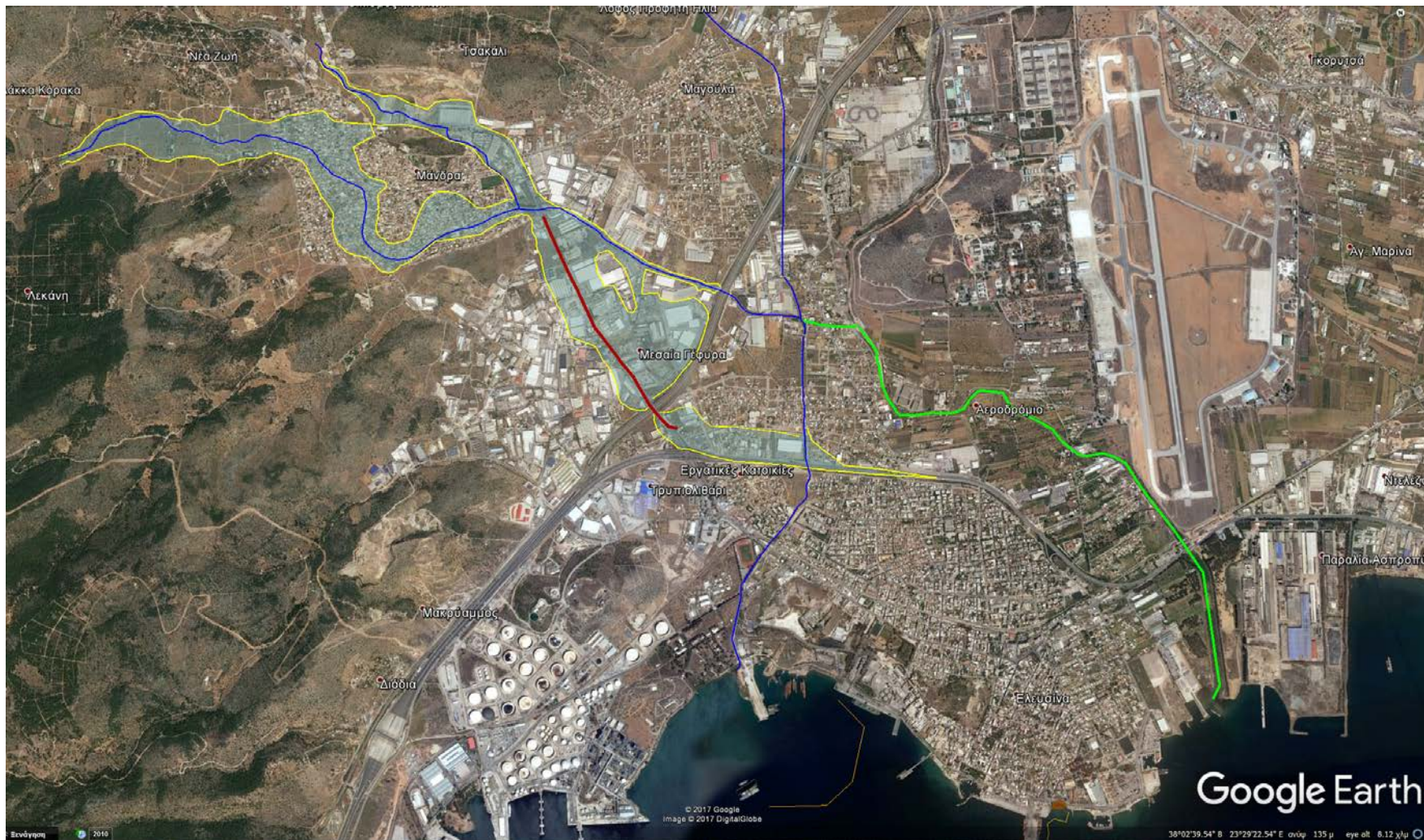
INDUSTRIAL AREA OF MANDRA AND ELEFSINA, 15/11/2017

The flood runoff is trapped by the Attica Road and the walls of Mandra's Industrial Area and drained beneath the interchange with the E962. Sources stream flows eastwards, overflows to the industrial area and, at the limits of its strength, is drained under the A.R.





MANDRA – ELEFSINA AREA





POLLUTION PLACED IN COASTAL ZONE OF ELEFSINA





POLLUTION PLACED IN COASTAL ZONE OF ELEFSINA





NATIONAL ROAD MANDRA - ELEFSINA, JUNCTION ATTICA ROAD 15/11/2017





NATIONAL ROAD MANDRA - ELEFSINA, JUNCTION ATTICA ROAD 15/11/2017





NATIONAL ROAD MANDRA - ELEFSINA, JUNCTION ATTICA ROAD 15/11/2017





ROAD OF MANDRA – ELEFSNA AND INDUSTRIAL AREA, 15/11/2017





ROAD OF MANDRA - ELEFSINA, ACCEPT LOCAL ADJUSTMENT OF A STATION IN AN OBSTACLE (VEHICLE) 15/11/2017



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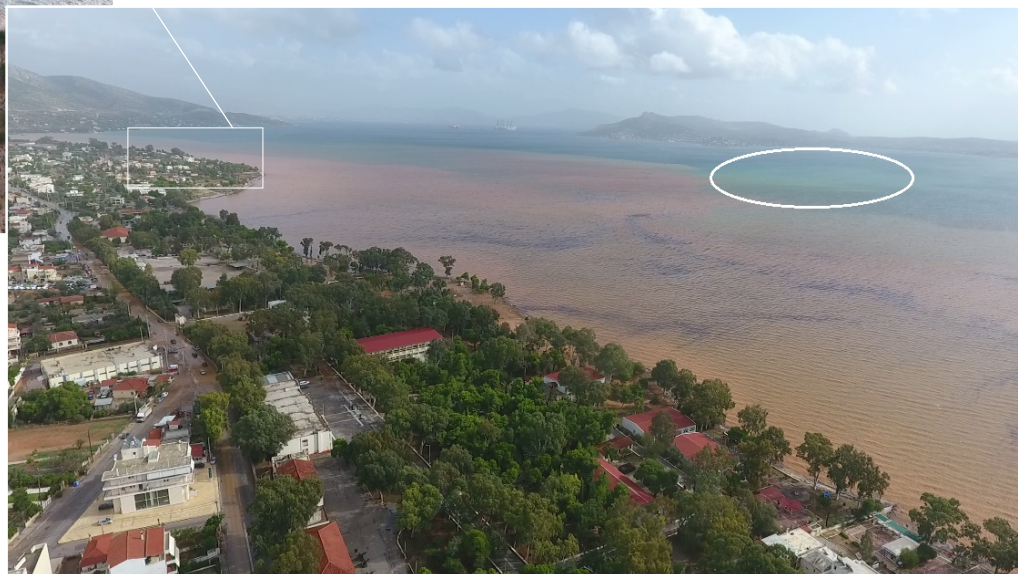


12sec



COASTAL ZONE, NEA PERAMOS, 15/11/2017

At the point where the mechanism of deltaic formation of the rays develops, two points with high flow rates are observed. The consequence of these speeds is to stir the bottom material at the estuary points. The scraping of the bottom because of the large volume of mud that surrounds the coastal zone is not evident in the friction area but is noticeable at a greater distance (about one kilometer from the coast) where there is no more mud on the surface.

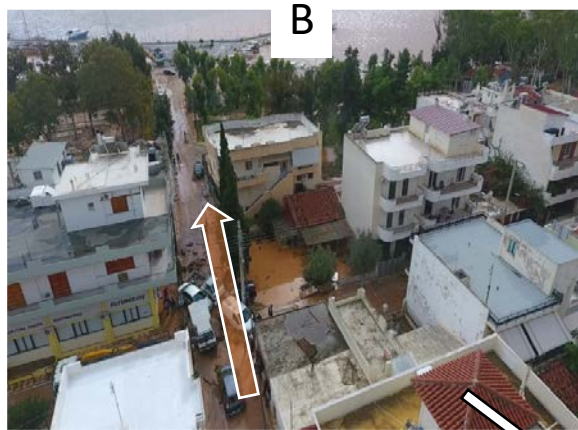




DESCRIPTION OF MATERIAL TRANSPORT METHOD AT THE SEA, COASTAL ZONE, NEA PERAMOS

Two zones of material concentration in the estuary

- A. Deposits of litter and other materials along the coast.
- B. Sludge deposits on the coast and offshore turbidity



A. The construction works and large transverse structures and other structures are encased in blocked materials.

B. Excessive amounts of water and sludge overflow and form a diffuse flow that collects superficially in morphological humiliations alongside the former natural bed. They enter the city plan and flood the area.



OBJECTS ACROSS THE MAPINA , NEA PERAMOS 15/11/2017





COASTAL ZONE, NEA PERAMOS & ELEFSINA 15/11/2017 (PHOTOS: Christakis Ch., news247.gr)





POLLUTION SPOT - NEA PERAMOS, 15/11/2017



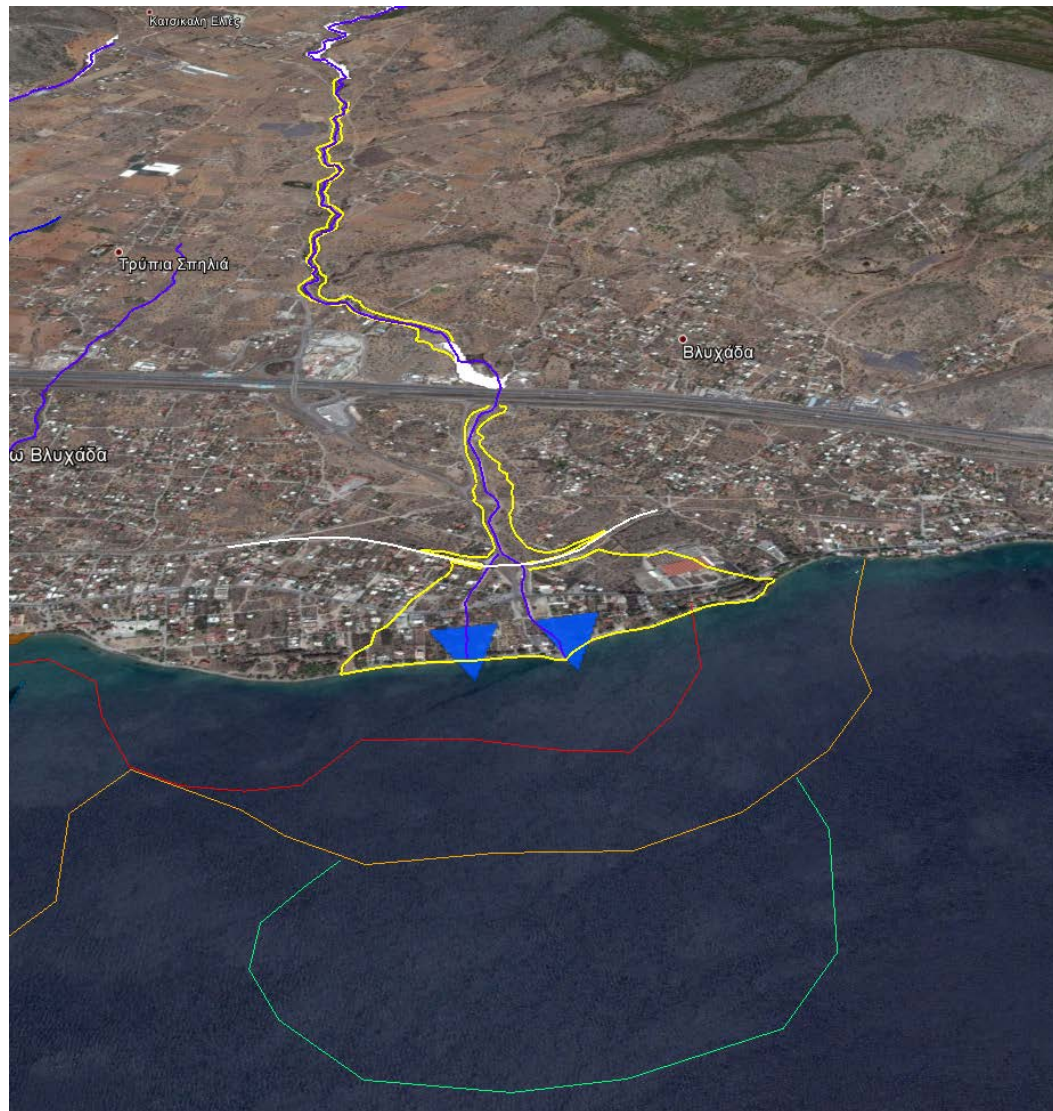


IMPACT AREA OF NEA PERAMOS 15 AND 16-11-2017





IMPACT AREA 15 AND 16-11-2017





FLOODED FAN IN THE JUNCTION OF NEA PERAMOS (NERAKI)





FLOODED FAN IN THE JUNCTION OF NEA PERAMOS (NERAKI)





FLOODED FAN IN THE JUNCTION OF NEA PERAMOS (NERAKI)





TECHNICAL PROJECT UPSTREAM OF NEA PERAMOS CONNECTING ADDITIONAL MATERIALS AND AUTHORIZING WATER AND WATER DRAINAGE UPSTREAM





FATALITY MAP OF MANDRA - ELEFSINA





SOCIAL VULNERABILITY IN THE AFFECTED AREA

Social vulnerability is defined as "a multidimensional concept that helps identify the characteristics and experiences of communities (and individuals) that enable them to respond and recover from natural disasters(Cutter 2003).

Mapping social vulnerability reveals areas that may require additional assistance, be it planning to mitigate disasters before extreme events, or additional relief efforts after a disaster.

In recent years, various indicators of social vulnerability have been developed and explored. Indicative are the weakness / lack of access to resources, the inability / lack of access to information and knowledge, unemployment / underemployment, vulnerable groups (women, children, the elderly), welfare / poverty indicators(Cutter et al 2003, Holand & Lujala 2013).

Western Attica 2020+ Strategic Planning for the Municipalities of Western Attica used as the main source of statistical information the inventory ELSTAT (2011).

Indicative data reported and indicators of social vulnerability in the region.

	Unemployment	Graduates of tertiary education	People in financial weakness (N)
<i>Municipality of Megara</i>	28,8%	12.1%	579
<i>Municipality of Mandras - Eidilias</i>	18,6%	10.8%	300

