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**DIGITIZATION
OF DESTROYED
INFRASTRUCTURE**

Kyiv
region



REBUILD **UA**

ABOUT THE PROJECT

Background

The military actions of Russia and Belarus cause numerous damages and destruction in almost all regions of Ukraine — housing and infrastructure are being destroyed, industrial facilities and local businesses shut down.

The speed and efficiency of the country's recovery processes directly depend on a competent assessment of the damage, correct budgeting and a step-by-step plan for reconstruction. A transparent assessment of losses will justify the need for funding as well as simplify the process of raising funds for recovery.

About the project

The RebuildUA project aims to digitize, analyze and demonstrate to the world the destruction of Ukraine's infrastructure. The geography of the project covers all regions of the country affected by military aggression.

The results will be made public, communicated to communities, public authorities and specialized recovery funds.

Project founders:

Drone survey and digitization of geospatial information:



Land analysis and interaction with communities:



Methodology

1. Drone photography and orthophoto creation

The use of drones allows the project team to collect detailed data on the destruction: to fly at low altitudes, and shoot buildings at different angles and from all sides. For localities where drone shooting is not possible, we use high-resolution satellite images.

2. Collection of photos and videos

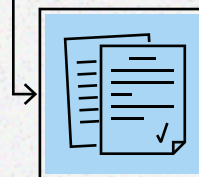
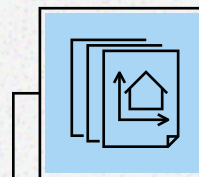
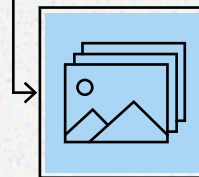
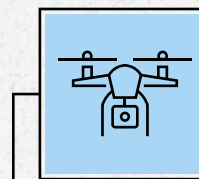
To ensure completeness of the input data, the project team captures photos and videos, as well as collects additional information from verified sources.

3. Destruction detection and data processing


Based on orthophotos, GIS specialists digitize all buildings, identify destroyed objects, classify building types, and determine levels of destruction.

4. Publication of analytical reports

Designers and content managers present the complete information in public infographic reports.



Find out more at the project website:

 rebuildua.net

ABOUT THE LOCALITY


The town of Irpin in Kyiv region gained worldwide popularity due to the brutal crimes of Russian troops, lasting for almost a month. They destroyed thousands of buildings, shot and burned hundreds of cars, killed hundreds of civilians...

Residents still find abandoned military equipment, ammunition and mines in their yards. About 50% of buildings in Irpin were destroyed, now the reconstruction will require time and significant resources. Find out more on the pages of the RebuildUA team report.

Keep track of our destinations on the map and in the project news.



 rebuildua.net

 [/rebuildua.net](https://www.facebook.com/rebuildua.net)



Region
District
Community

Kyiv
Buchanskyi
Irpinska

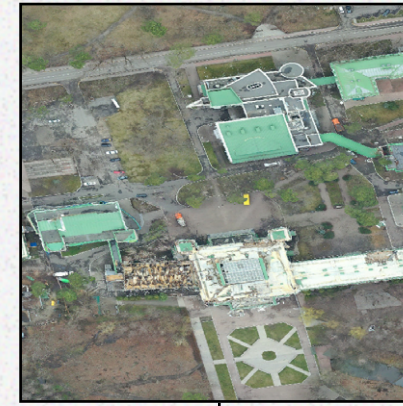
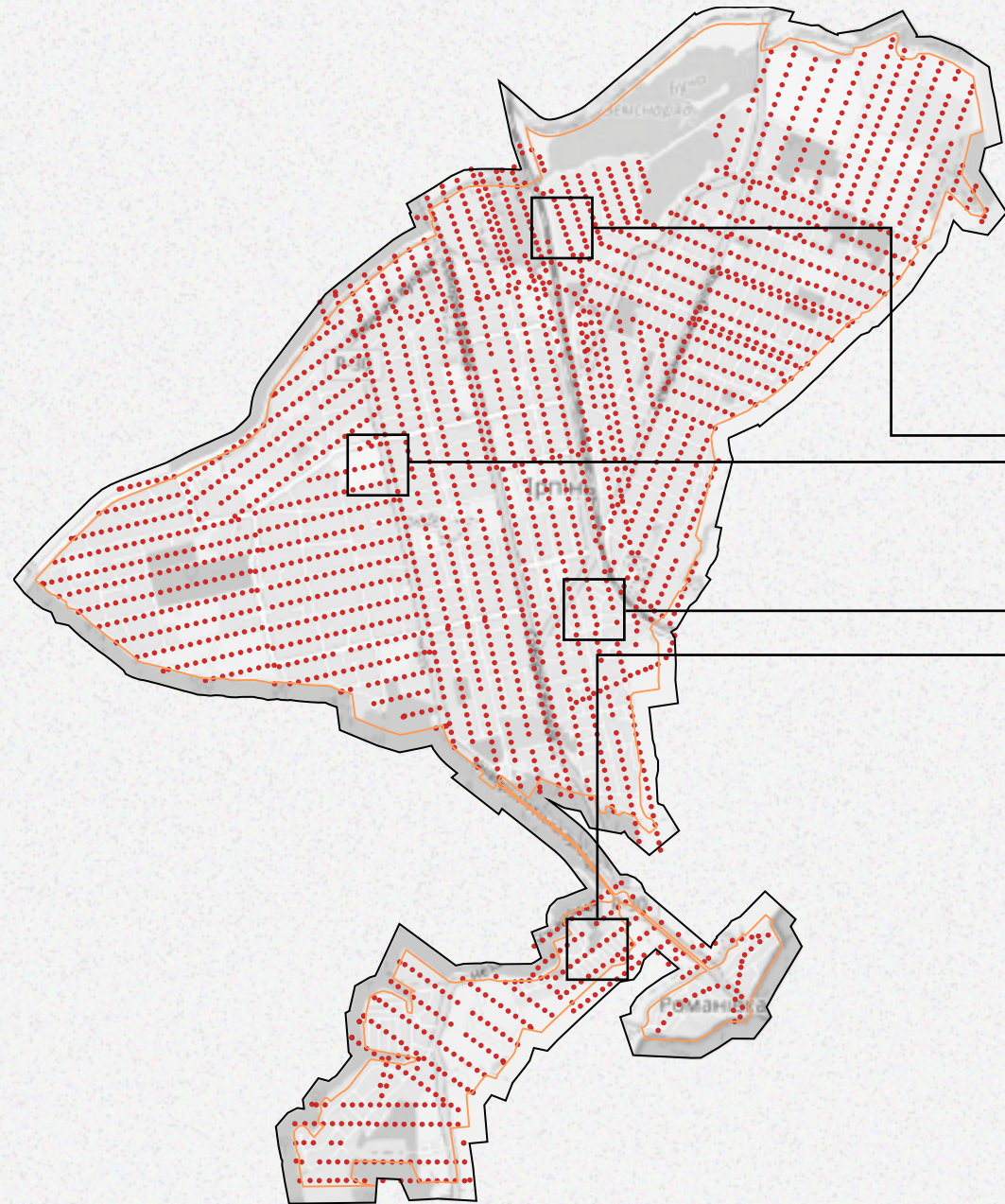


Survey area
1 790 hectares



Population
69 962 people

DIGITIZATION PROCESS



- border of the locality
- trajectory of drone shooting

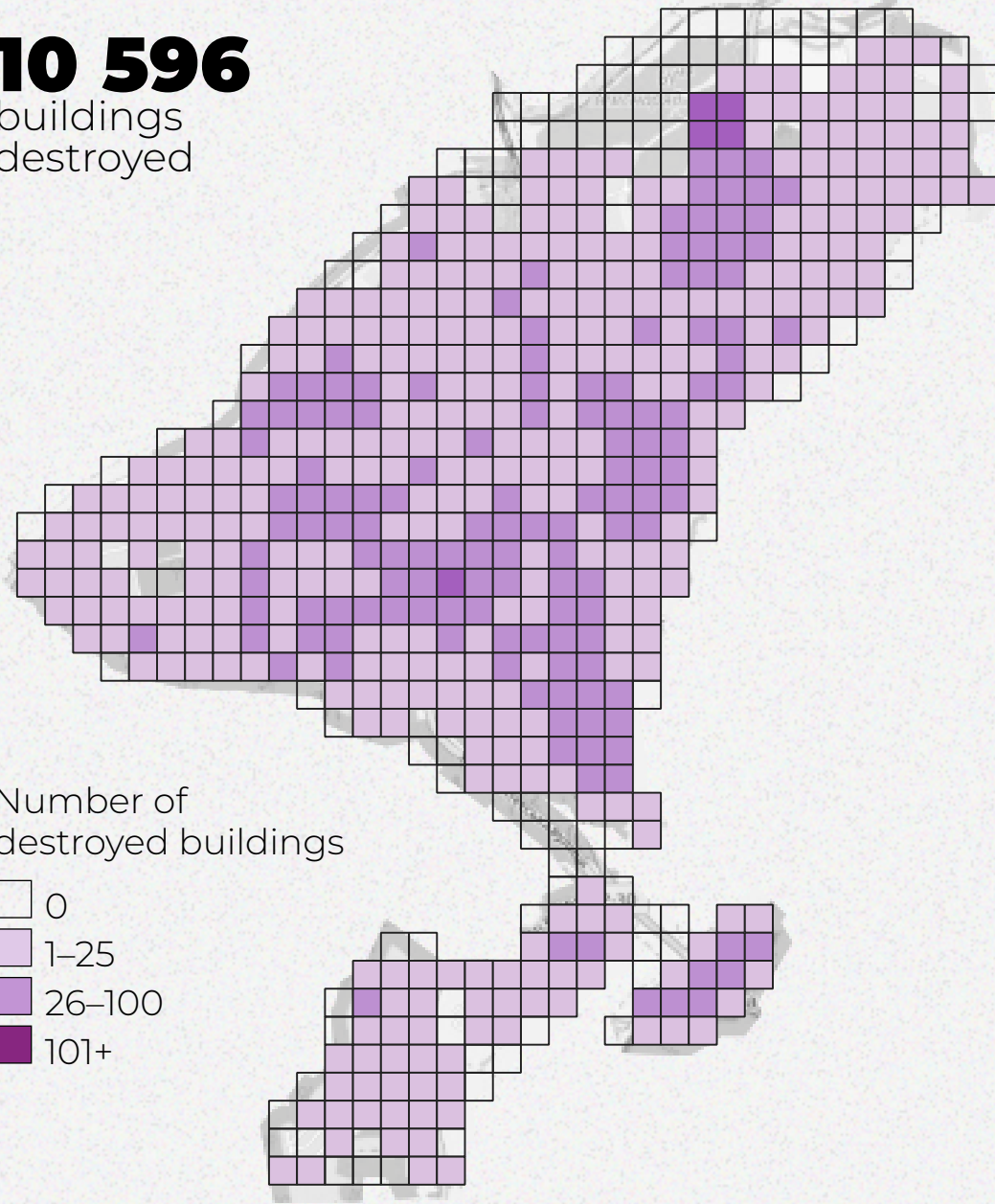
25 flight missions
3 126 pictures for orthophoto
750 hours of data processing
30 Gigabytes of data

Video from a drone

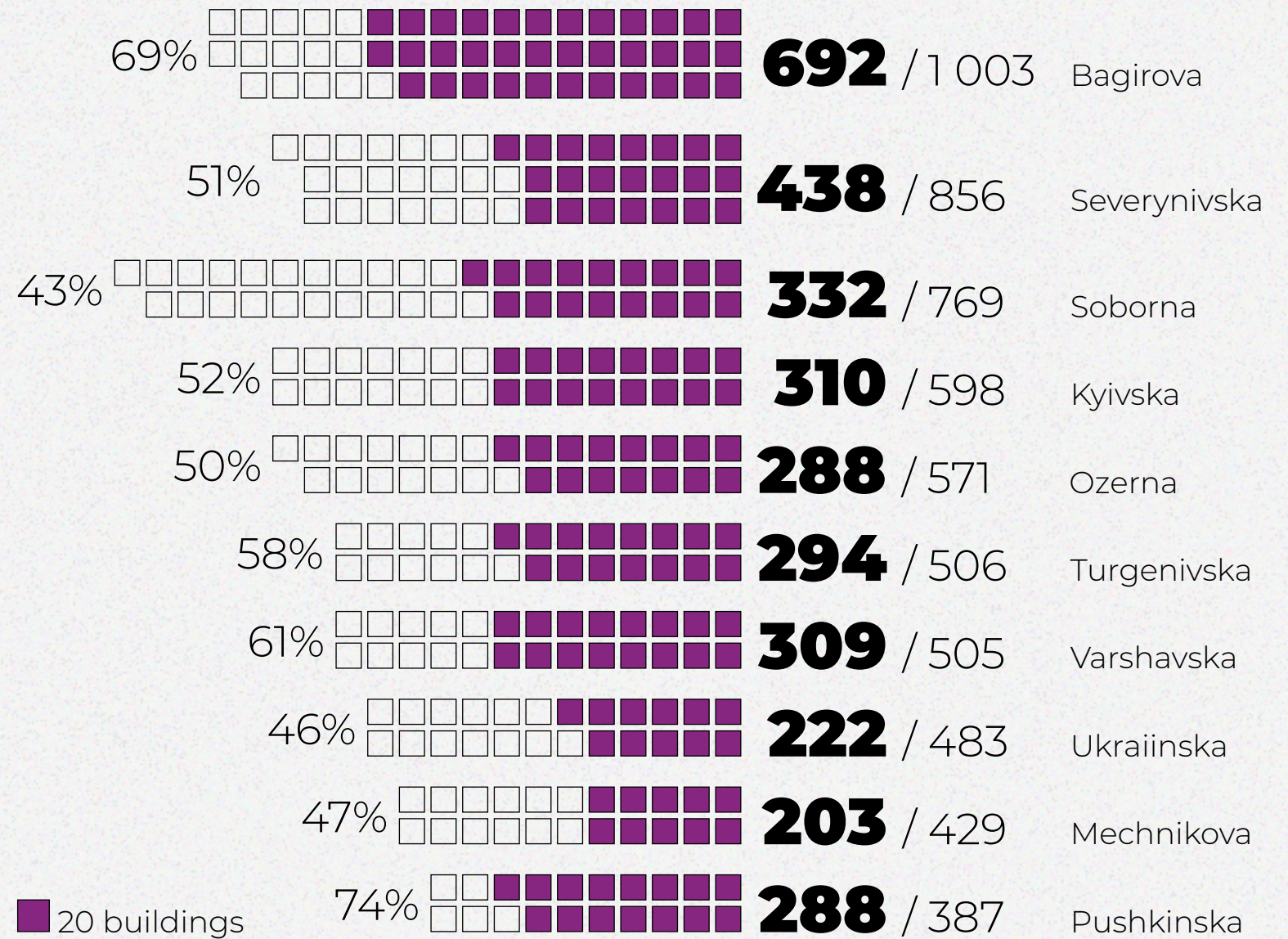


THERMAL MAP OF DESTRUCTION

10 596
buildings
destroyed



Destruction of the largest streets

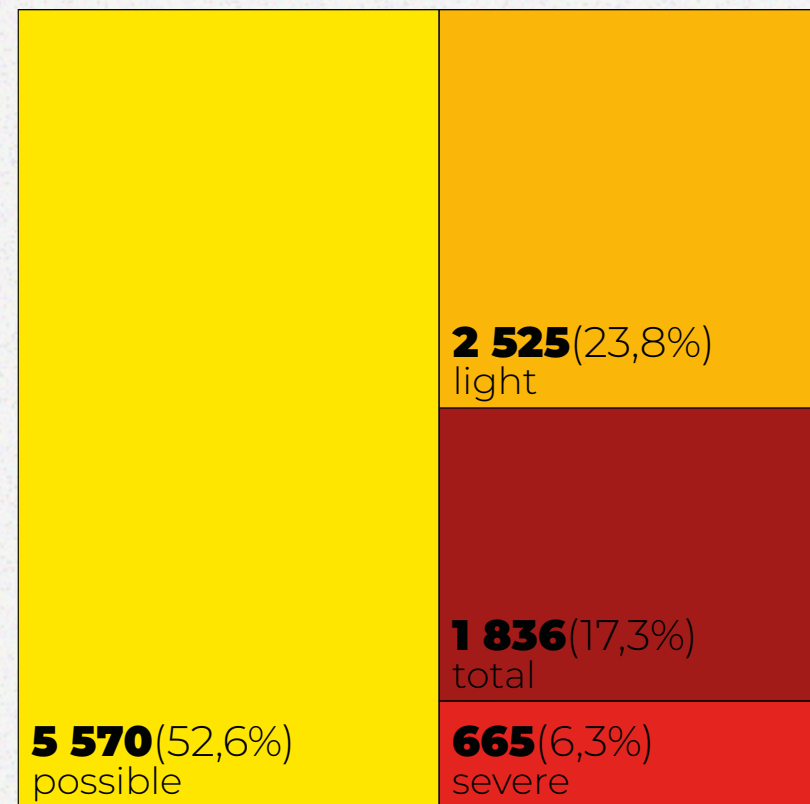


LEVELS OF DESTRUCTION

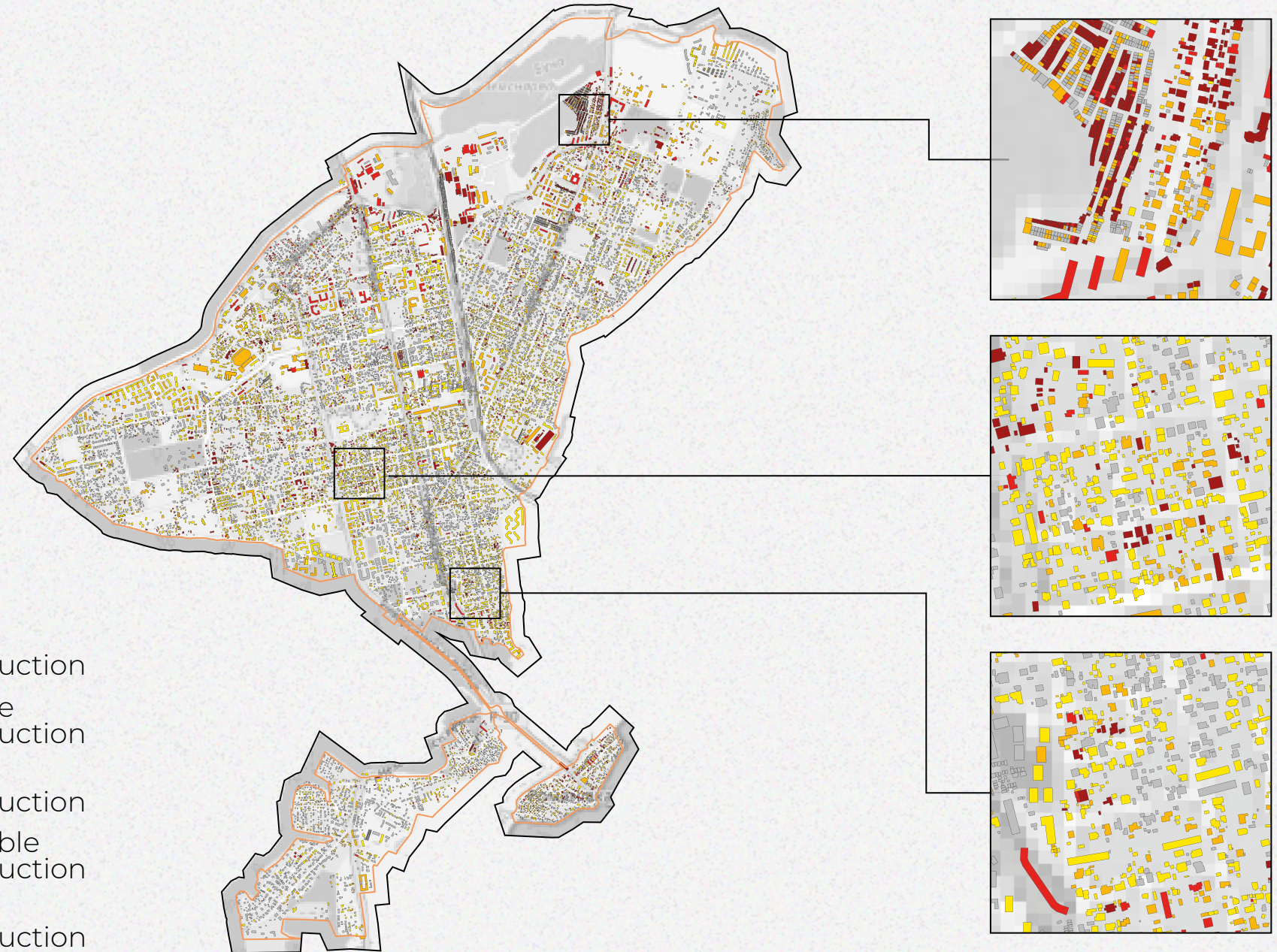
Buildings destroyed:

10 596 / 22 149

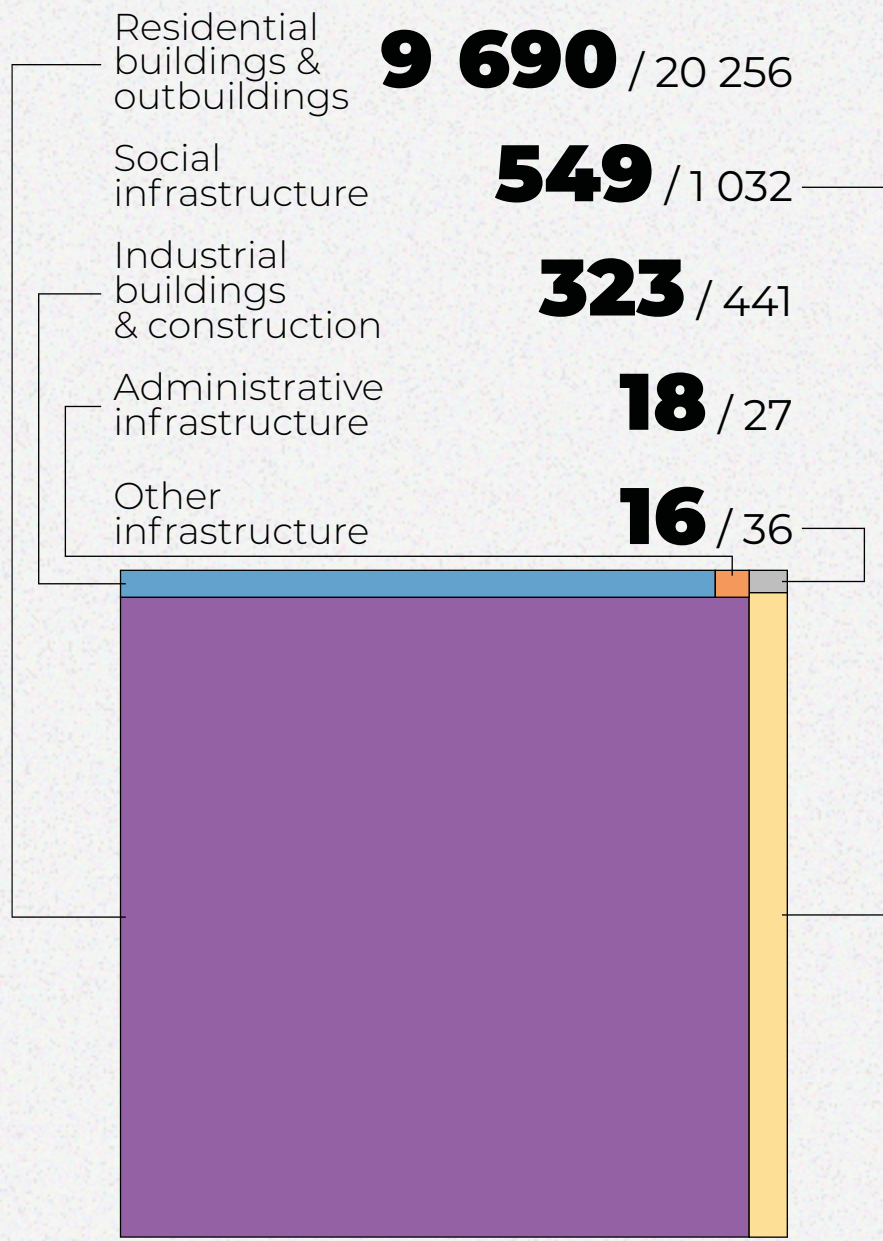
Level of destruction, number of buildings



- total destruction
- severe destruction
- light destruction
- possible destruction
- no destruction

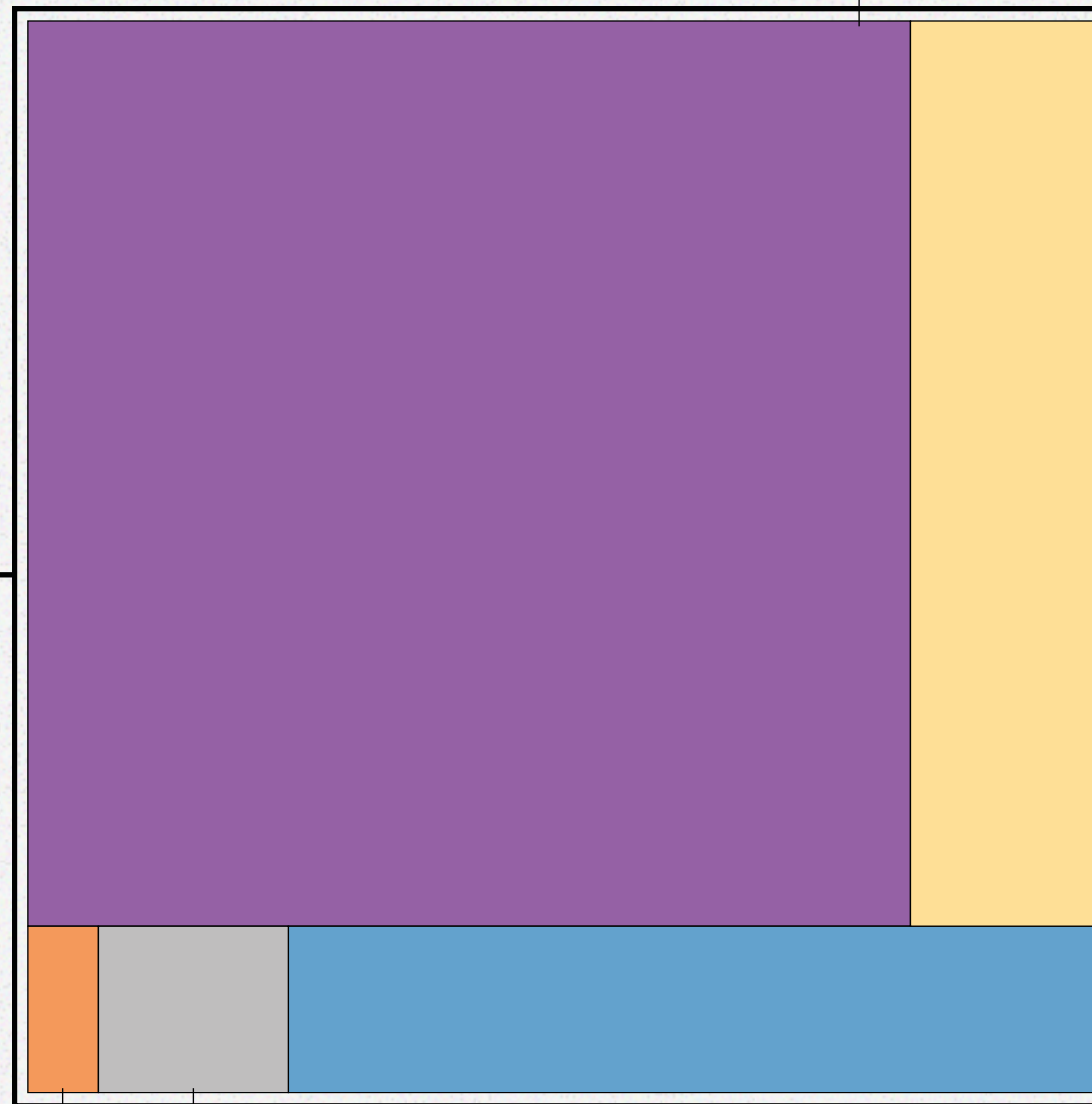


TYPES OF DESTROYED OBJECTS



ASSESSMENT OF LOSSES

Losses by types of buildings



Total losses

\$921,7 mln

(25,3 bln UAH)

\$648,06 mln
Residential buildings
& outbuildings

\$135,10 mln
Social infrastructure

\$102,13 mln
Industrial infrastructure
& construction

\$26,81 mln
Other infrastructure

\$9,62 mln
Administrative infrastructure

LOCAL BUSINESS ANALYSIS*

Characteristics of local business

12 383

business
entities

=

95%

of all business
entities of Irpin urban
community

7 860

individual
entrepreneurs

151

own 528 land plots with a
total area of 165.6 hectares

328

own 894 real
estate objects
(excl. land plots)

4 523

legal entities

321

own 2 629 land plots
with a total area of
2 295,84 hectares

376

own 2 000
real estate objects
(excl. land plots)

838

VAT payers

1 083 business
entities had fixed
assets in the amount

>15 bln UAH

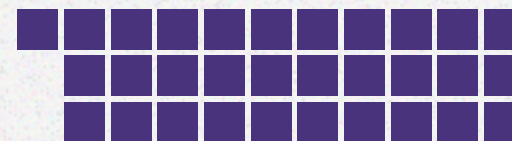
47 business entities exported
products to 140 countries
for the amount of

≈0,4 bln UAH

paid taxes
and fees to the local
budget**

≈0,8 bln UAH

Business by clusters of economy



3 149

Trade/commerce



1 845

Information and
telecommunications



1 781

Housing, construction,
real estate



1 549

Science and
education



1 475

Social services



823

Other services



739

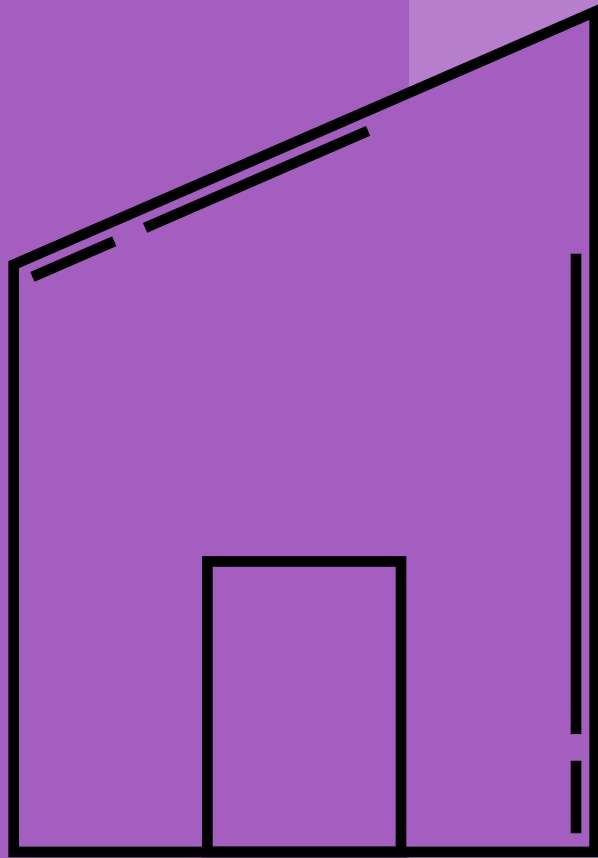
Logistics



676

Production

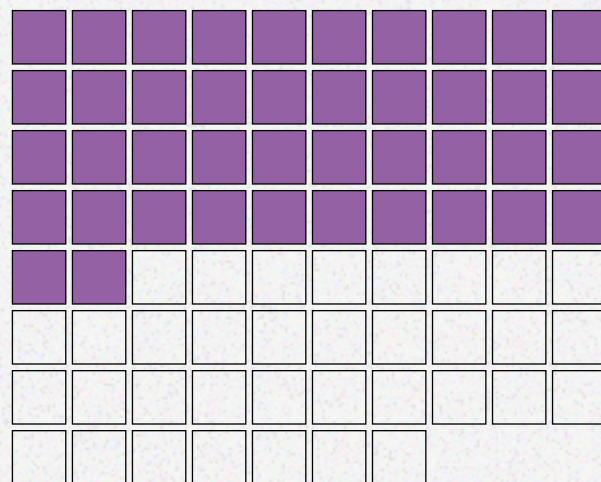
RESIDENTIAL BUILDINGS & OUTBUILDINGS



SCALE OF DESTRUCTION

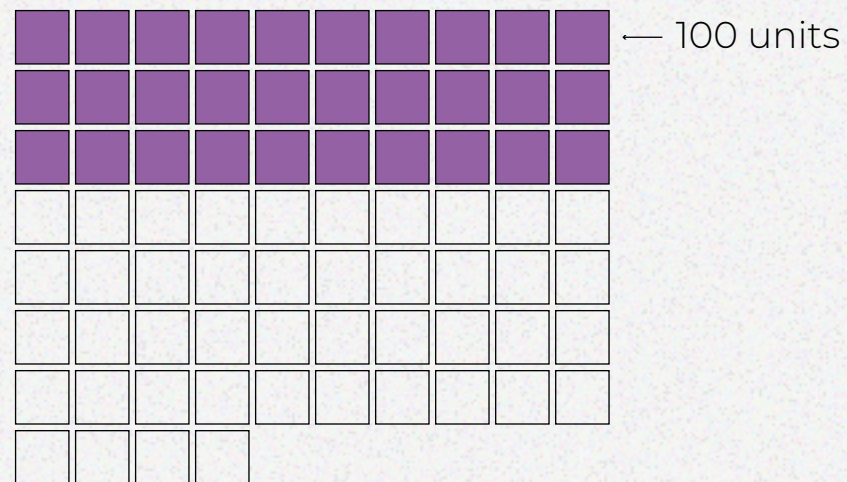
Residential buildings & outbuildings

Private houses



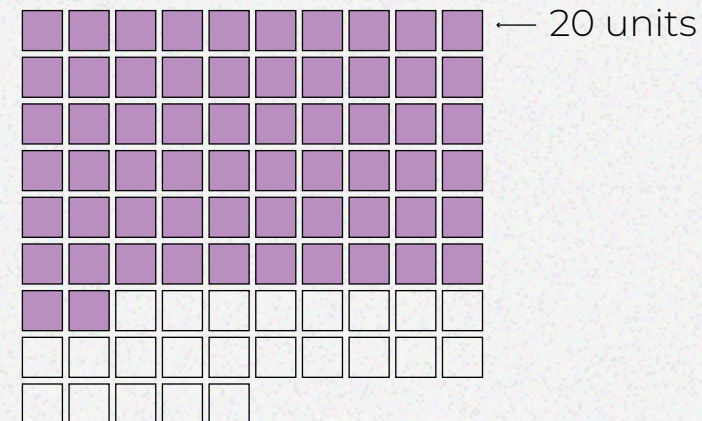
4 195
/ 7 738

Outbuildings



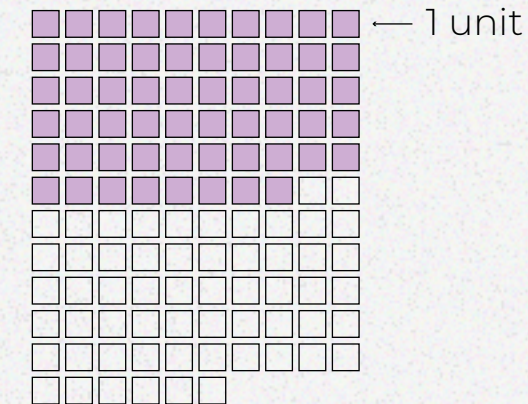
3 018
/ 7 377

Apartment buildings



622
/ 854

Greenhouses



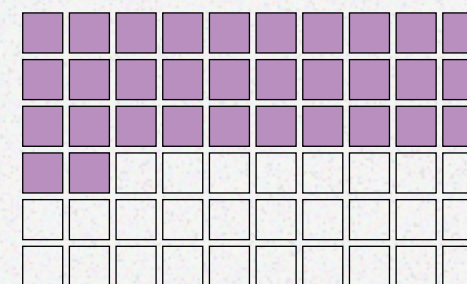
58
/ 116

Garages and parking spaces



1 474
/ 3 786

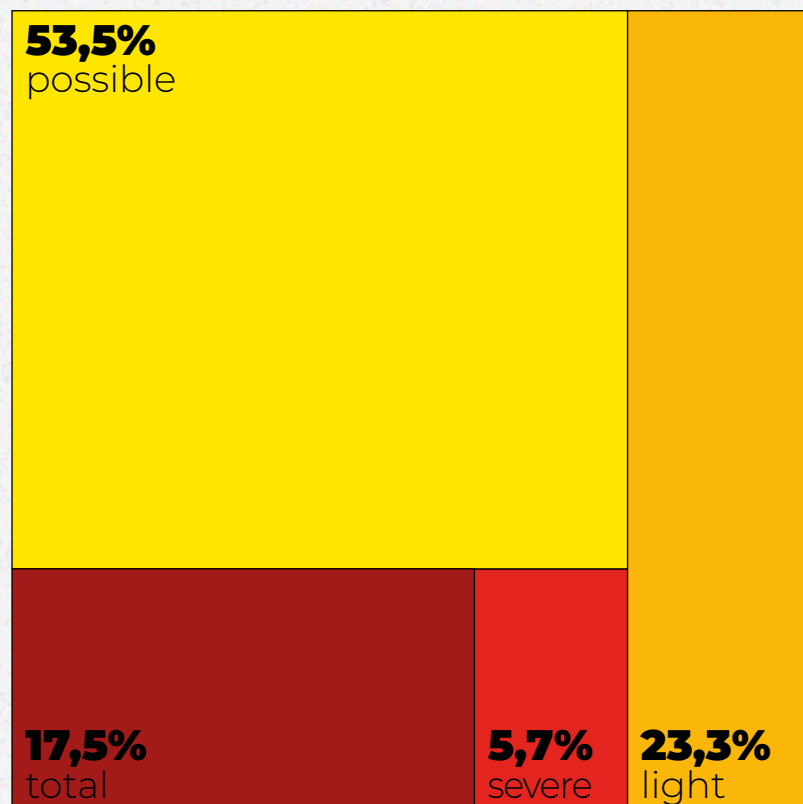
Townhouses and duplexes



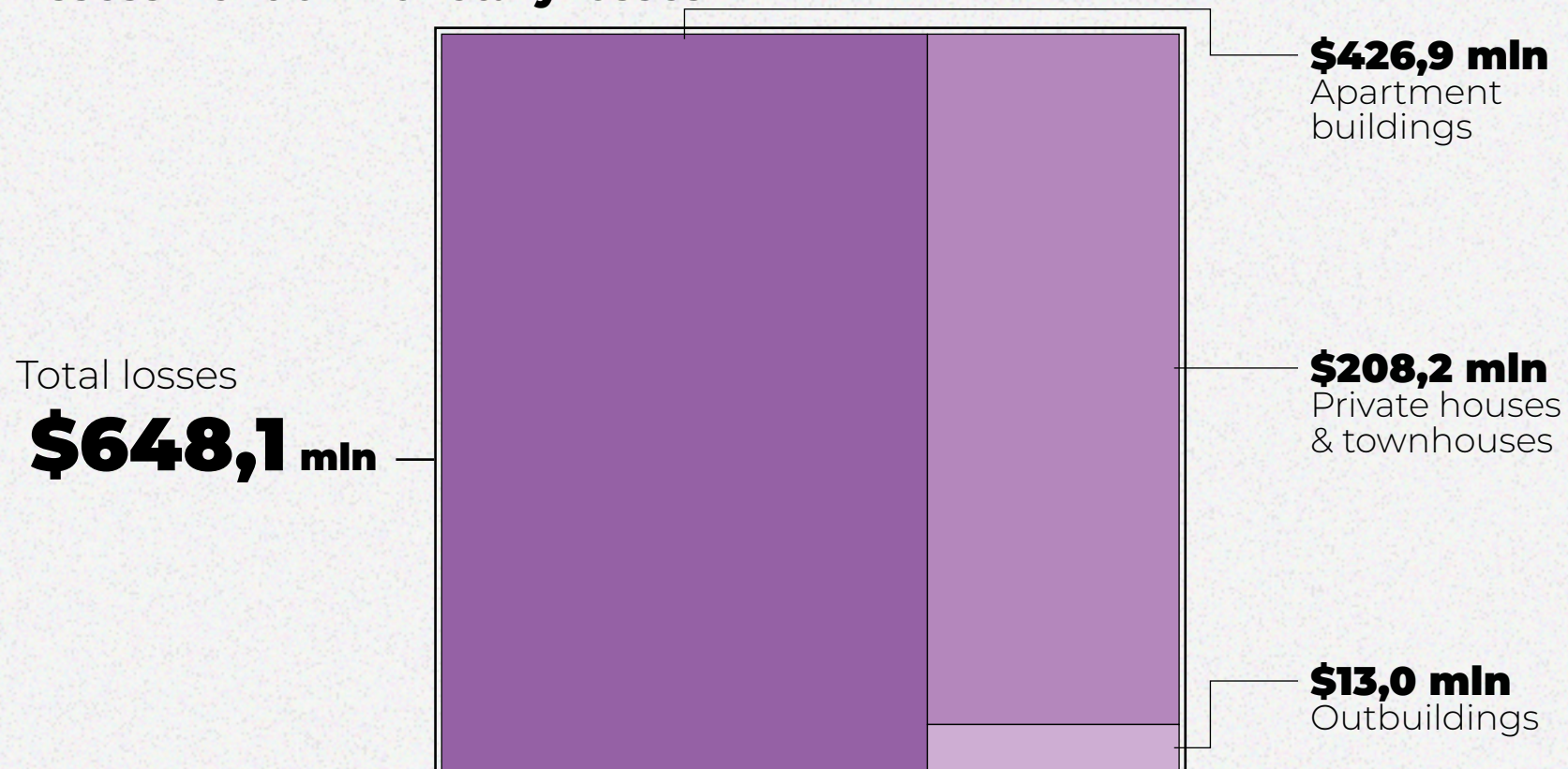
323
/ 605

SCALE OF DESTRUCTION

Level of destruction

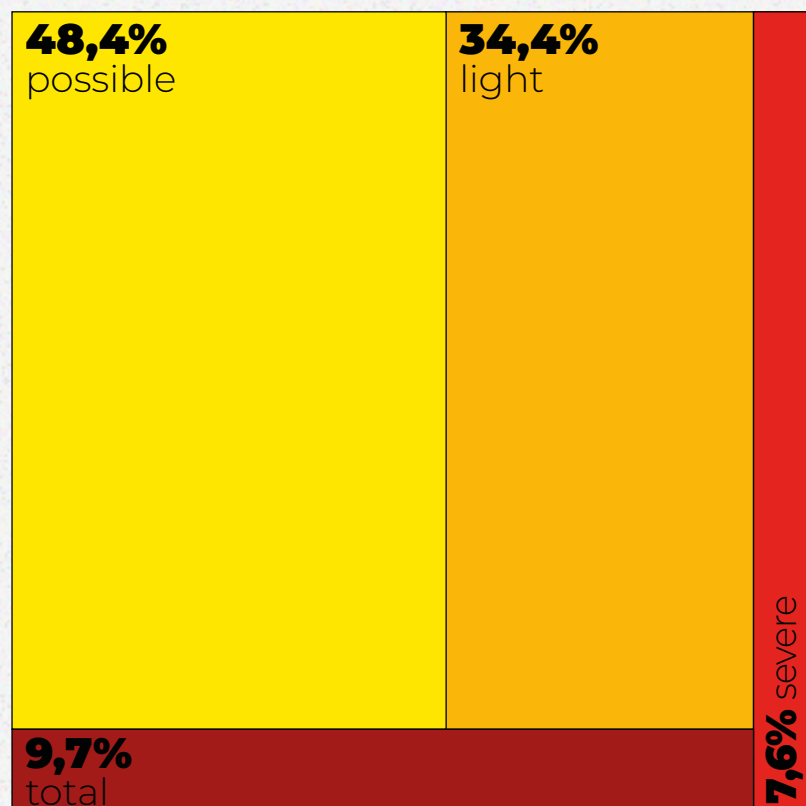


Assessment of monetary losses



APARTMENT BUILDINGS

Level of destruction

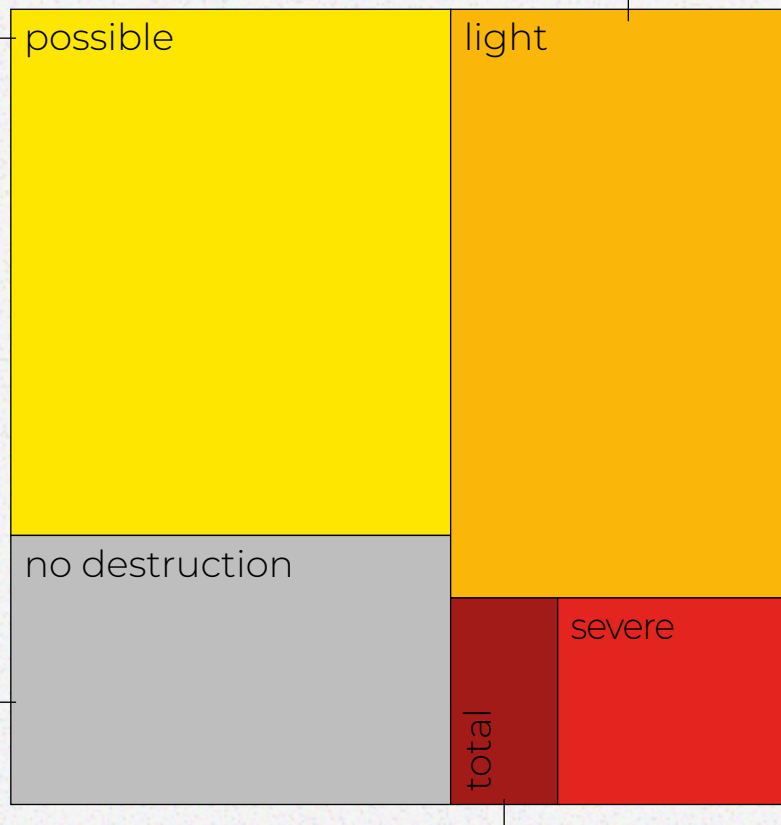


Total losses

\$426,9 mln

The area of destruction and the number of residents who suffered damage

1 182,5 ths m²
38 145 people



598,0 ths m²
19 290 people

1 060,9 ths m²
34 224 people

257,3 ths m²
8 300 people

112,2 ths m²
3 619 people

Total area of damage

2 612,9 ths m²

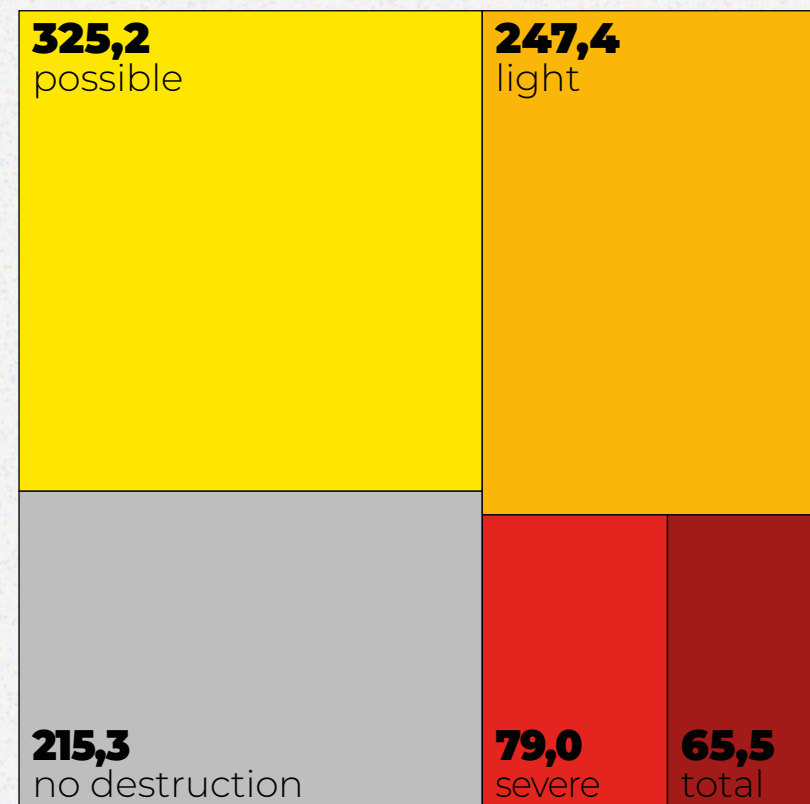
Number of residents affected

84 288

APARTMENT BUILDINGS

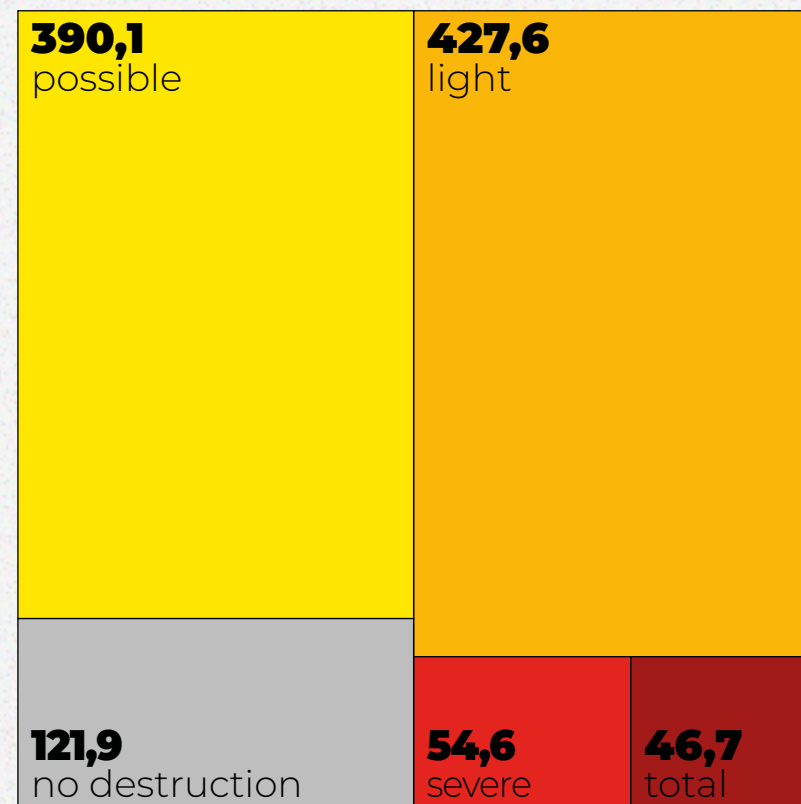
Area of destruction by number of floors

 **5 floors** (ths m²)

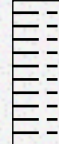


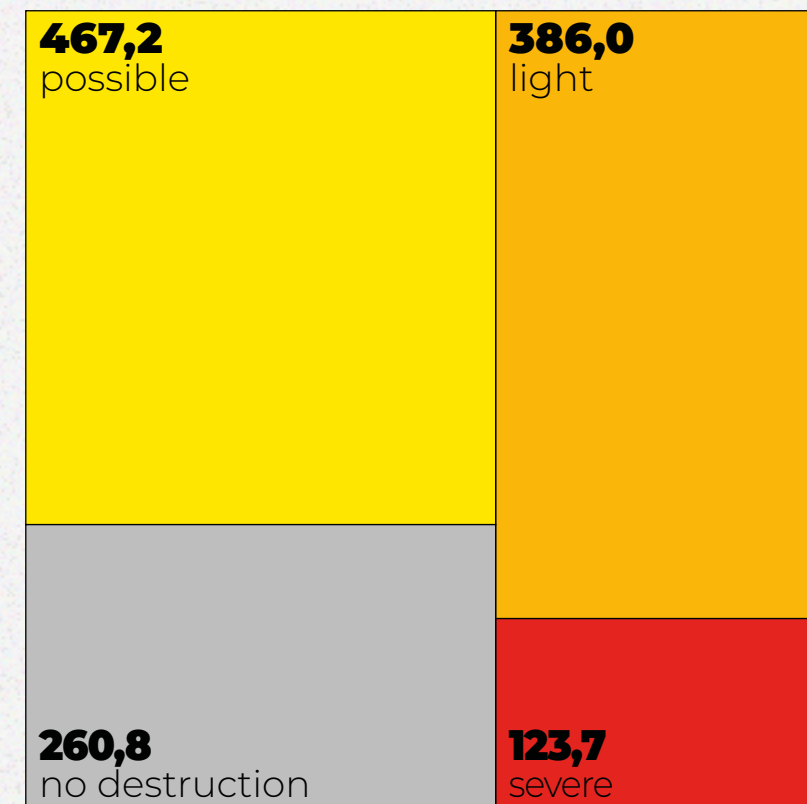
Total area of damage
717,1 ths m²

 **6-9 floors** (ths m²)



Total area of damage
919,0 ths m²

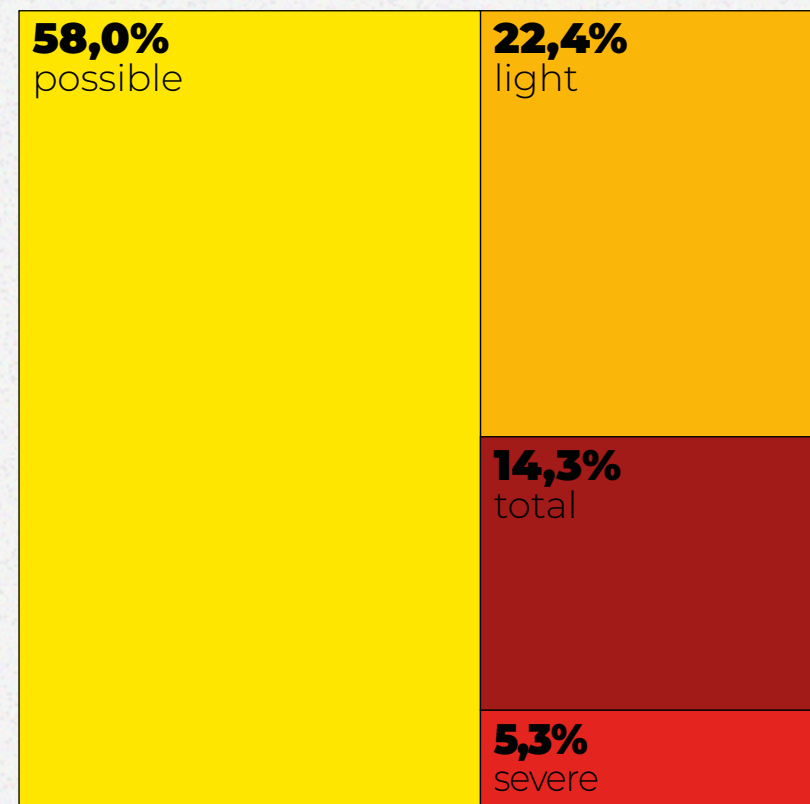
 **10+ floors** (ths m²)



Total area of damage
976,8 ths m²

PRIVATE HOUSES & TOWNHOUSES

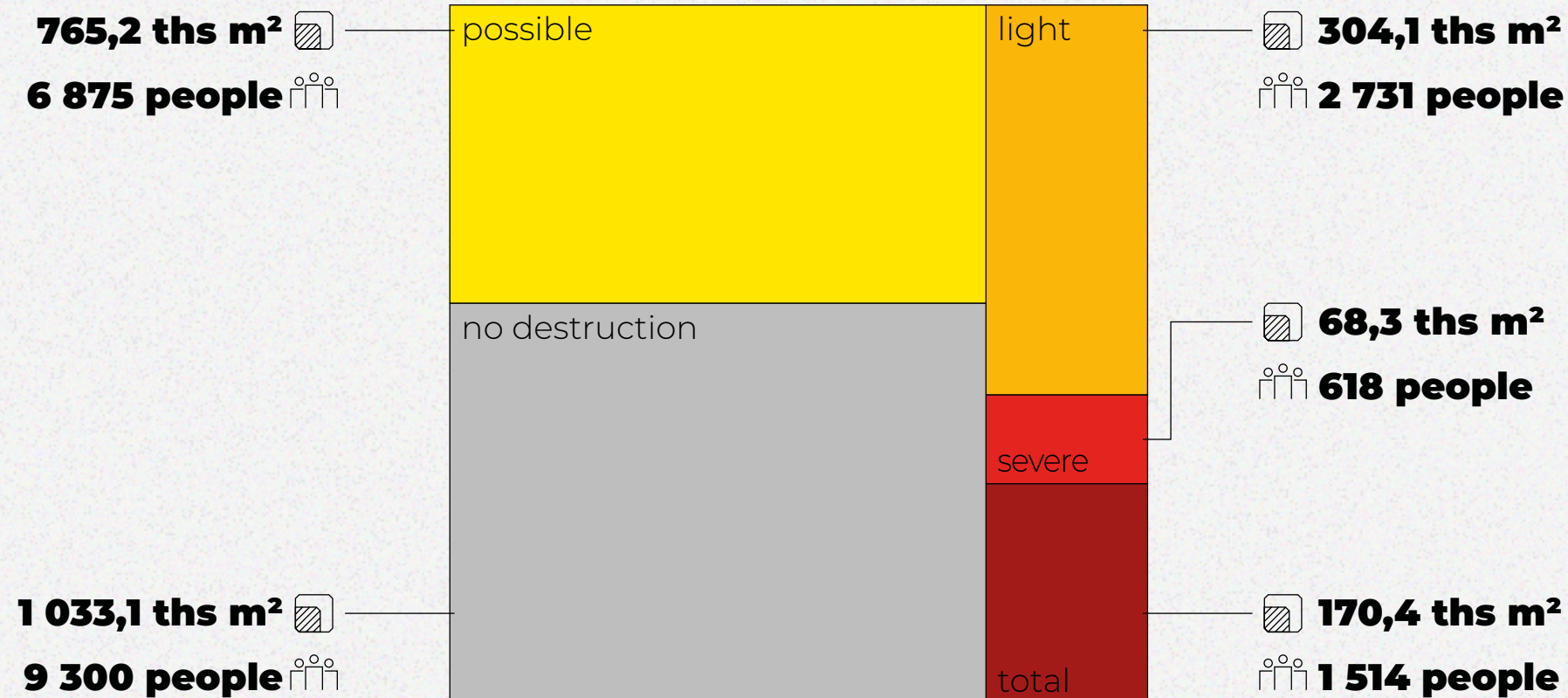
Level of destruction



Total losses

\$208,2 mln

The area of destruction and the number of residents who suffered damage



Total area of damage

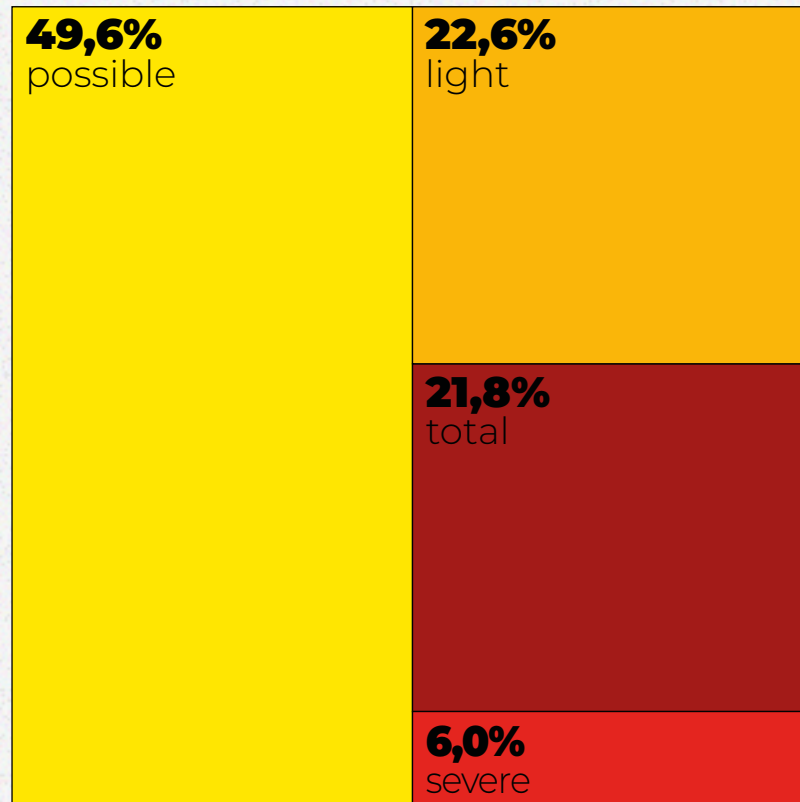
1 308,0 ths m²

Number of residents affected

11 738

OUTBUILDINGS

Level of destruction



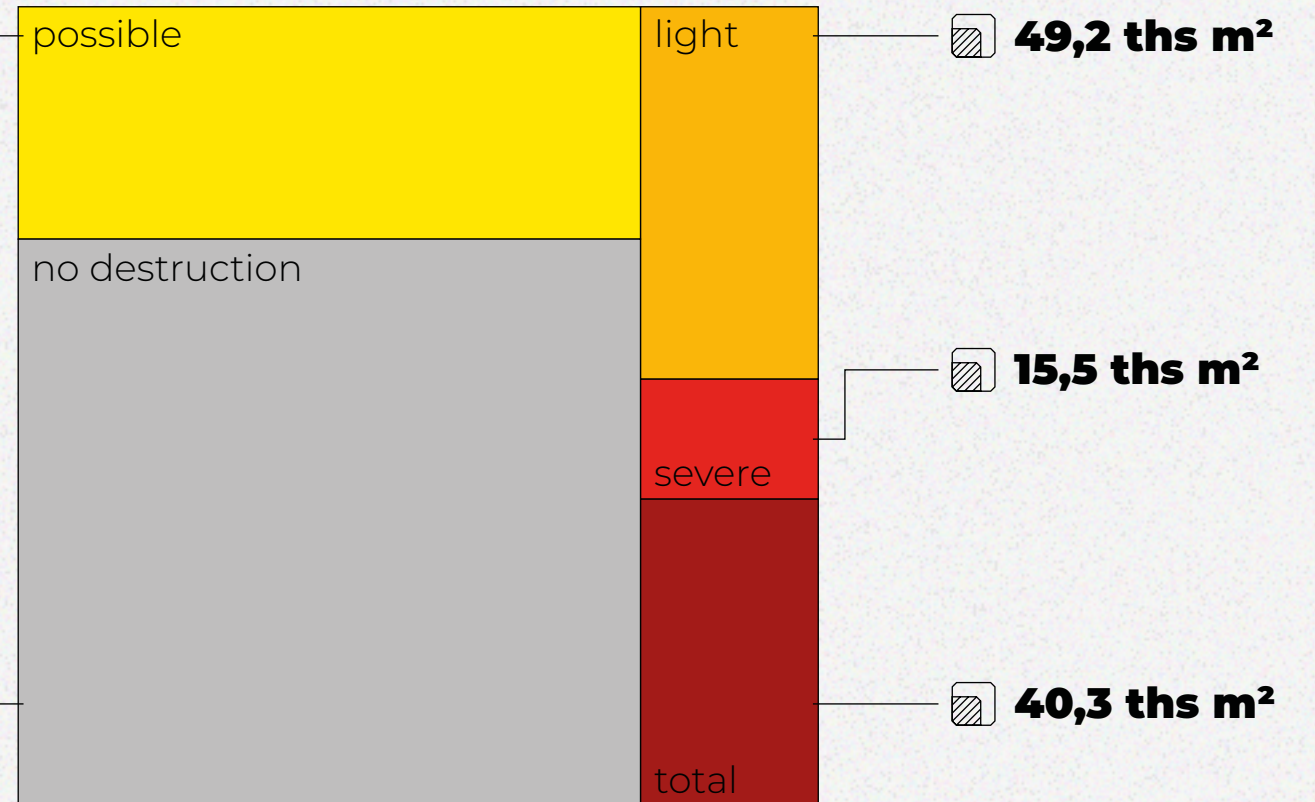
Total losses

\$13,0 mln

Area of destruction

106,7 ths m²

262,9 ths m²

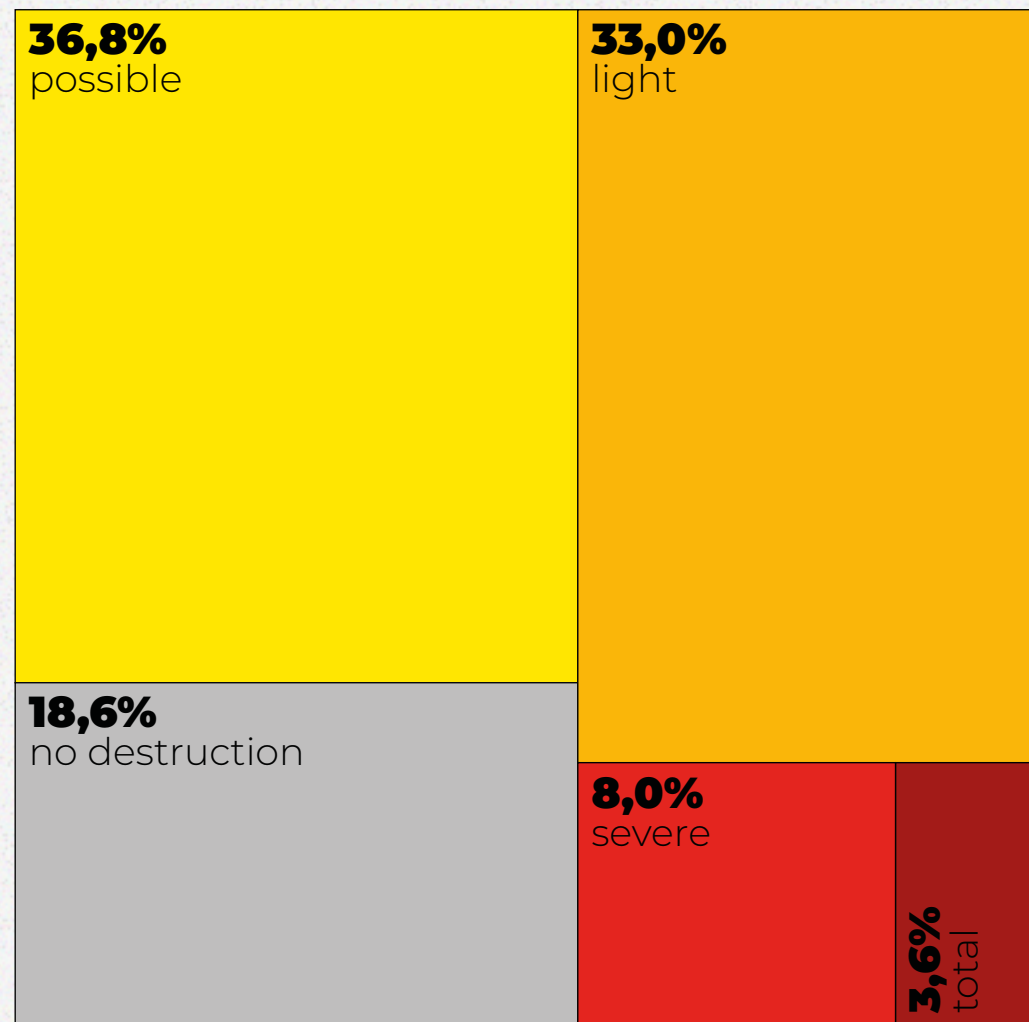


Total area of damage

211,6 ths m²

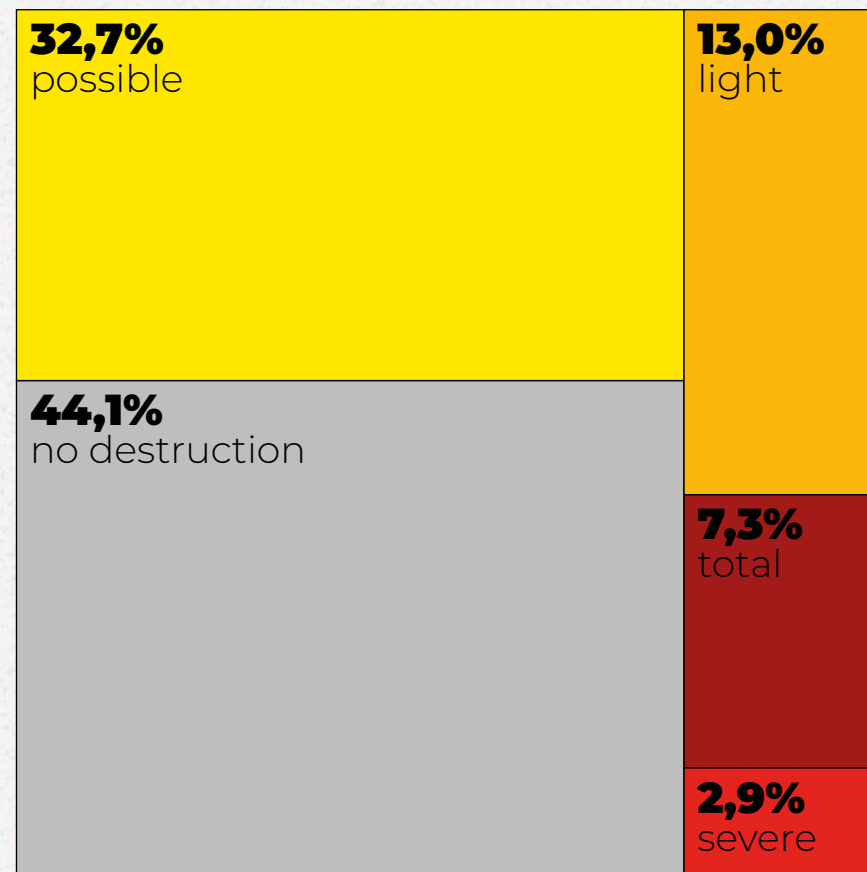
TOTAL AREA OF DESTRUCTION

Apartment buildings



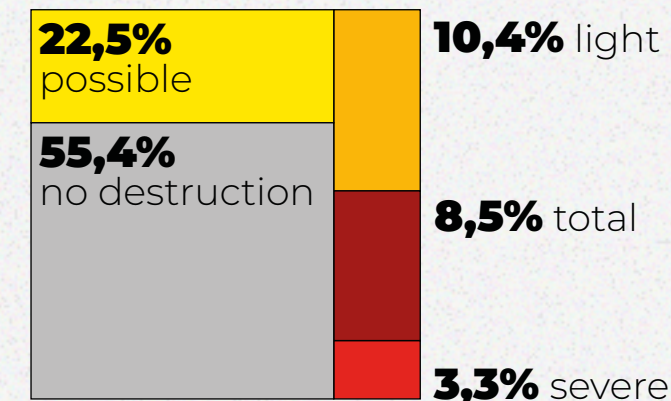
Total area of damage
2,6 mln m² / 3,2 mln m²

Private houses & townhouses



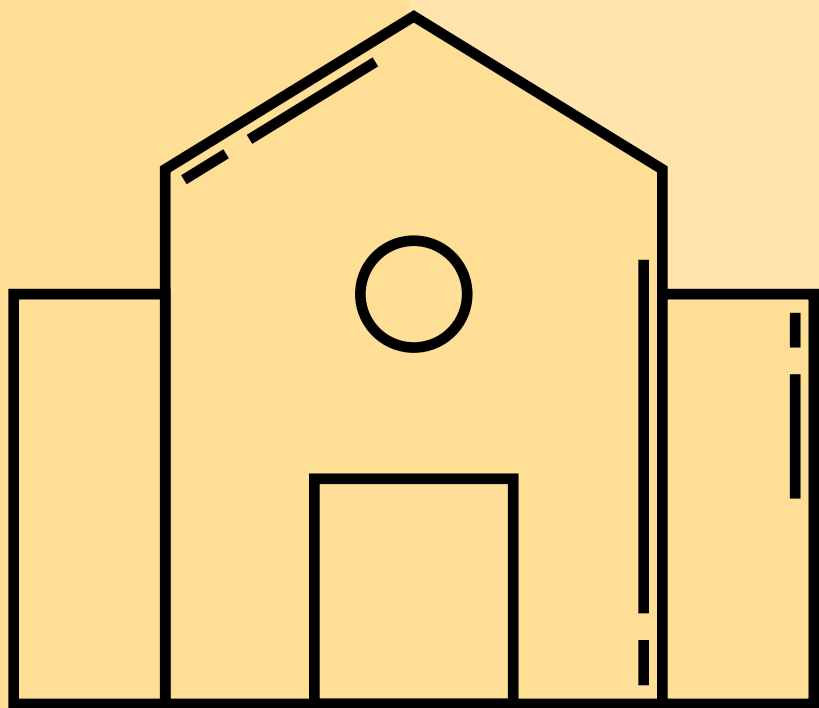
Total area of damage
1,3 mln m² / 2,3 mln m²

Outbuildings



Total area of damage
0,2 mln m² / 0,5 mln m²

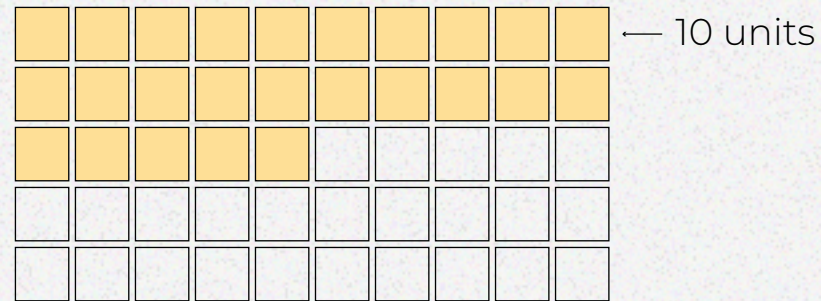
SOCIAL INFRASTRUCTURE



SCALE OF DESTRUCTION

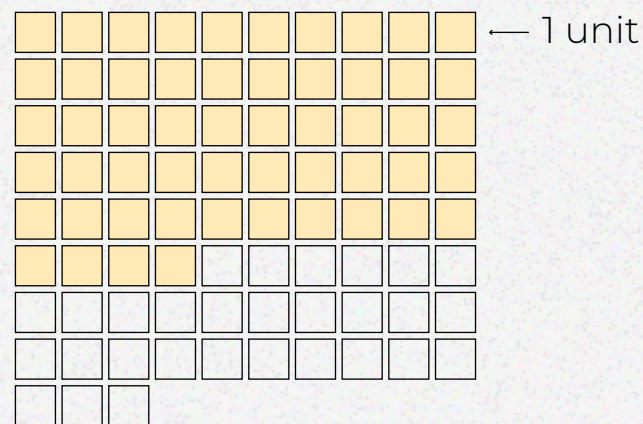
Social infrastructure

Trade and commerce



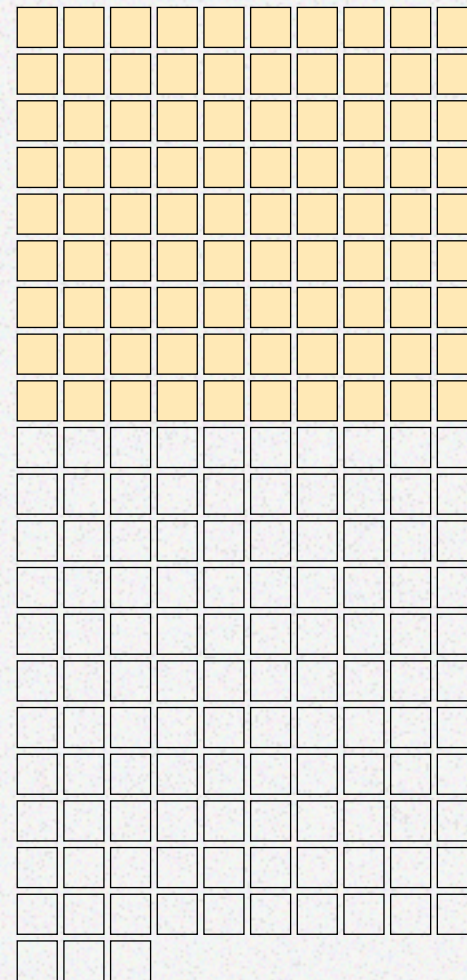
253
/ 502

Educational institutions



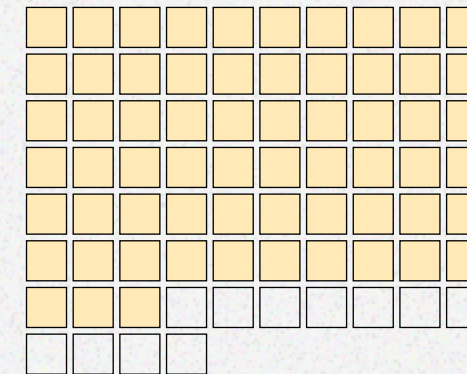
54 / 83

Buildings of general purpose



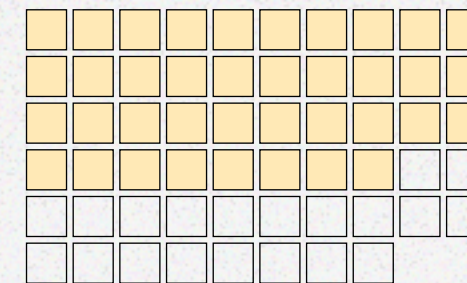
90 / 203

Hotels and recreation facilities



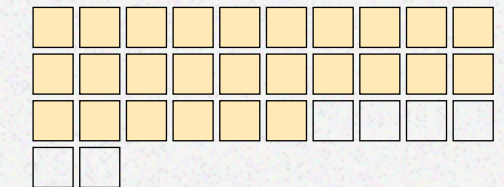
63
/ 74

Offices and conference centers



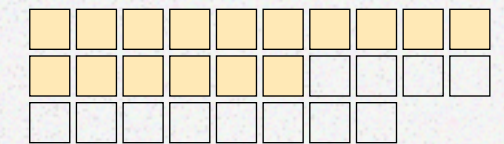
38
/ 58

Healthcare institutions



26
/ 32

Culture and religion institutions



16
/ 28

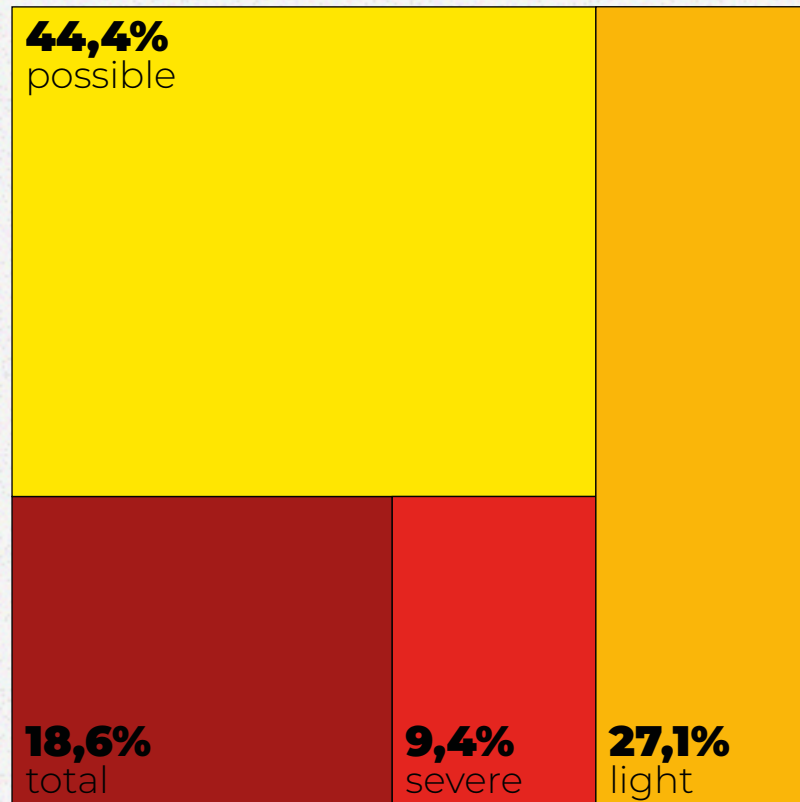
Sports facilities



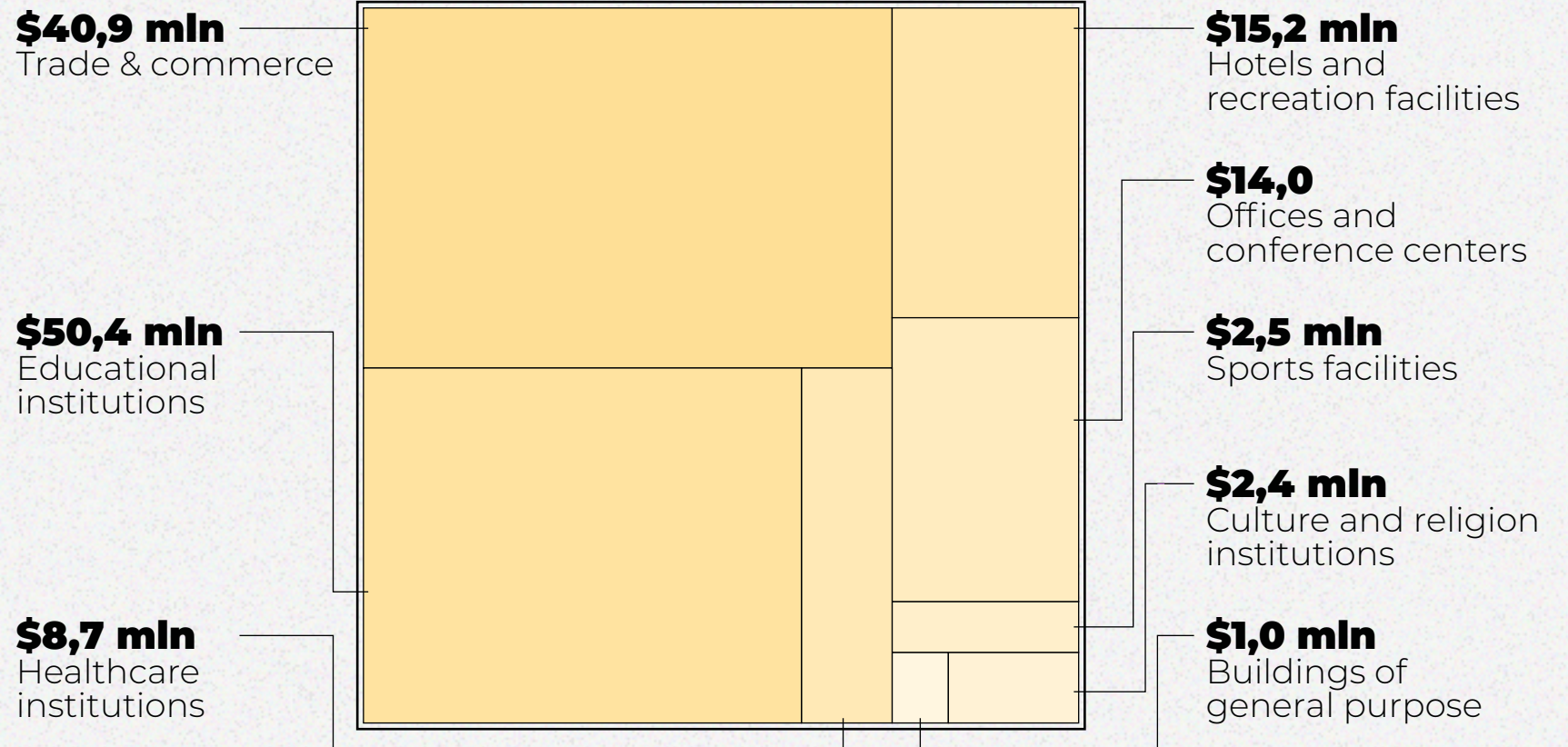
9
/ 12

SCALE OF DESTRUCTION

Level of destruction



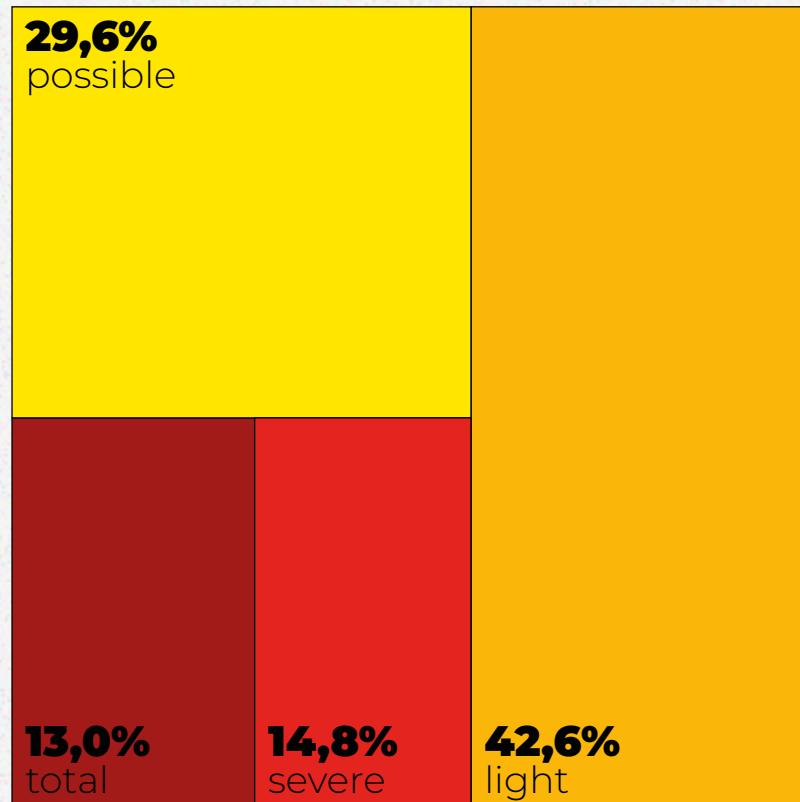
Assessment of monetary losses



Total losses
\$135,1 mln

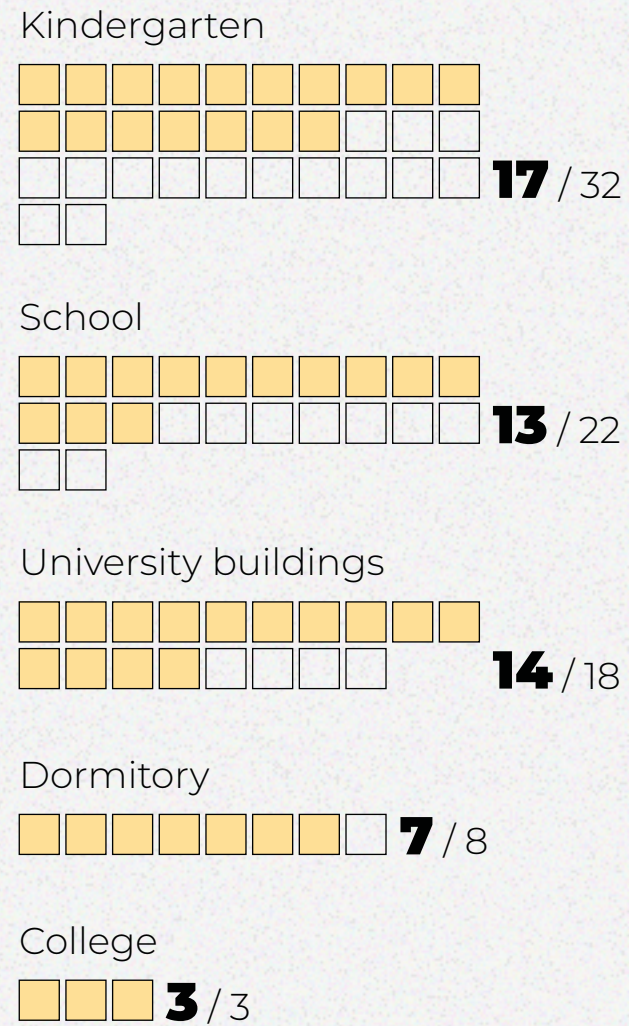
EDUCATIONAL INSTITUTIONS

Level of destruction

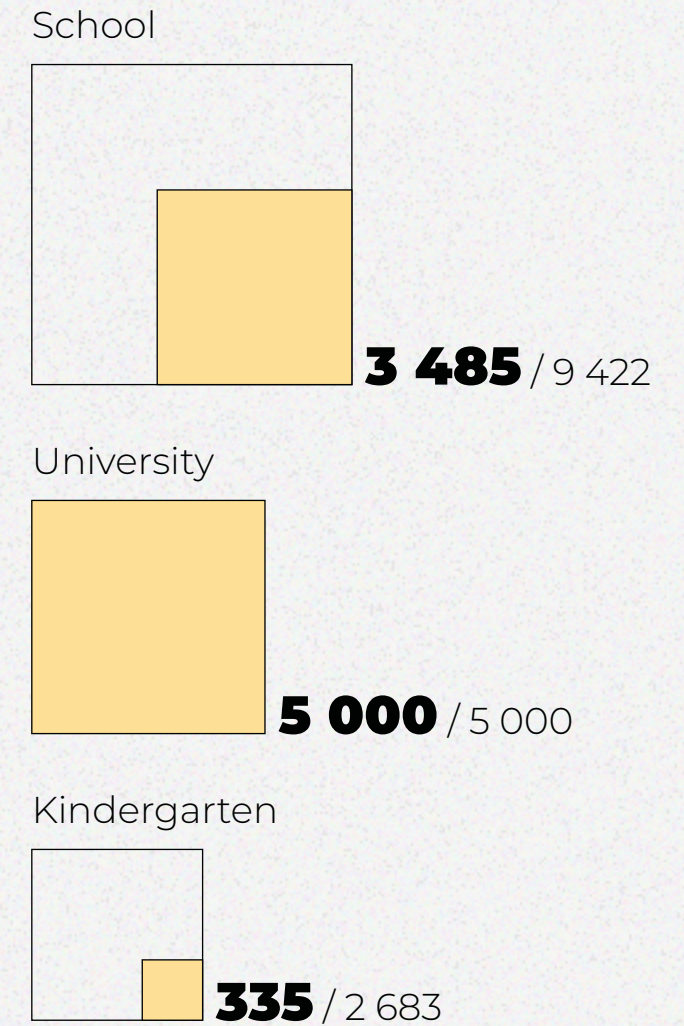


Total losses
\$50,4 mln

Scale of destruction

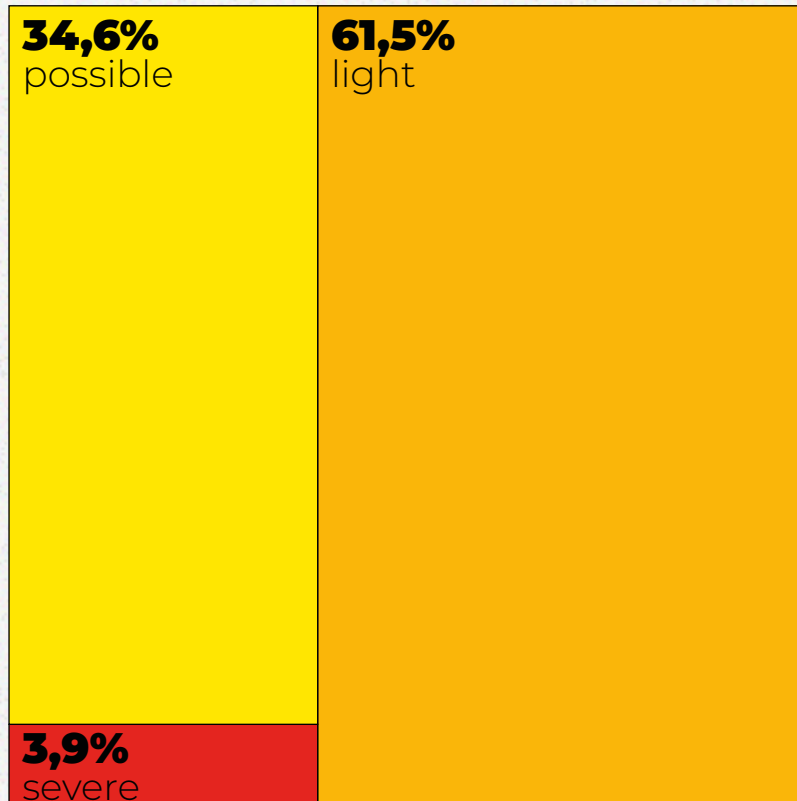


Lost the opportunity to study



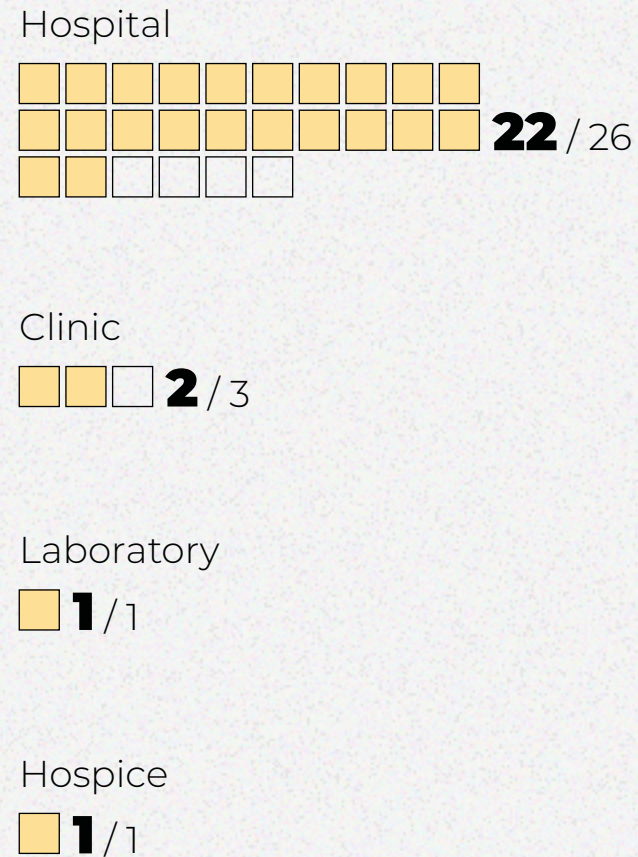
HEALTHCARE INSTITUTIONS

Level of destruction



Total losses
\$8,7 mln

Scale of destruction

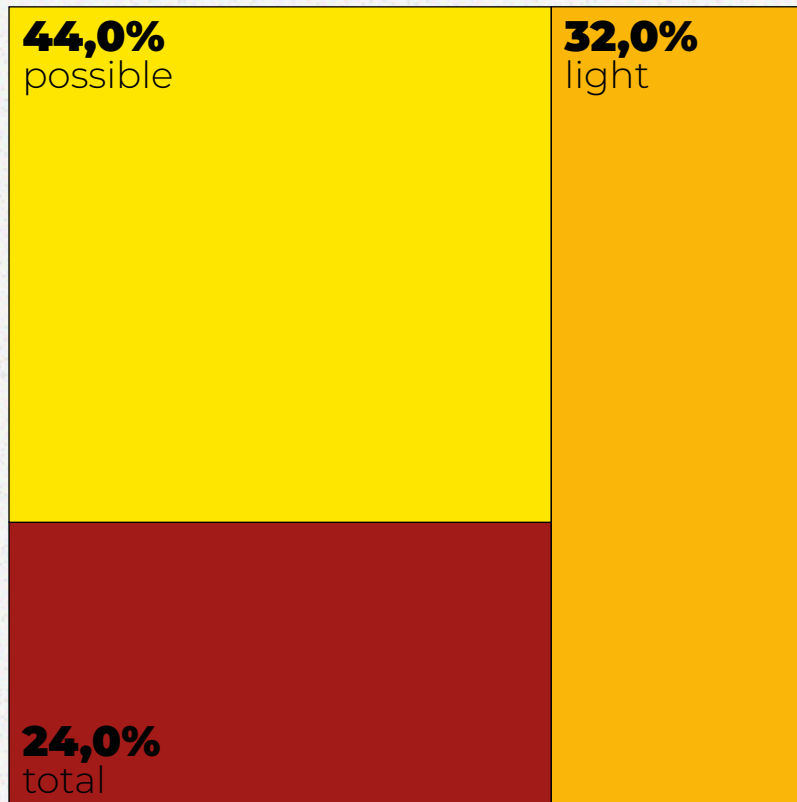


Local polyclinic



SPORTS, CULTURE AND RELIGION

Level of destruction



Total losses

\$4,9 mln

Scale of destruction

Churches



Sports facilities and buildings



Cultural institutions

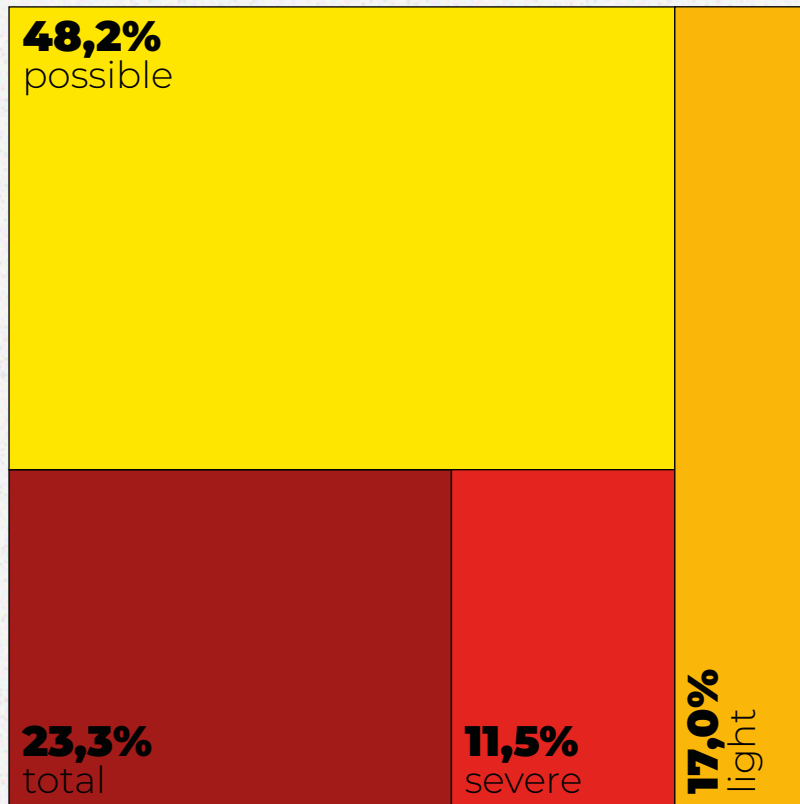


Central Stadium «Champion»



COMMERCIAL BUILDINGS

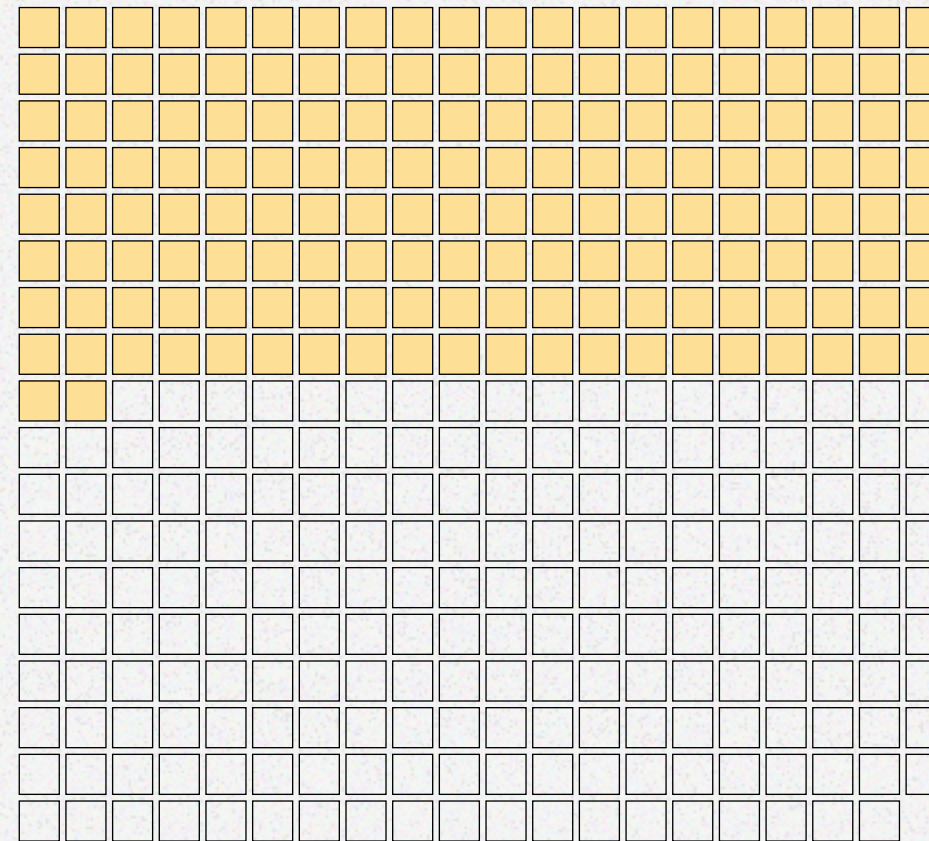
Level of destruction



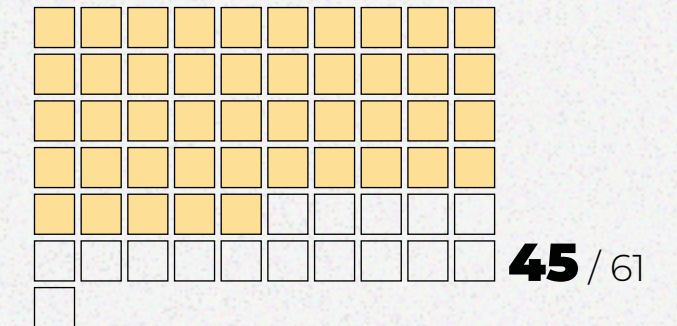
Total losses
\$40,9 mln

Scale of destruction

Commercial services and institutions



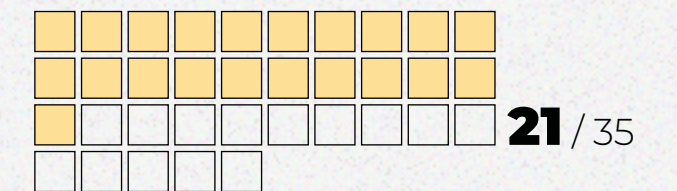
Trade



Grocery stores

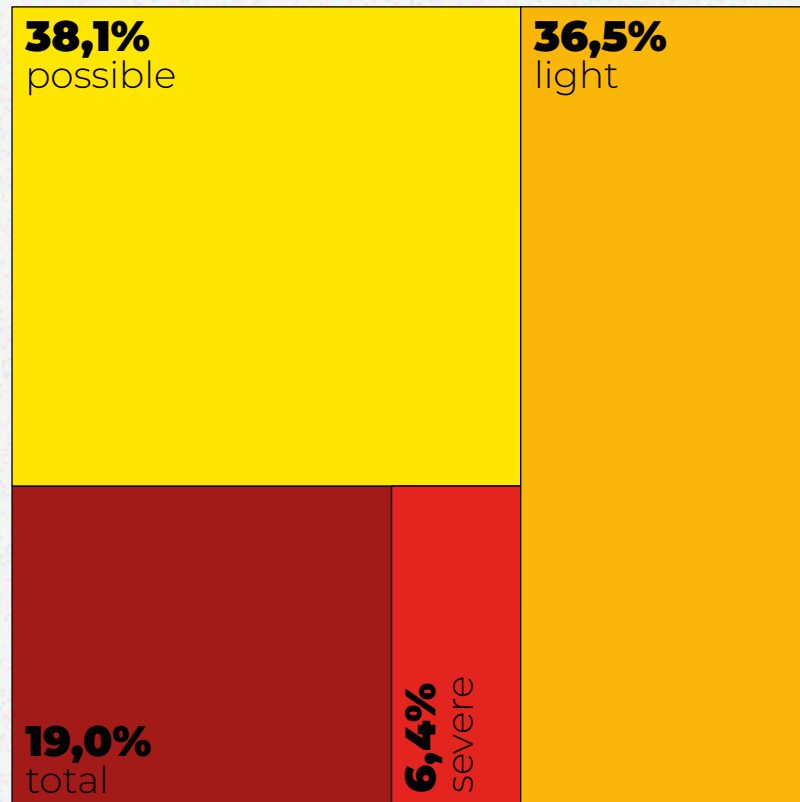


Cafes & restaurants



HOTELS & RECREATION FACILITIES

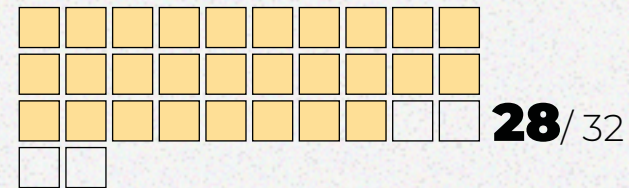
Level of destruction



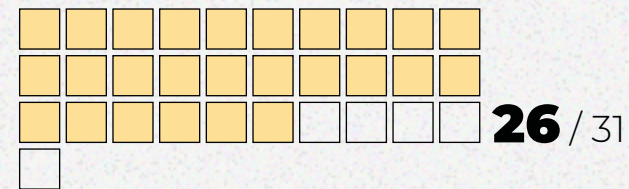
Total losses
\$15,2 mln

Scale of destruction

Hotels



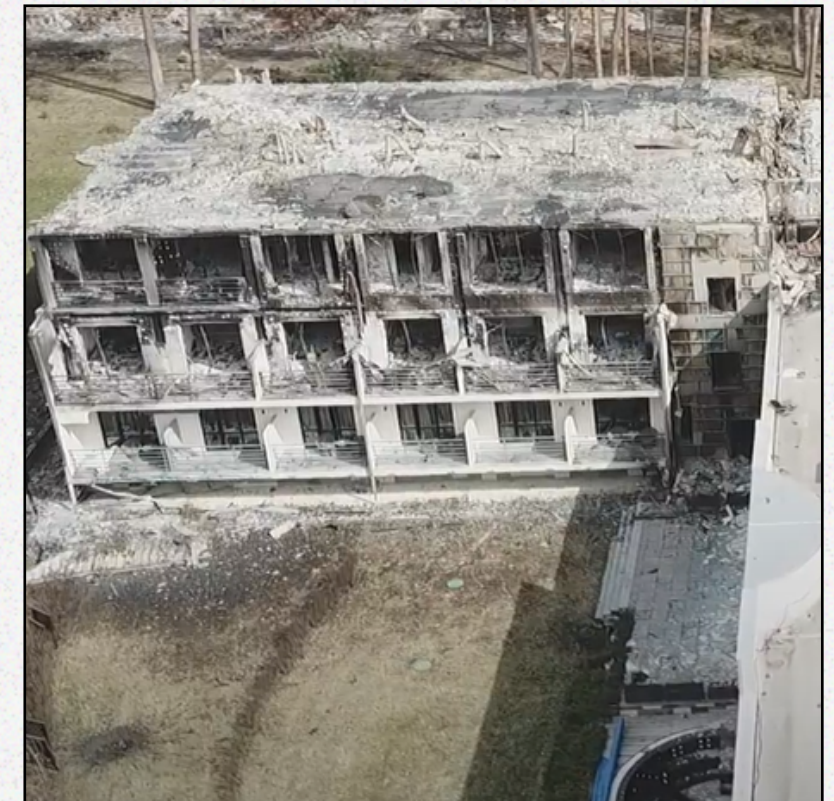
Sanatoriums



Camps

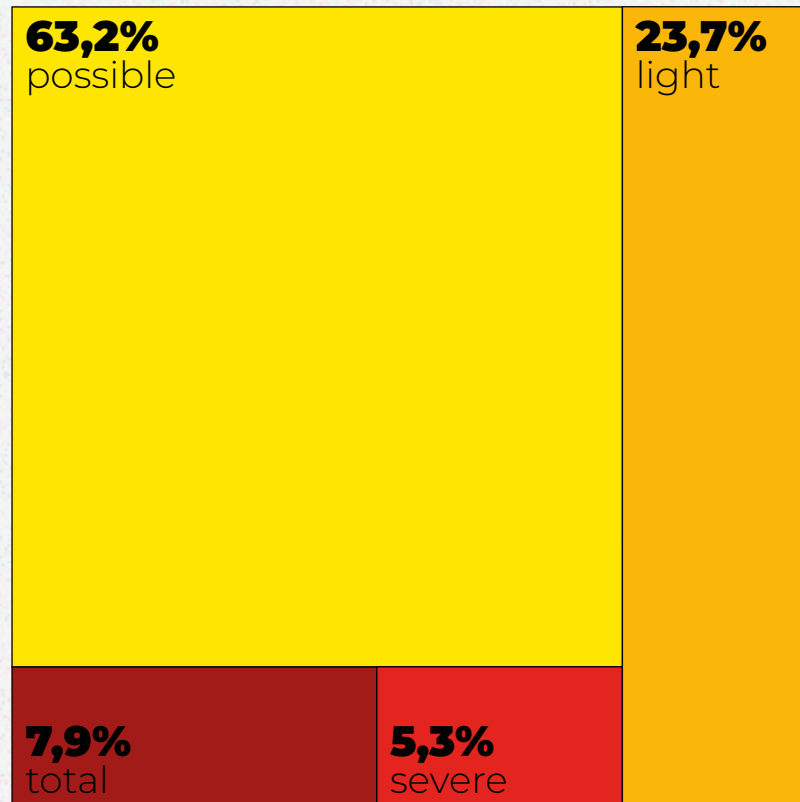


Recreation center



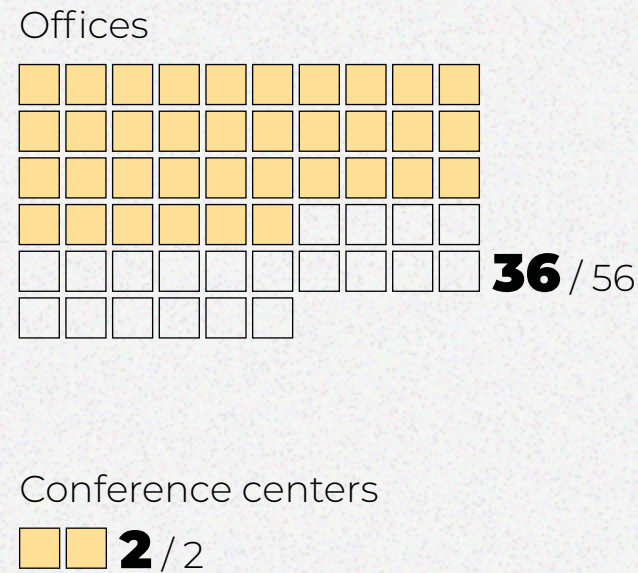
OFFICES & CONFERENCE CENTERS

Level of destruction



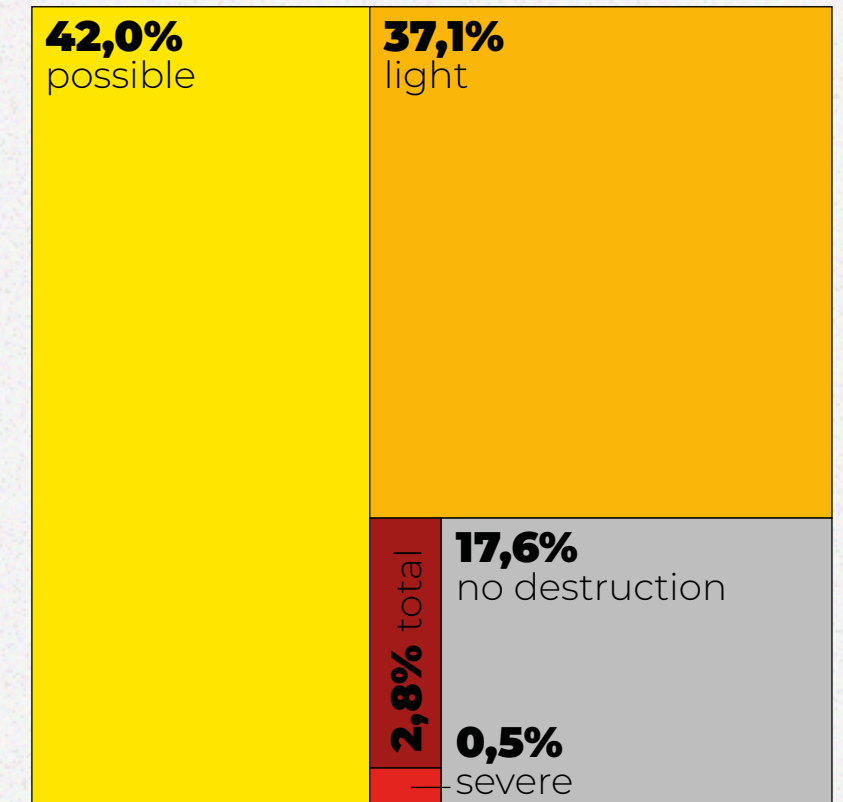
Total losses
\$14,0 mln

Scale of destruction



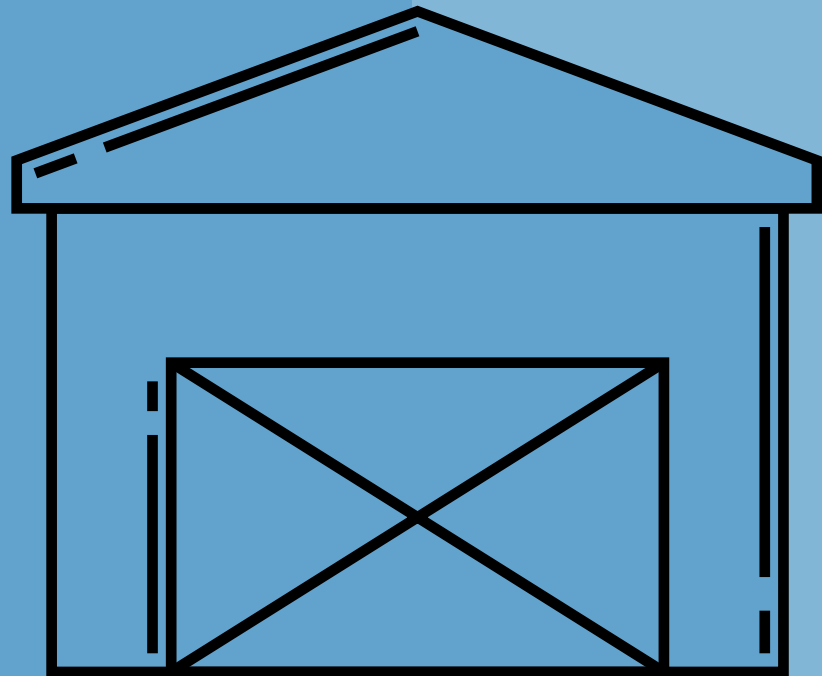
Lost places for work
5 160 / 6 259

Area of destruction



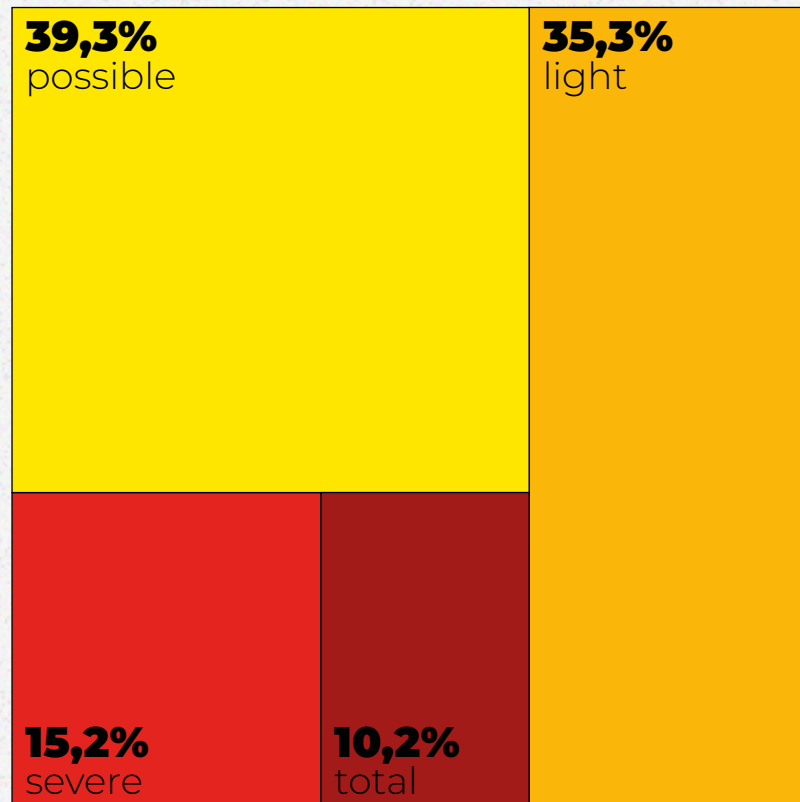
Total area of damage
51,6 ths m²

INDUSTRIAL INFRASTRUCTURE & CONSTRUCTION



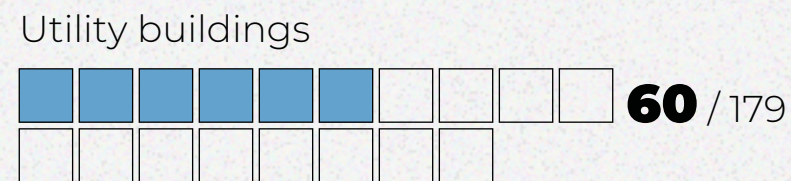
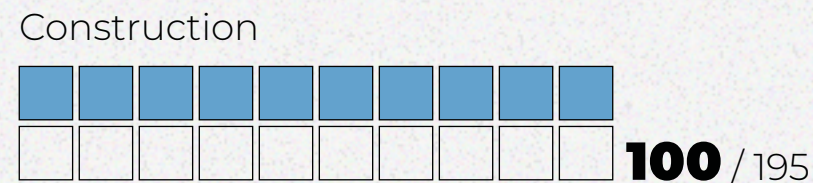
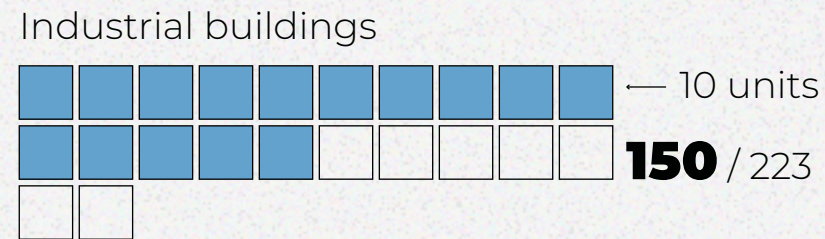
SCALE OF DESTRUCTION

Level of destruction



Total losses
\$102,1 mln

Scale of destruction



Warehouses

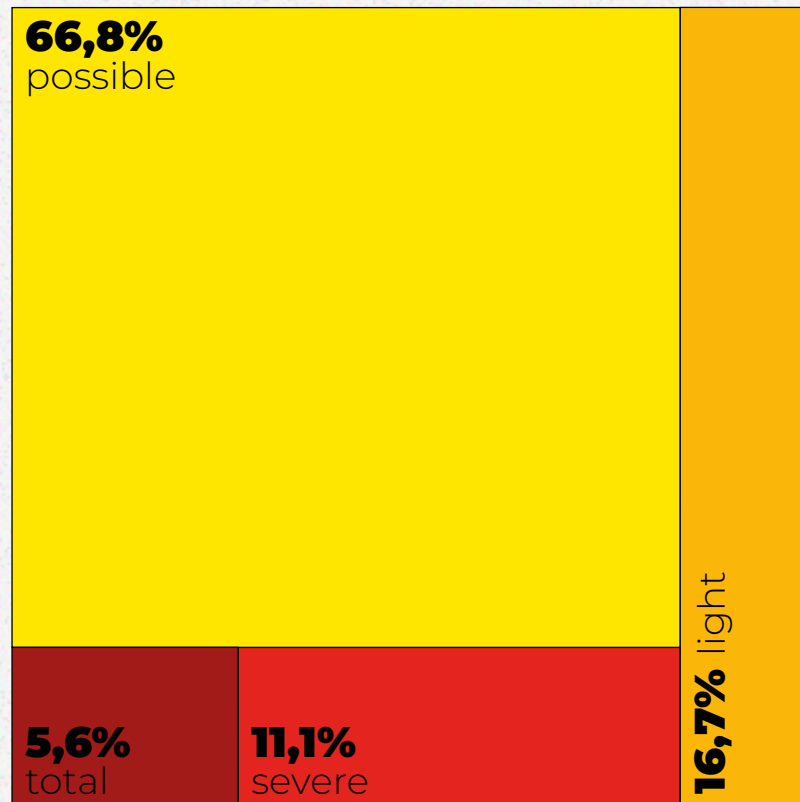


ADMINISTRATIVE INFRASTRUCTURE



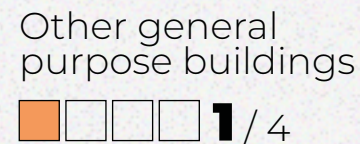
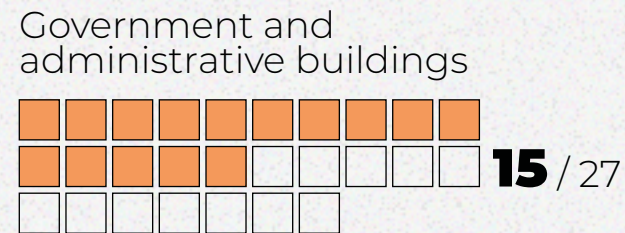
SCALE OF DESTRUCTION

Level of destruction



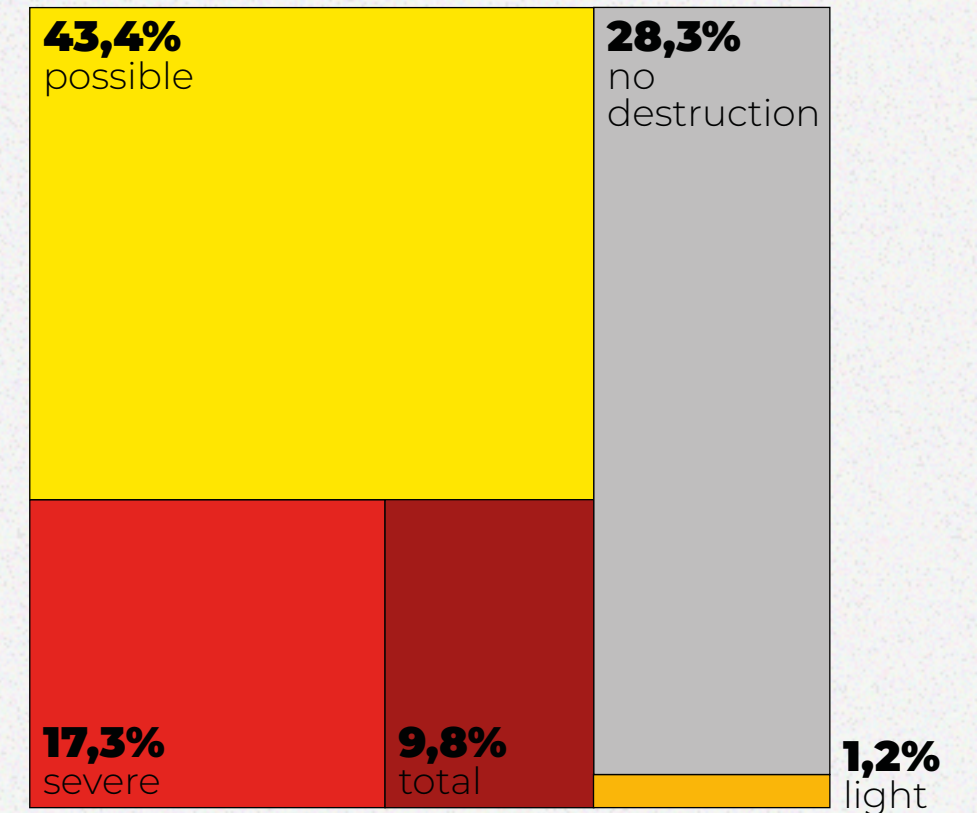
Total losses
\$9,6 mln

Scale of destruction



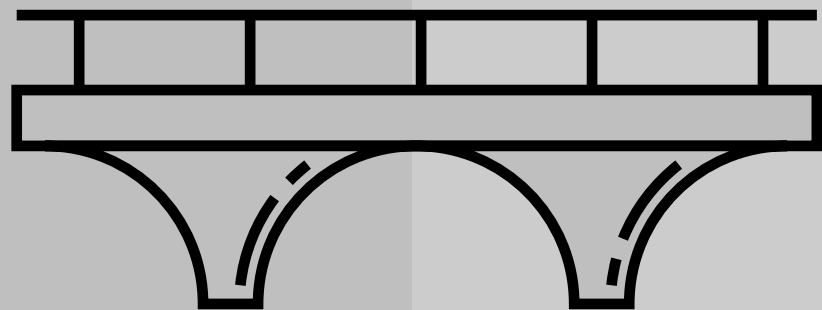
Lost places for work
3 475 / 4 844

Area of destruction



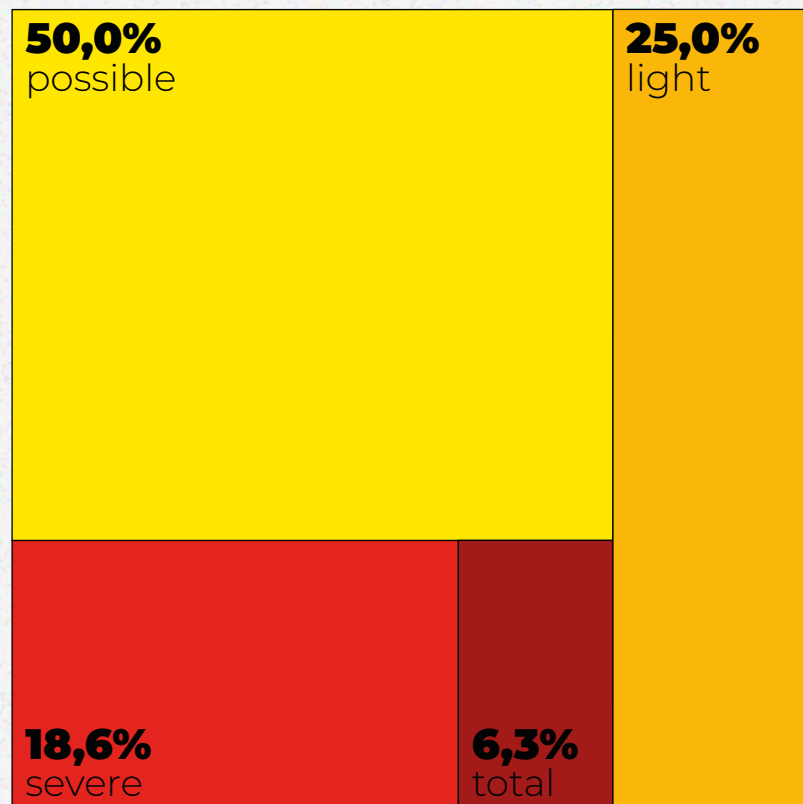
Total area of damage
4,8 ths m²

OTHER INFRASTRUCTURE



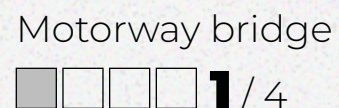
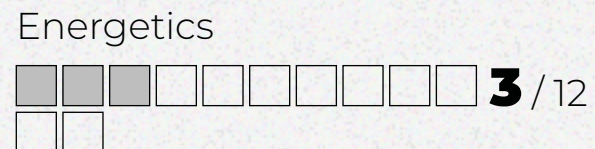
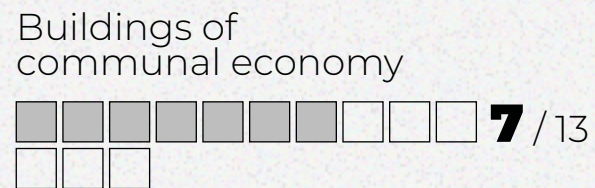
SCALE OF DESTRUCTION

Level of destruction



Total losses
\$26,8 mln

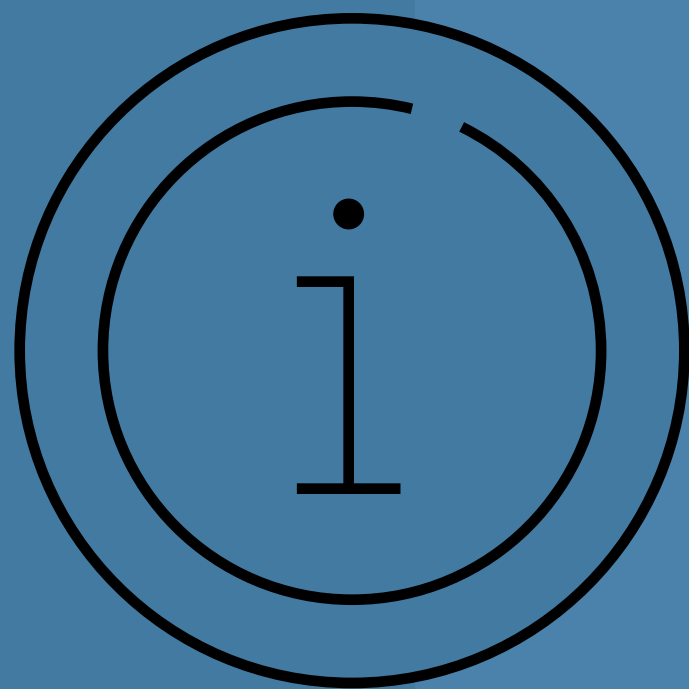
Scale of destruction



Motorway bridge



METHODOLOGIES AND ADDITIONAL INFORMATION



1. Assumptions

The following fractions were used for calculations:

100%

of the replacement cost of total destruction

50%

of the replacement cost of severe destruction

10%

of the replacement cost of light destruction

0%

of the replacement cost of possible destruction

2. Value determination



Large objects

The assessment of large objects, in particular enterprises, is calculated individually on the basis of financial statements and other public sources regarding value information.



Medium objects

Medium facilities, in particular, social infrastructure, trade objects, and services (health, education and culture, shops, hotels, restaurants, etc.) are calculated on the basis of average cost data, taking into account the type of area (urban/rural).



Small objects

Small objects, which include residential buildings, outbuildings and garages, are calculated based on the average footage (taking into account the area and type of area) and the cost per square meter (nominal cost + cost of redecoration repairs + cost of dismantling).

HOW WE DETERMINE LEVELS OF DESTRUCTION

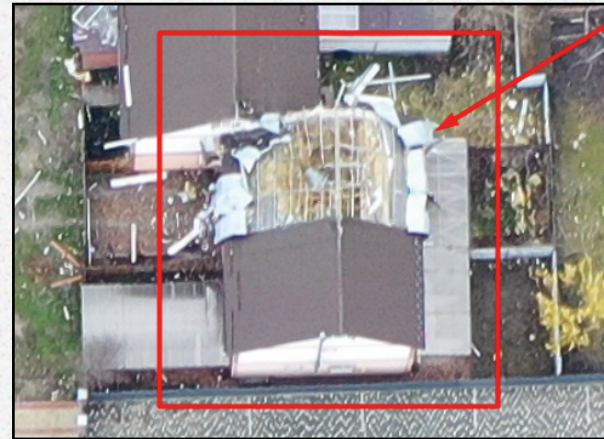
Total destruction



Appointed when the original structure of the building is no longer detectable restoration is impossible, namely:

- the building is completely or significantly destroyed (> 50%);
- only part of the building collapsed to the foundation.

Severe destruction



Implies significant visible damage to the building and its structure, which includes:

- collapse of part of the roof;
- serious destruction and damage to the walls.

Light destruction



Implies minor partial damage to the building and its structure:

- minor damage to the roof,
- collapse of chimneys,
- damage to facade, decorative and removable elements,
- a large amount of debris.

Possible destruction



Intended for buildings that are difficult to interpret due to lower image quality (for example, shadow or poor resolution due to high angle of shooting).

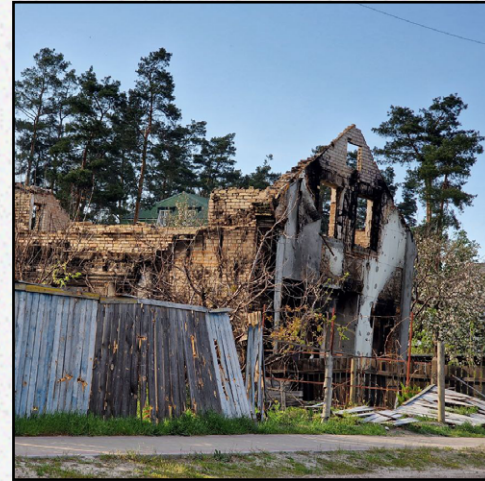
Visual signs may include be small amounts of debris, gravel or sand around the building.

PHOTO EVIDENCE

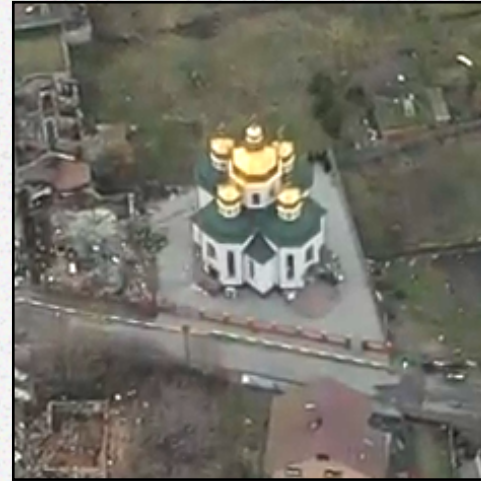
Townhouse



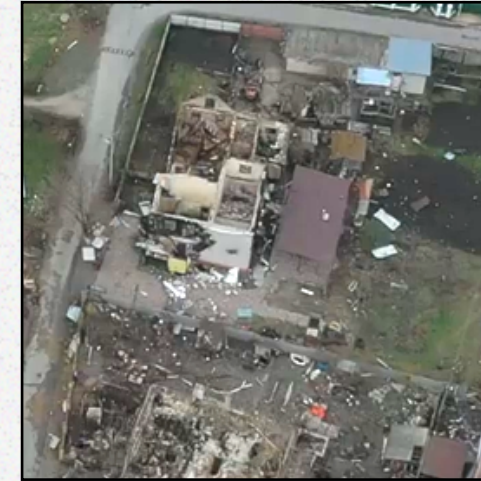
Private house



Church



Outbuildings



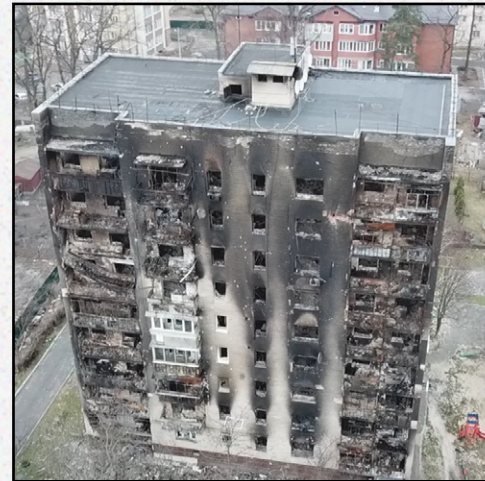
Outbuildings



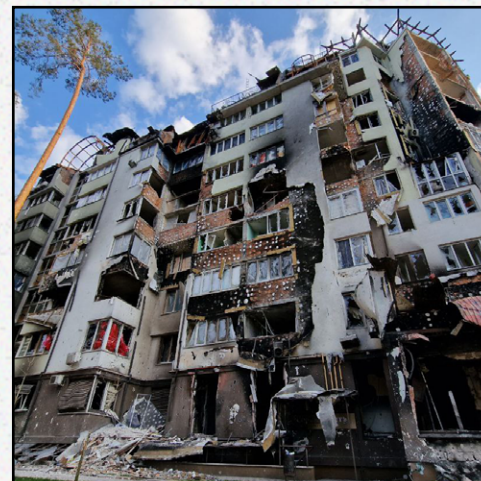
University of the State
Fiscal Service of Ukraine



Apartment building



Apartment building



Apartment buildingk



Irpin Lyceum No. 3



IRPIN THROUGH THE EYES OF BEHOLDERS

Irpin: Russia's reign of terror in a quiet neighbourhood near Kyiv



Ukrainians have retaken Irpin from the Russian invaders. But it's a city that now lies in ruins



A Horror Film In Reality: What Does Irpin Near Kyiv Look Like From A Bird's Eye View (Photo)



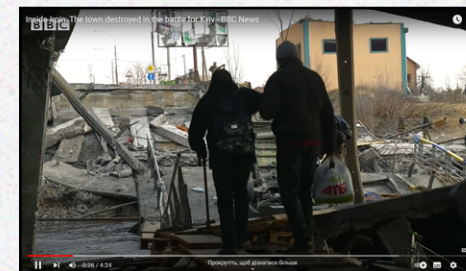
Life returns to Irpin: repairing vital infrastructure has happened quickly but healing still a slow process



In ruined Kyiv suburb, residents ask, 'What have we done to Putin to be slaughtered like this?'



Ukrainian forces survey damage to Irpin littered with Russian 'unexploded ammunition'



Inside Irpin: The town destroyed in the battle for Kyiv - BBC News



Drone footage shows devastation in war-torn Irpin, Ukraine



Civilians escape from Irpin with stories of grief and terror



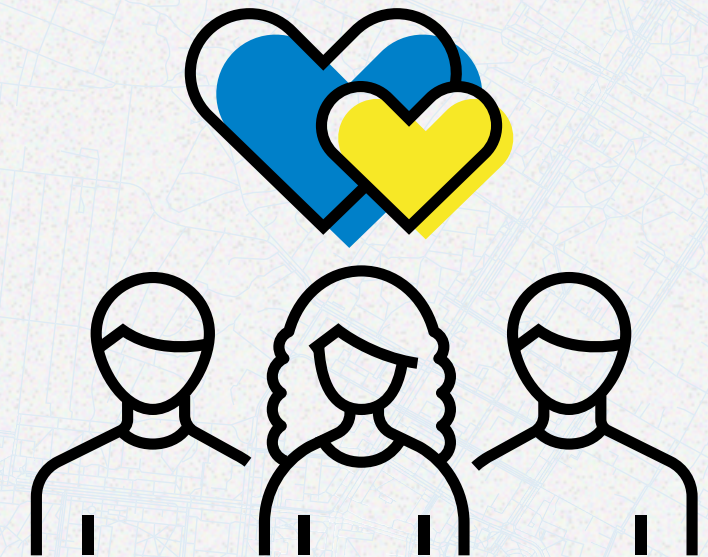
GRATITUDE TO VOLUNTEERS

Being a volunteer is a necessary and responsible mission, because the contribution of every citizen is important for the reconstruction of the country. The active position, engagement and tireless work of volunteers support the work of the RebuildUA project team, bringing us closer to the desired result.

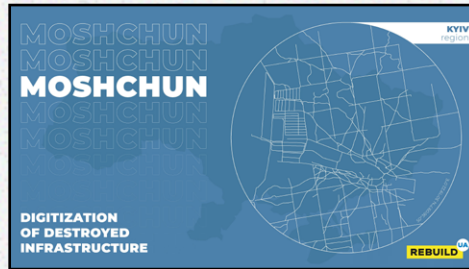
These people helped RebuildUA digitize the destruction of Irpin:

Nadia Beba
Denis Vishnevskiy
Kateryna Volokh
Anton Hagen
Kristina Gorbacheva
Mykola Gorokhov
Eduard Dibrivny
Alina Yerkeeva
Nikita Kyrychek
Kateryna Kulyk
Maxim Lazavenko

Semen Pavlenko
Oleksiy Pedosenko
Vladyslav Poda
Mykola Rokytyanskyi
Konstantin Sokolchuk
Vyacheslav Telegin
Serhii Haymyk
Olga Khatsko
Diana Khomenko
Maria Shkolnyk



PREVIOUS REPORTS



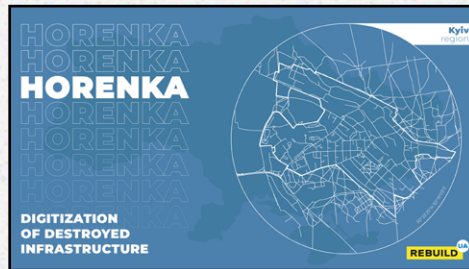
Moshchun,
Buchanskyi district,
Kyiv region

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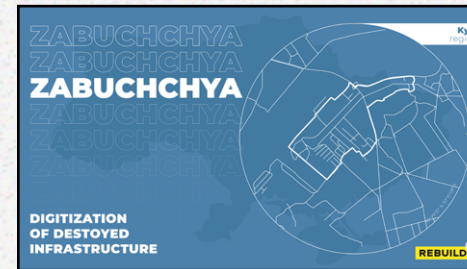
Ozera,
Borodianskyi district,
Kyiv region

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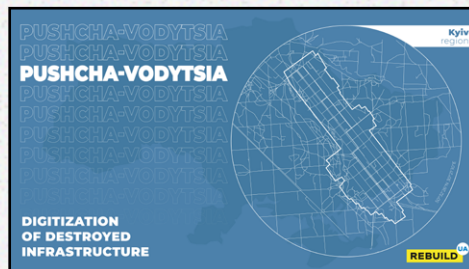
Horenka,
Buchanskyi district,
Kyiv region

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Zabuchchya,
Buchanskyi district,
Kyiv region

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Pushcha-Vodytsia,
district of Kyiv

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REBUILD

UA

The RebuildUA project aims to analyze and visualize the destroyed infrastructure of Ukraine, make this information public and share the results with communities, public authorities and specialized foundations



rebuildua.net

Partners:

Visual style and content:



Assessment of losses and damage, budgeting:

KSE | Institute

Digitization of geospatial information:

Урбанина

Support in cooperation with public authorities:



Centre for Economic Recovery

Cooperation & analysis of community economy, Vkursi Hromada:

Center for
Innovations
Development

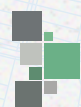
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ДЕПАРТАМЕНТ
МІСТОБУДУВАННЯ
ТА АРХІТЕКТУРИ



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BERNDTSON

KERNEL



ОТГ
ВСЕУКРАЇНЬКА
АСОЦІАЦІЯ