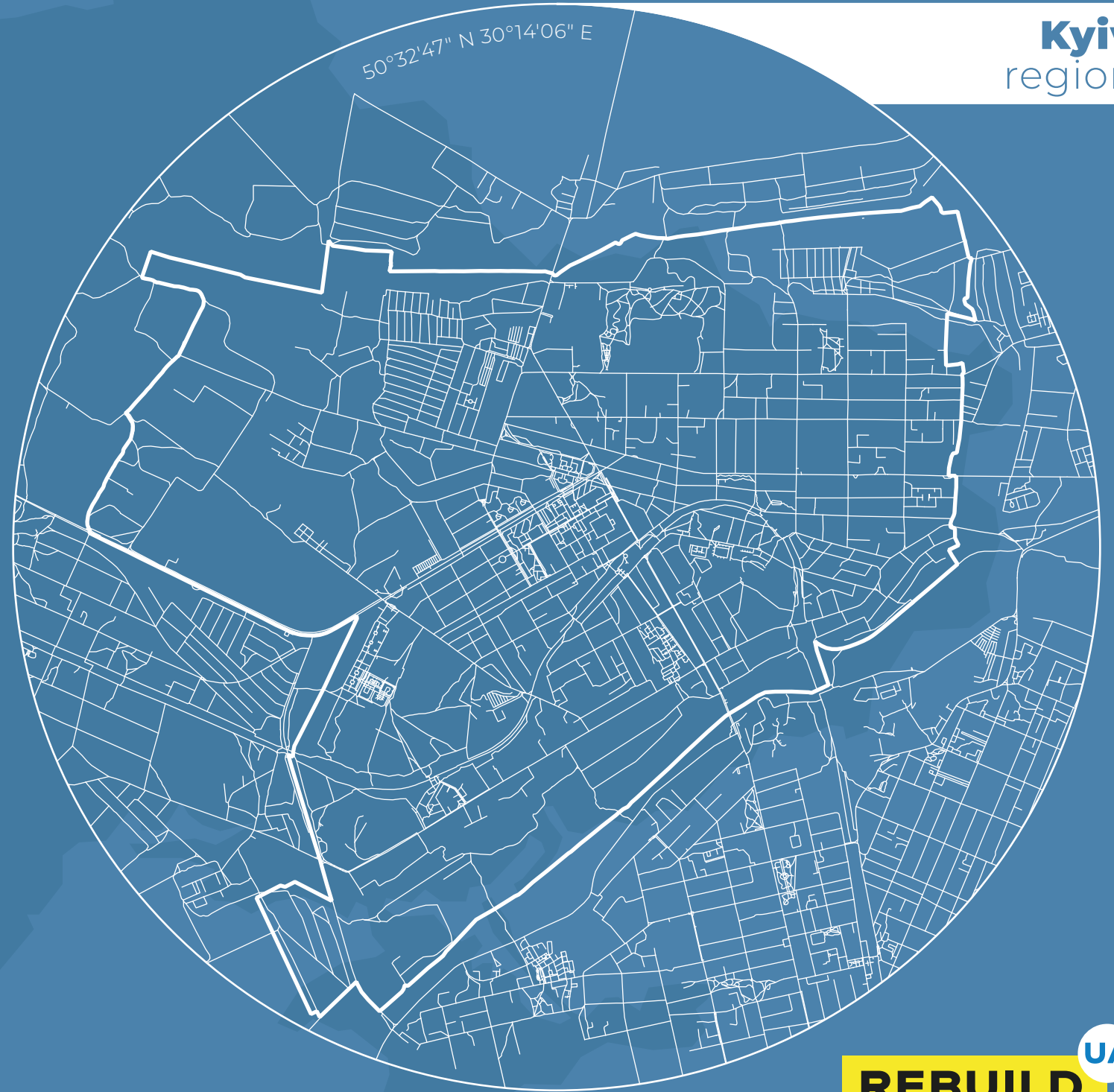


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BUCHA

**DIGITIZATION
OF DESTROYED
INFRASTRUCTURE**

Kyiv
region



REBUILD 

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 damages 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

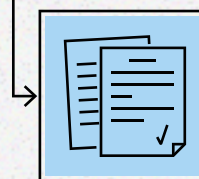
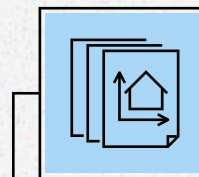
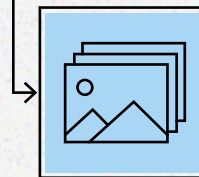
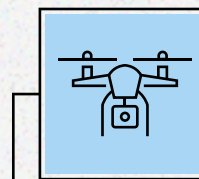
To ensure completeness of the input data, the project team captures photos and videos, as well as collects additional information from verified sources.

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:



ABOUT THE LOCALITY

The occupation of Bucha lasted more than a month. There were no quiet days here, the fighting continued constantly, and the town was liberated only on March 31. After de-occupation, numerous evidence of civilian killings, torture and other crimes emerged.

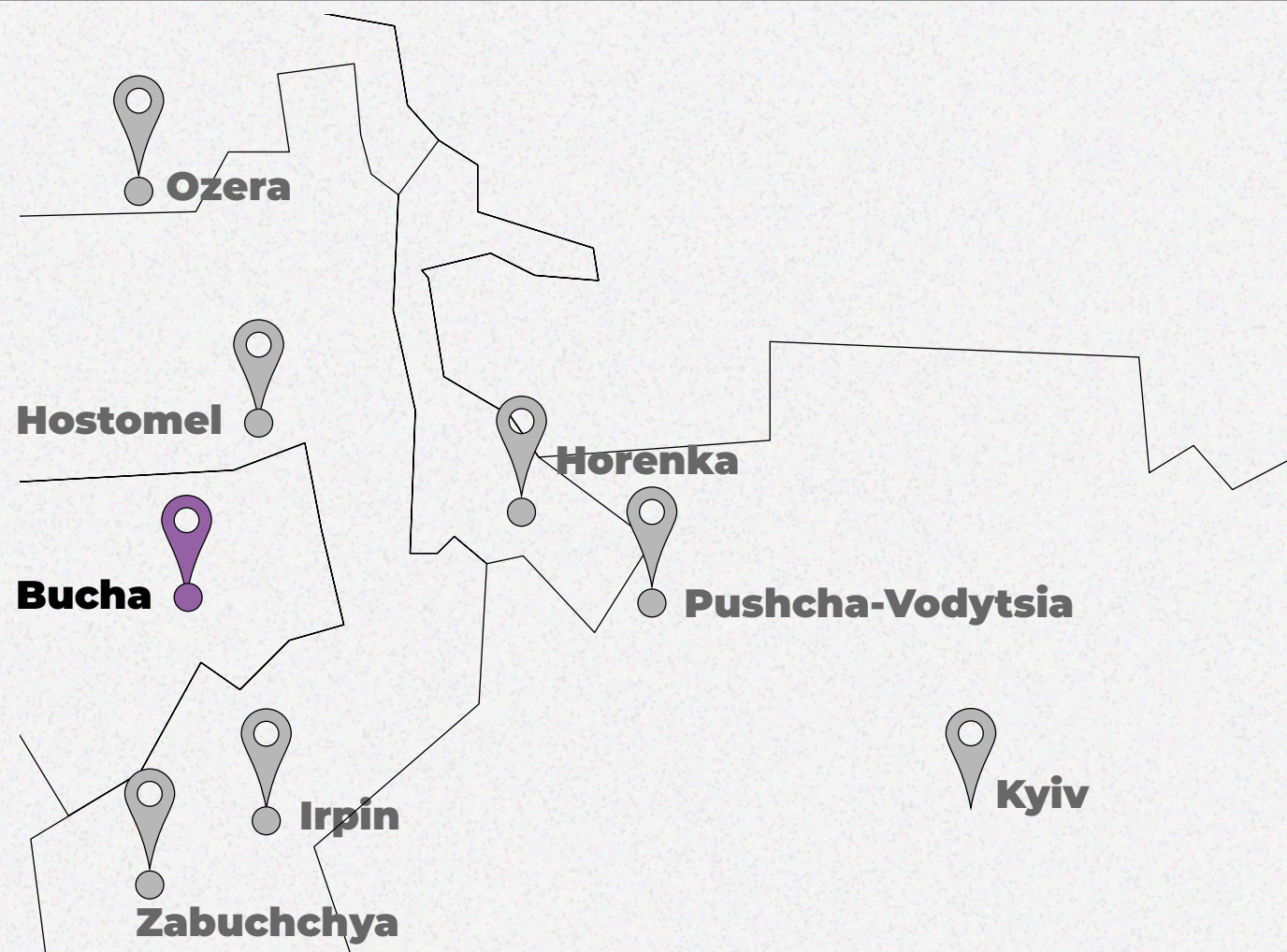
Because of the horrendous cruelty of the Russian army to civil Ukrainians Bucha became one of the bitter symbols of the war. The housing stock of the city suffered significant destruction, and mass graves were arranged right in the yards.

The RebuildUA team assessed the damage to the settlement. Keep track of our destinations on the map and in the project news.




 rebuildua.net

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



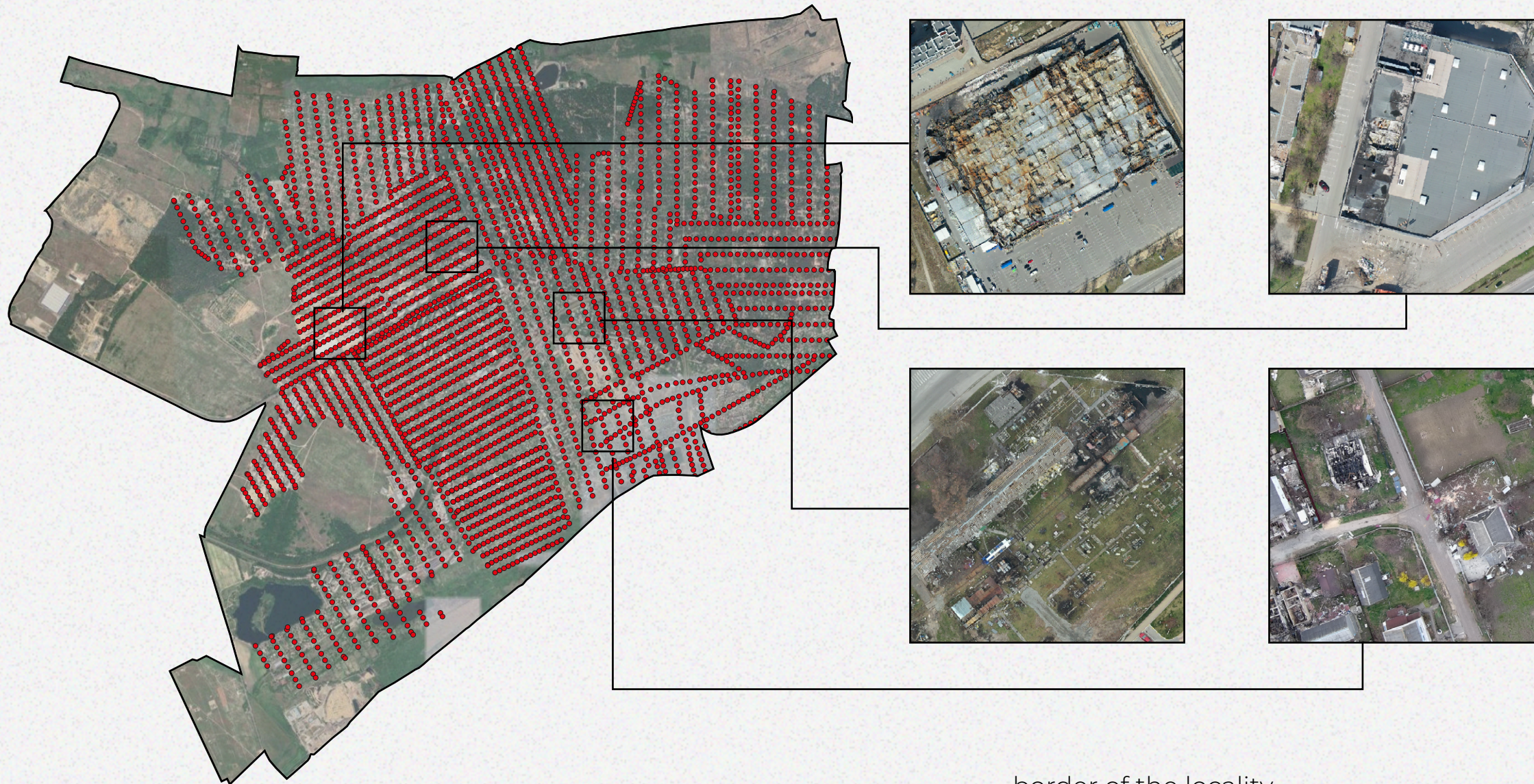
Region
District
Community

Kyiv
Buchanskyi
Buchanska


Survey area
26,57 km²


Population
42 279 people

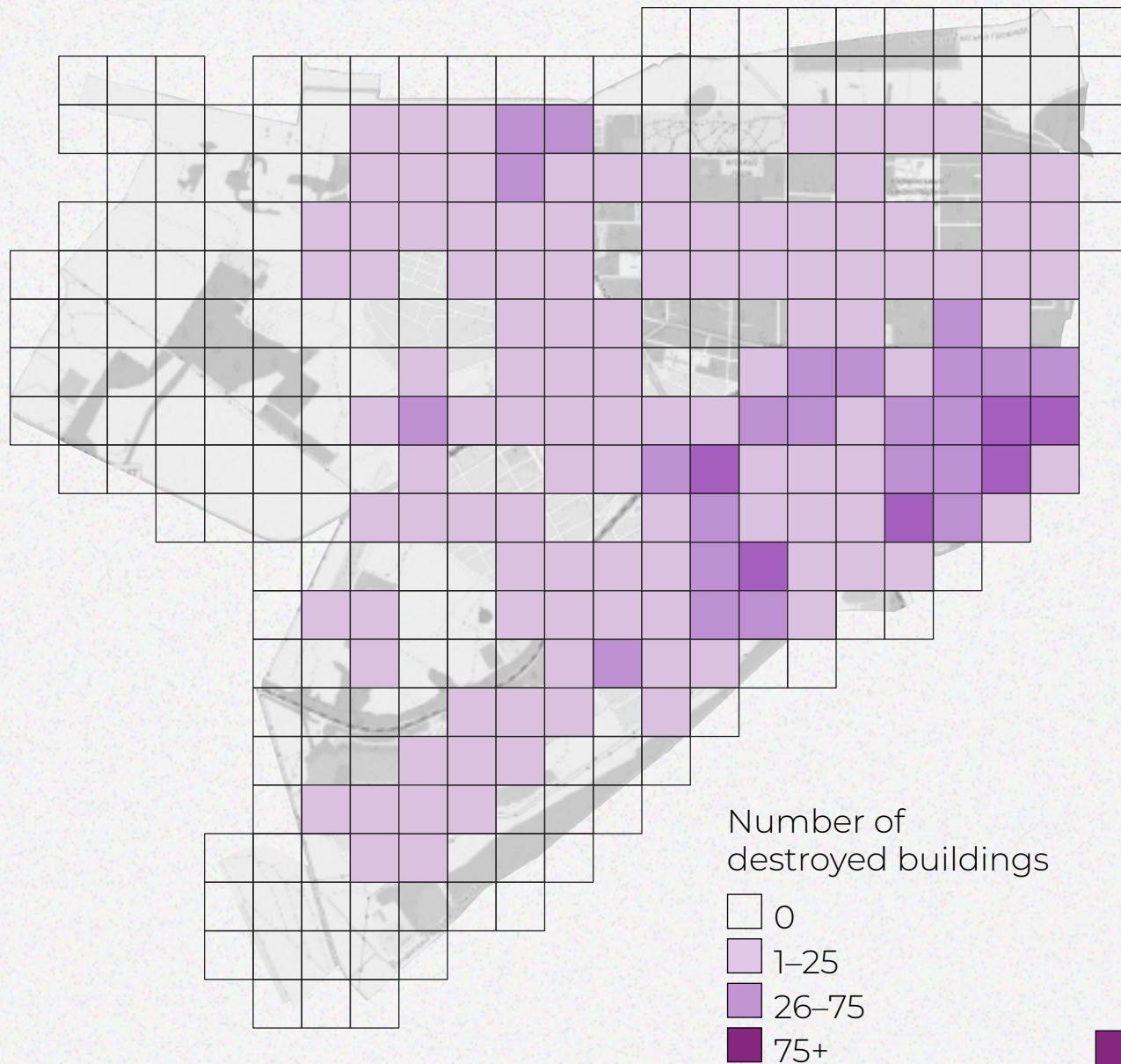
DIGITIZATION PROCESS



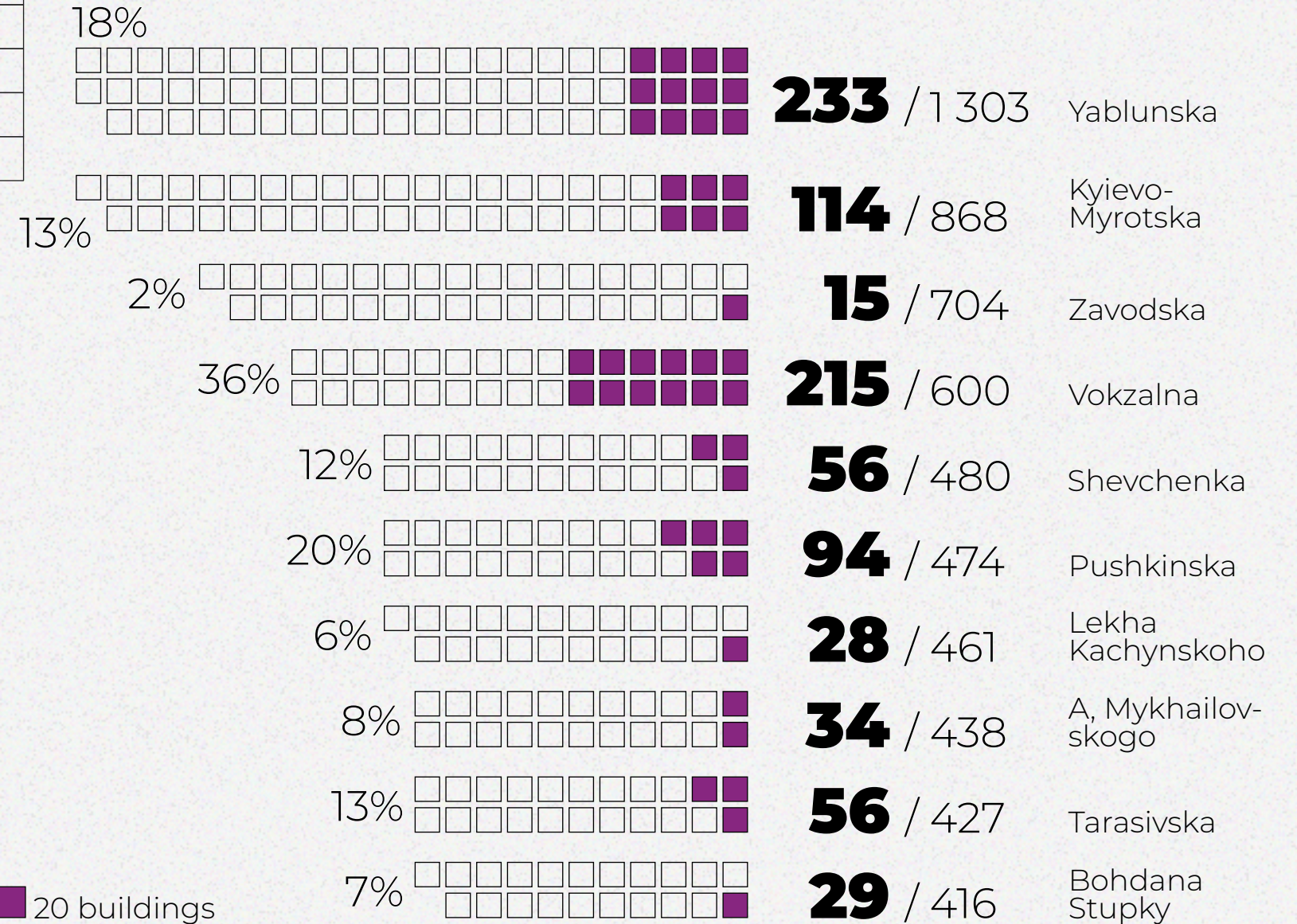
— border of the locality
..... trajectory of drone shooting

23 flight missions
4 565 pictures for orthophoto
650 hours of data processing
45,7 Gigabytes of data

THERMAL MAP OF DESTRUCTION



Destruction of the largest streets

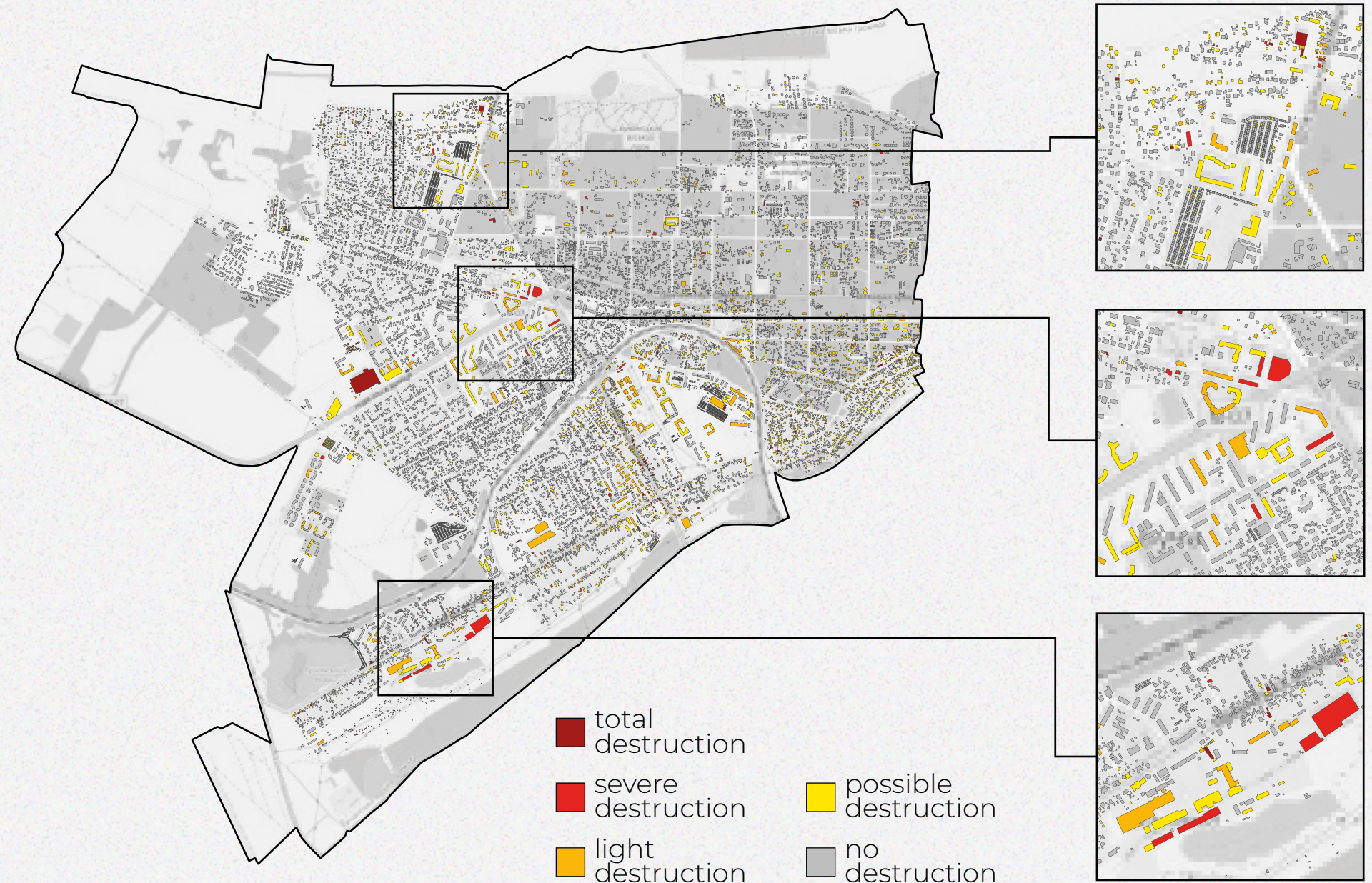
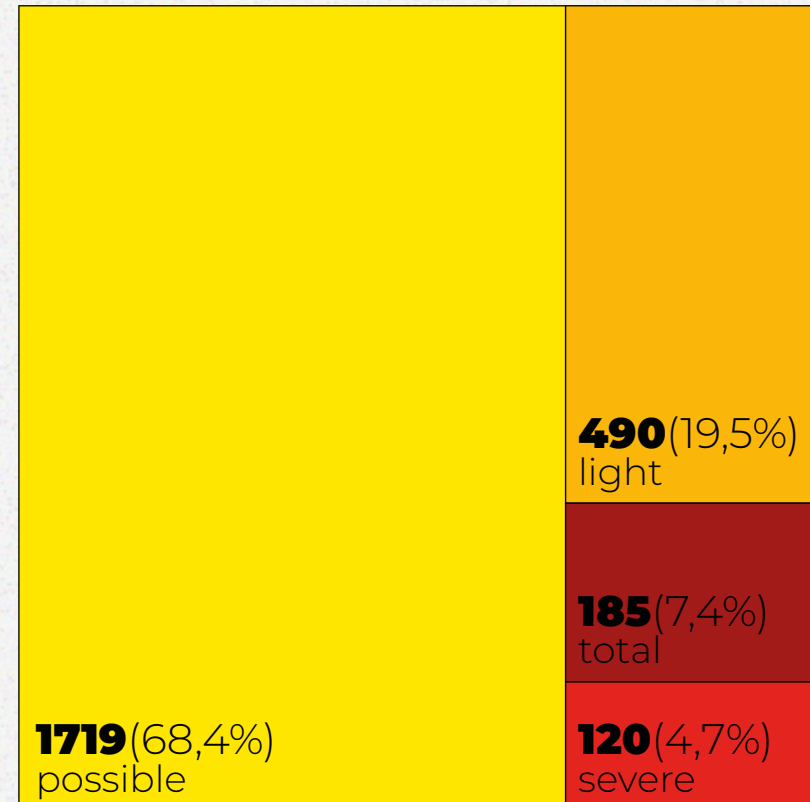


LEVELS OF DESTRUCTION

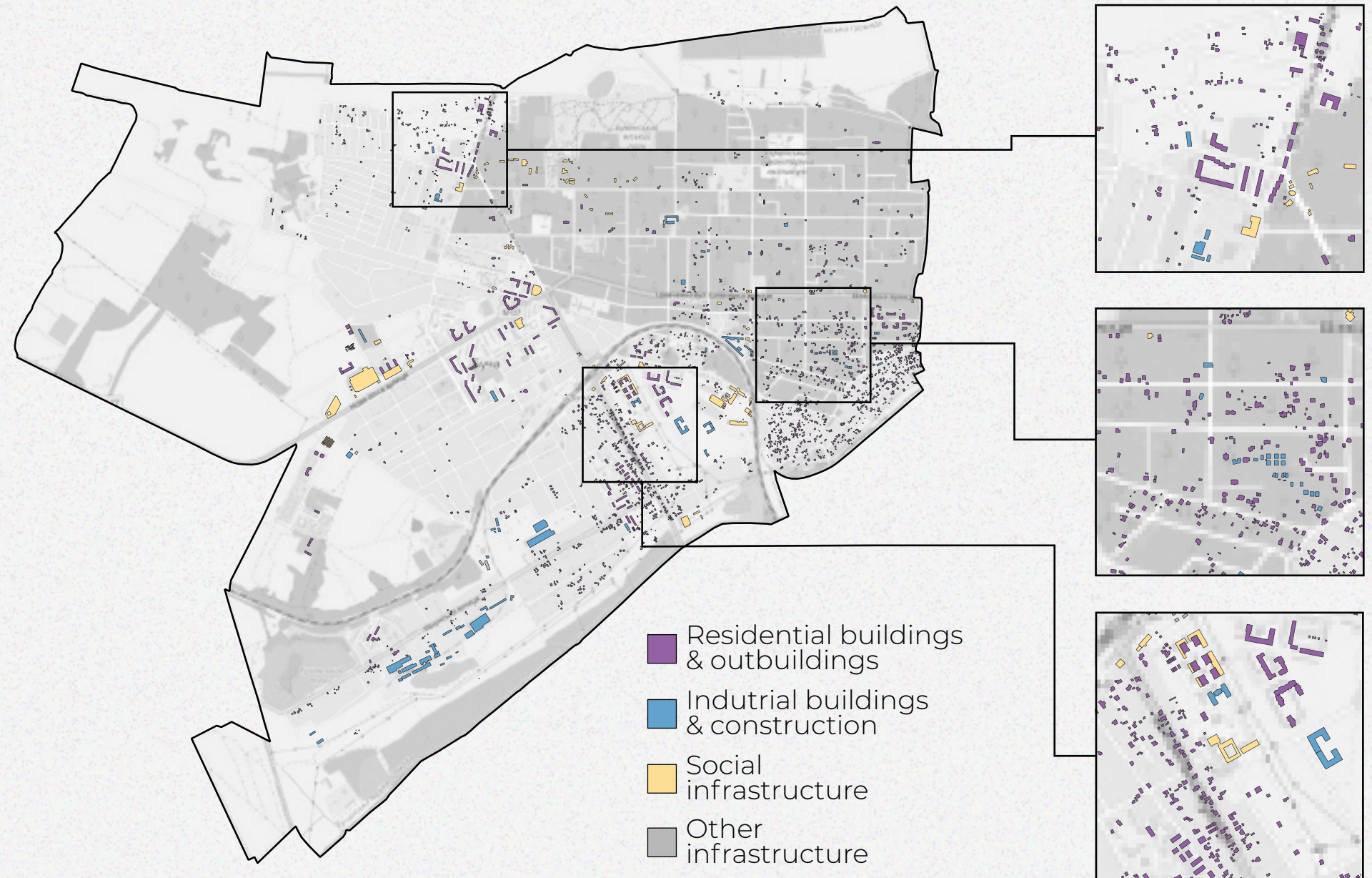
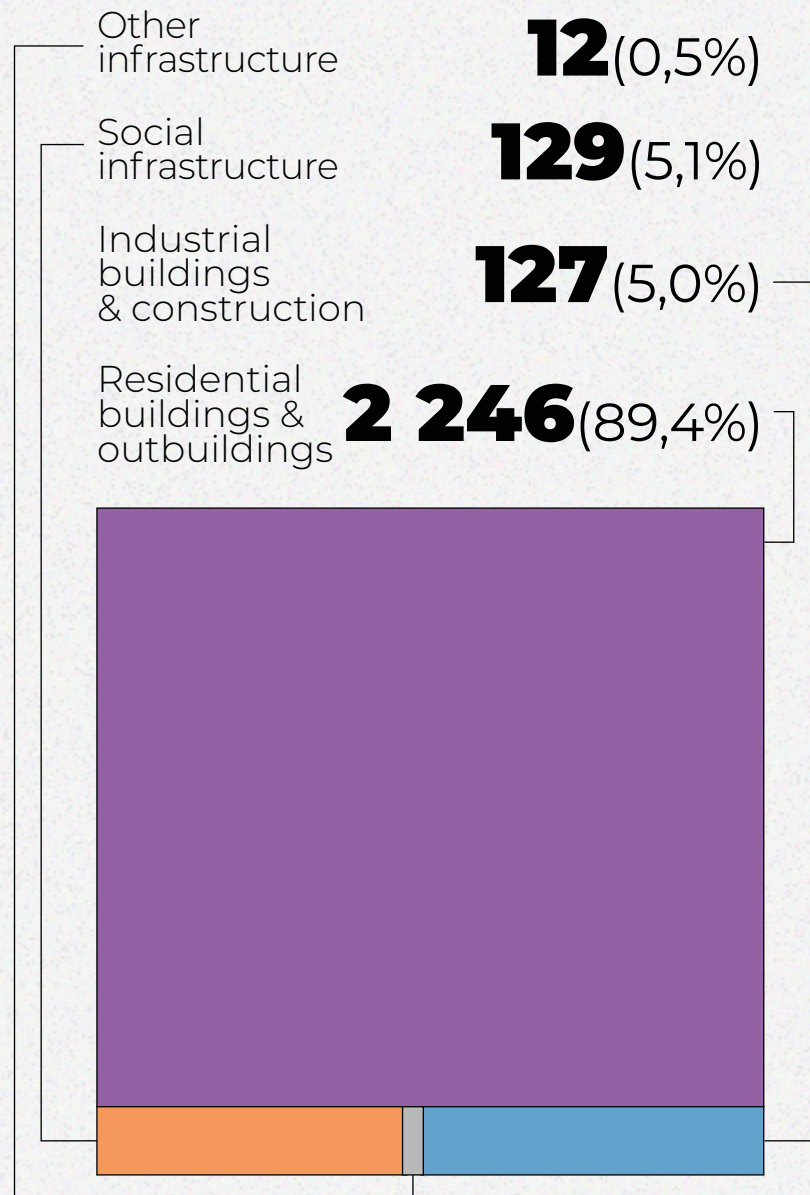
Buildings destroyed:

2 514 / 20 254

Level of destruction, number of buildings



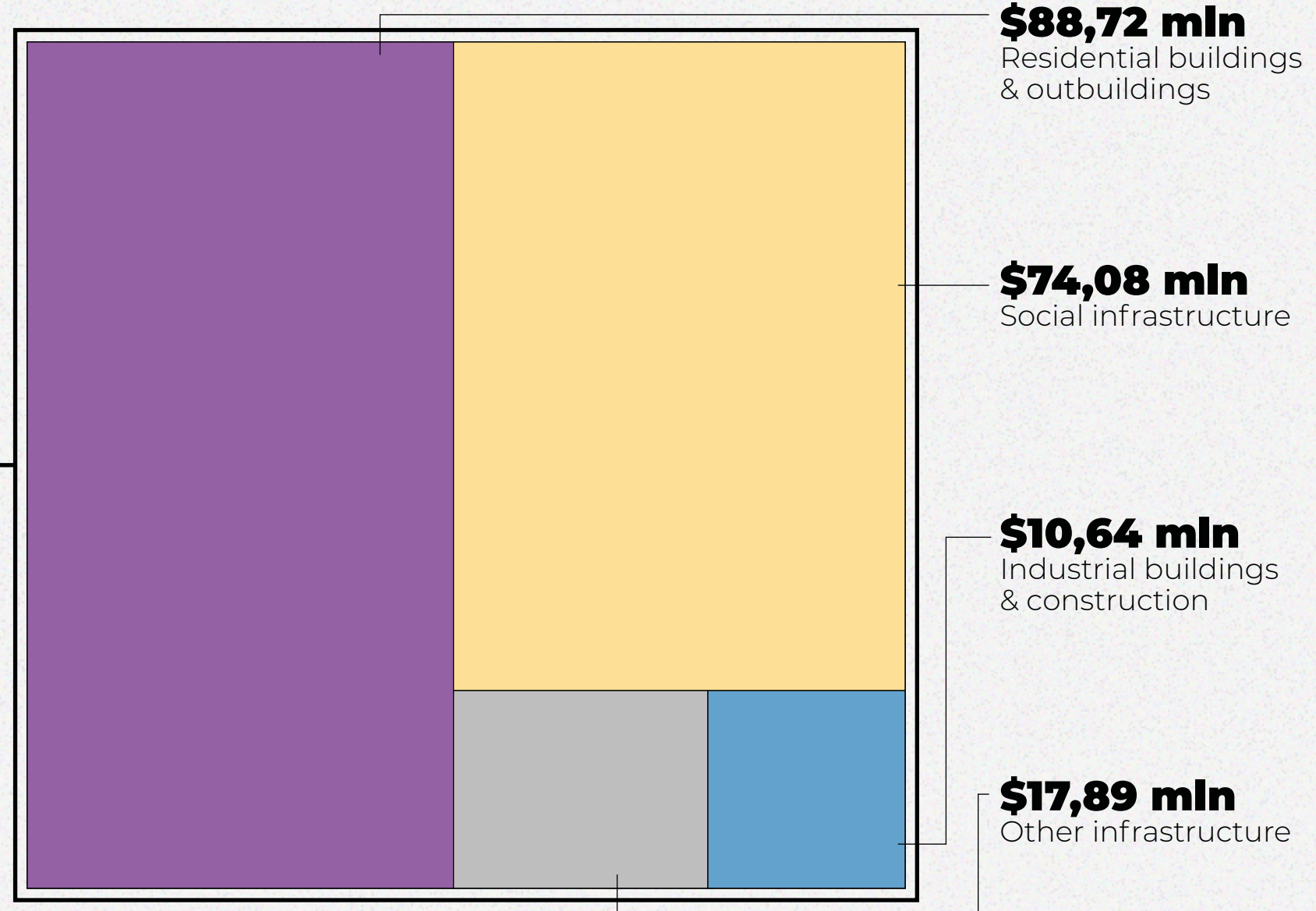
TYPES OF DESTROYED OBJECTS



ASSESSMENT OF DAMAGES

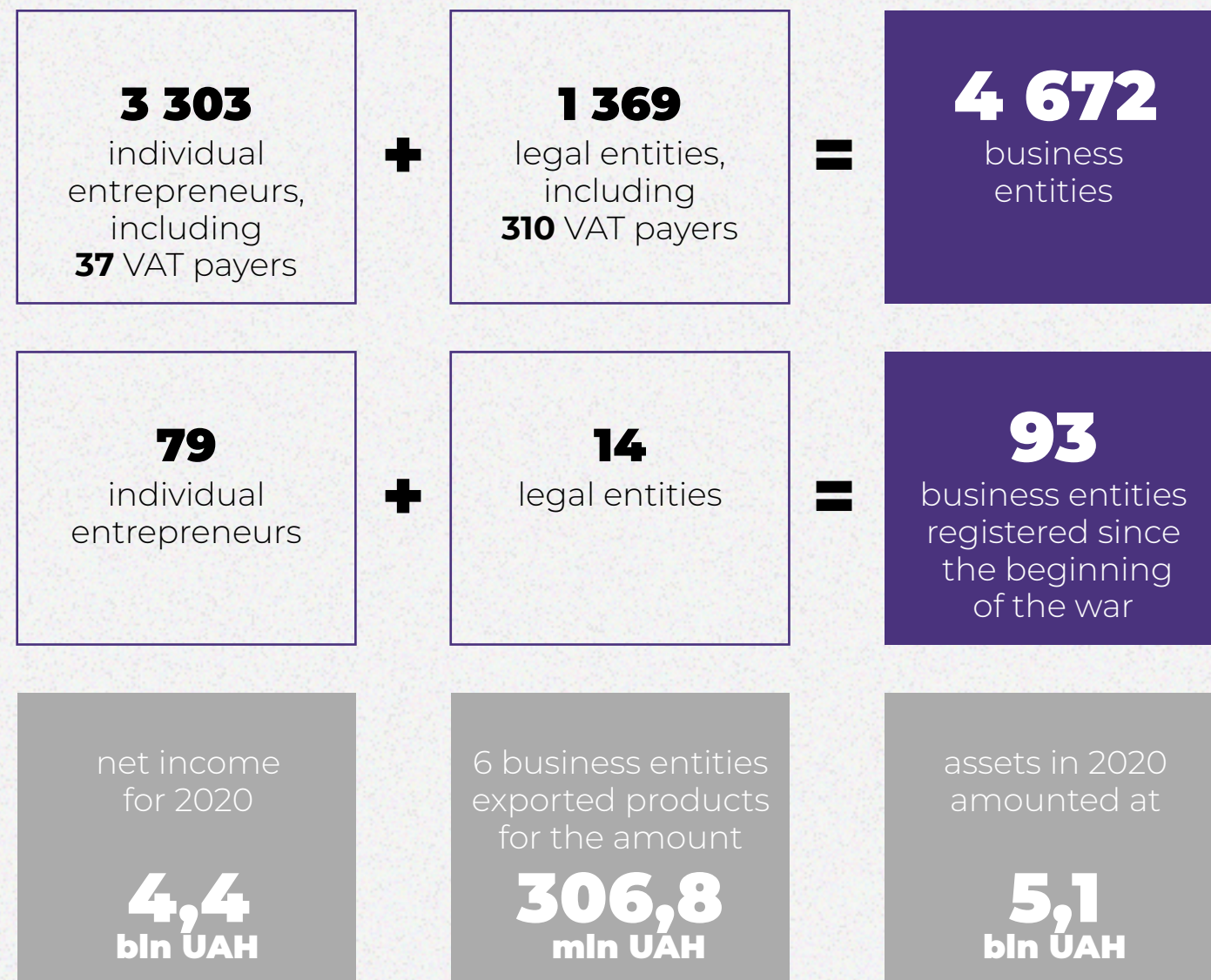
Damages by types of buildings

Total damages
\$191,3 mln
(5,2 bln UAH)

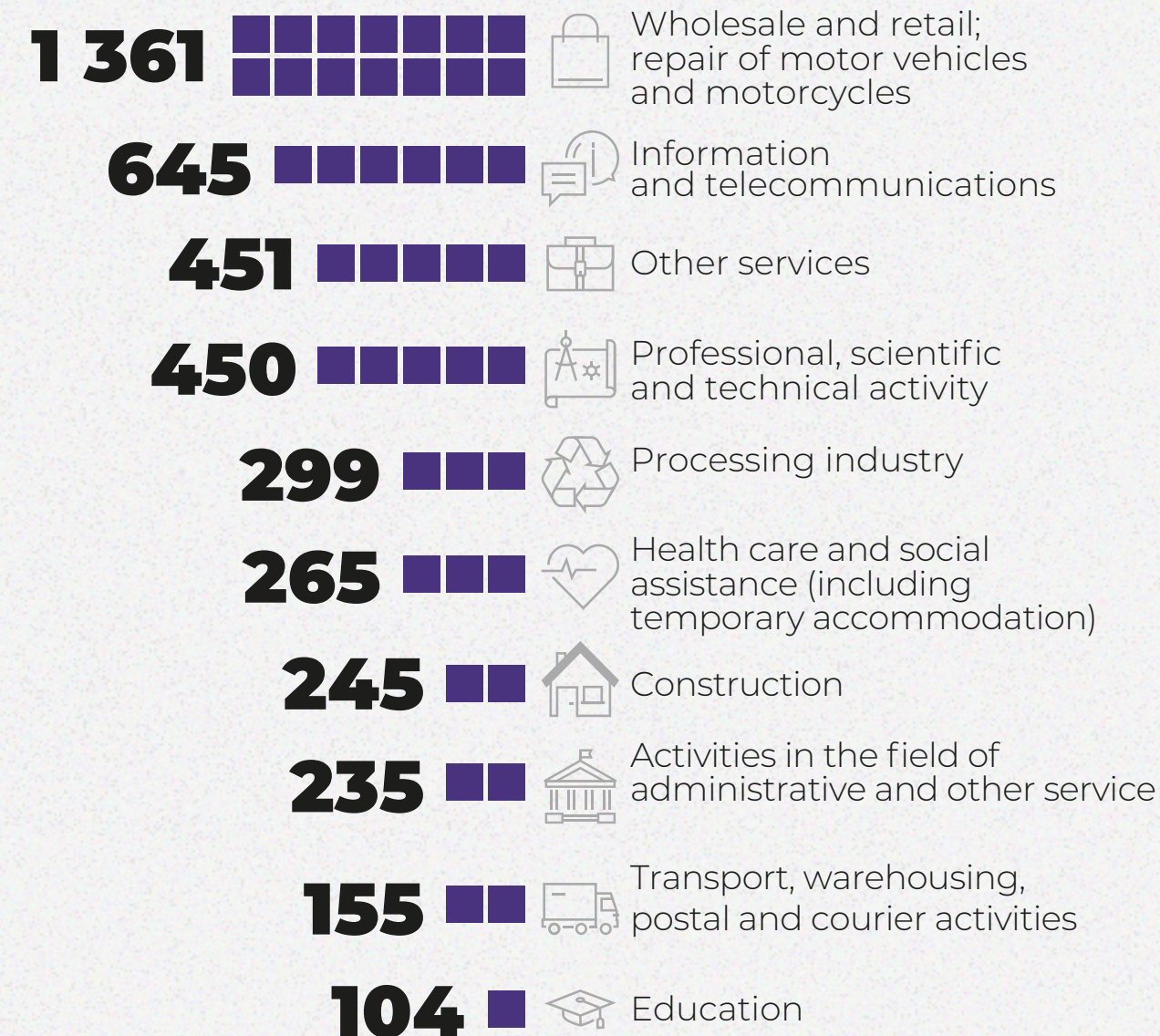


LOCAL BUSINESS ANALYSIS*

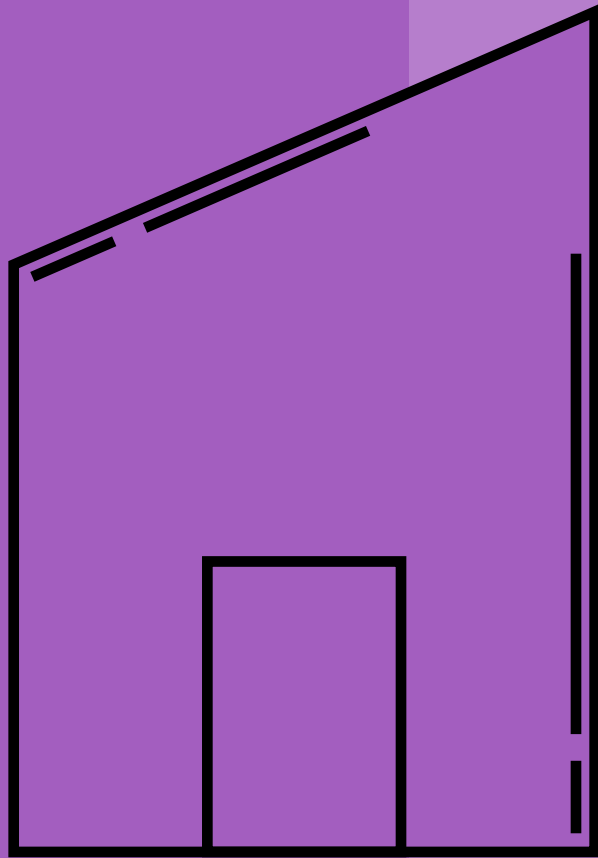
Characteristics of local business



Business by clusters of economy



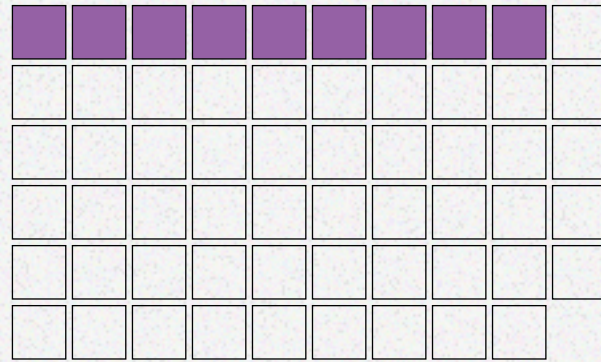
RESIDENTIAL BUILDINGS & OUTBUILDINGS



SCALE OF DESTRUCTION

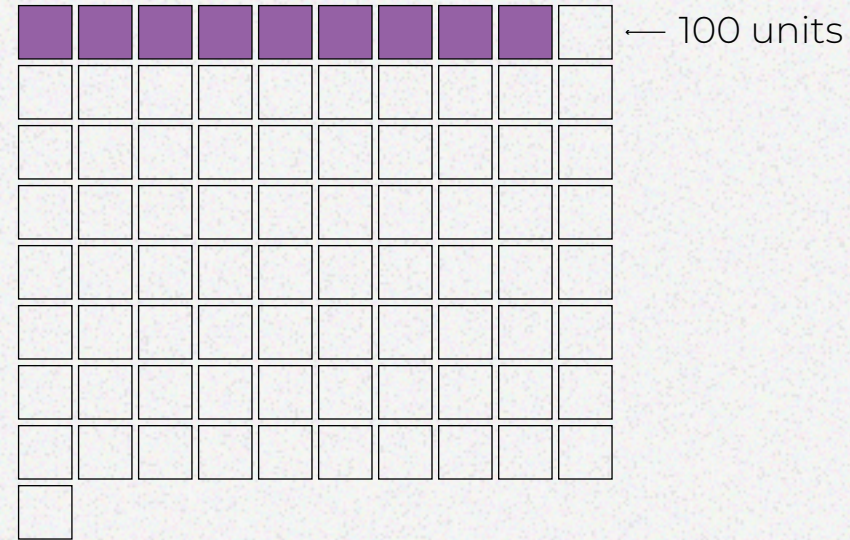
Residential buildings & outbuildings

Private houses



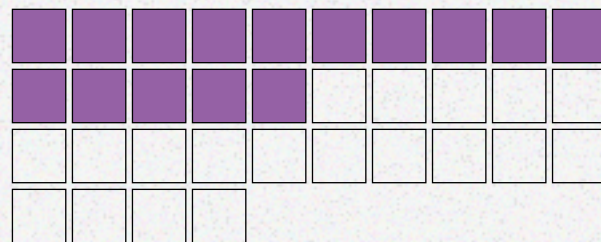
860
/ 5 943

Outbuildings



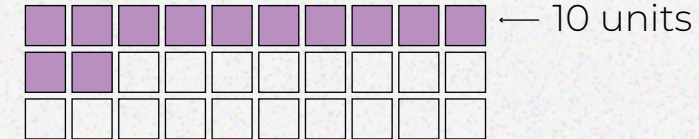
877
/ 8 119

Garages and parking spaces



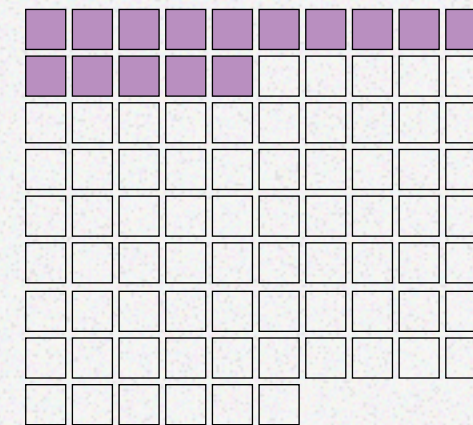
203
/ 3 386

Apartment buildings



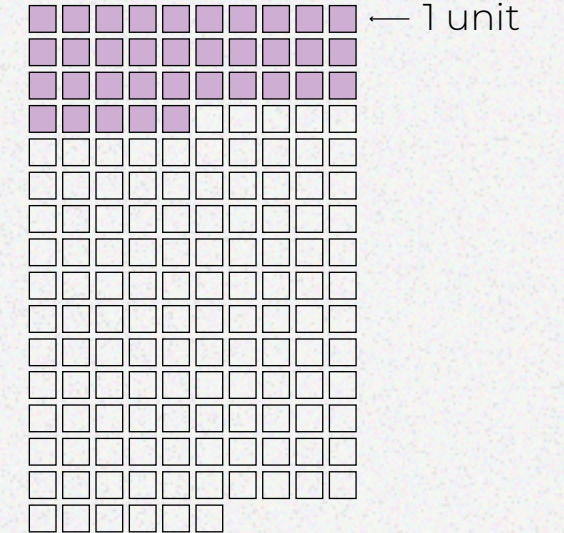
122
/ 281

Townhouses & duplexes



149
/ 859

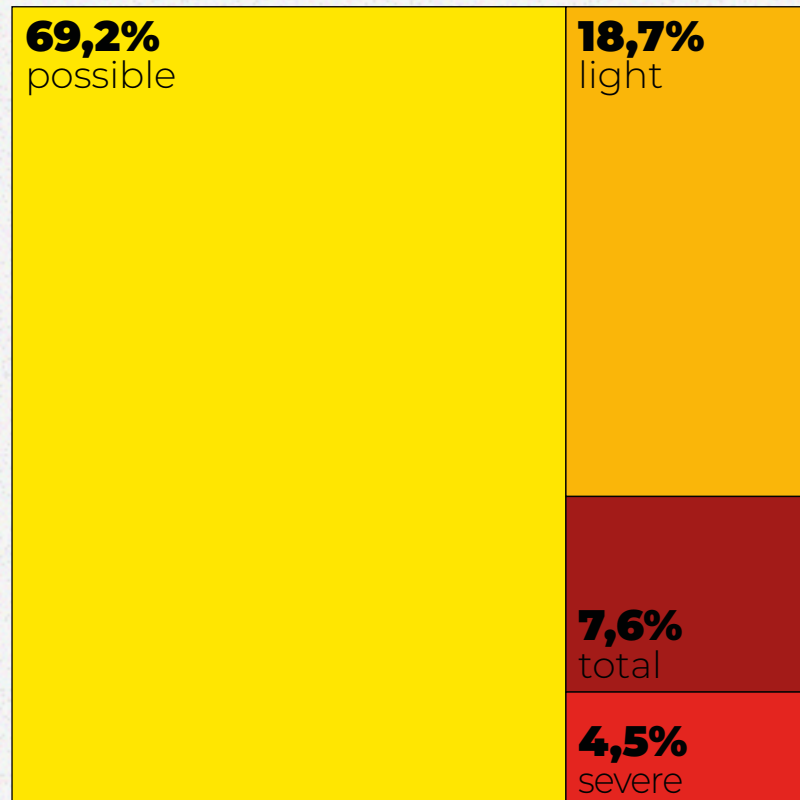
Greenhouses



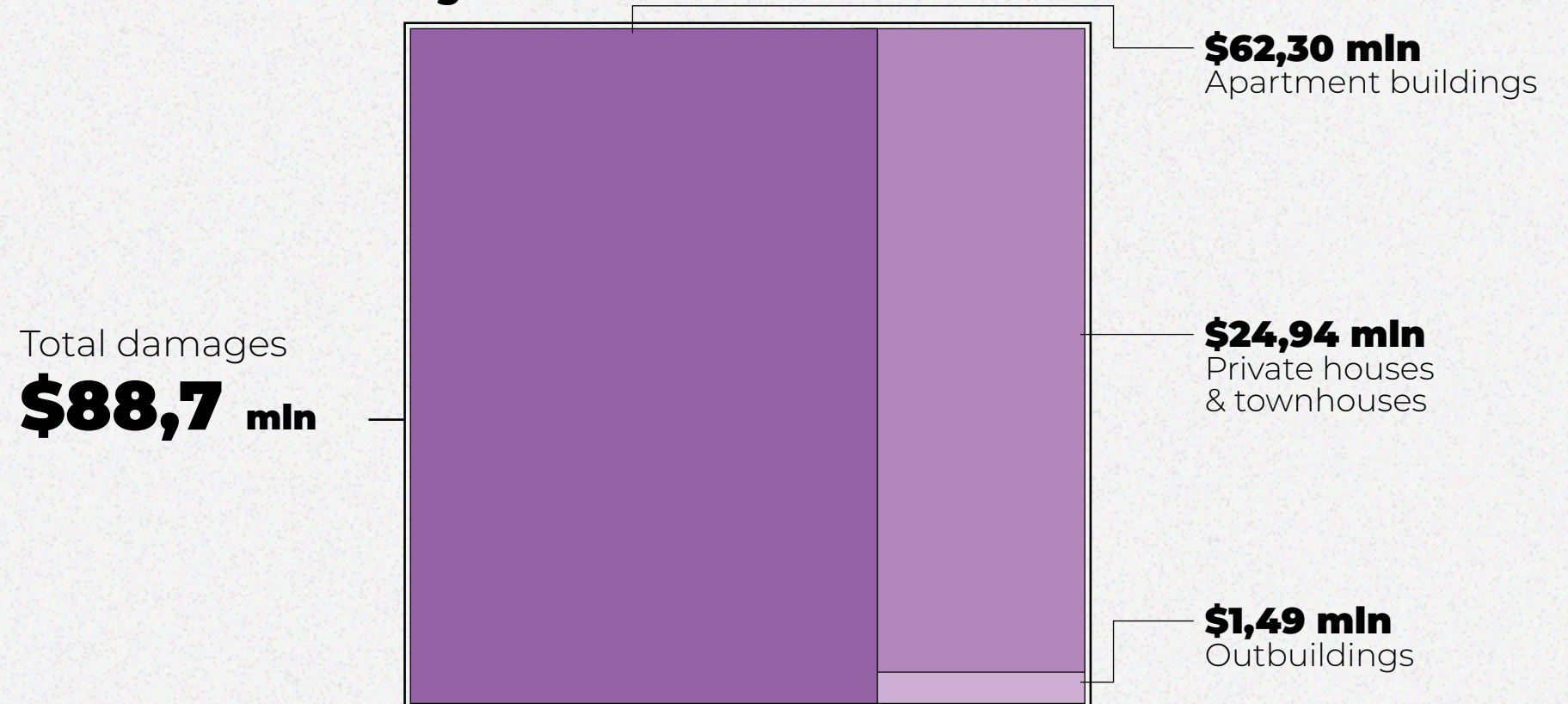
35
/ 156

SCALE OF DESTRUCTION

Level of destruction

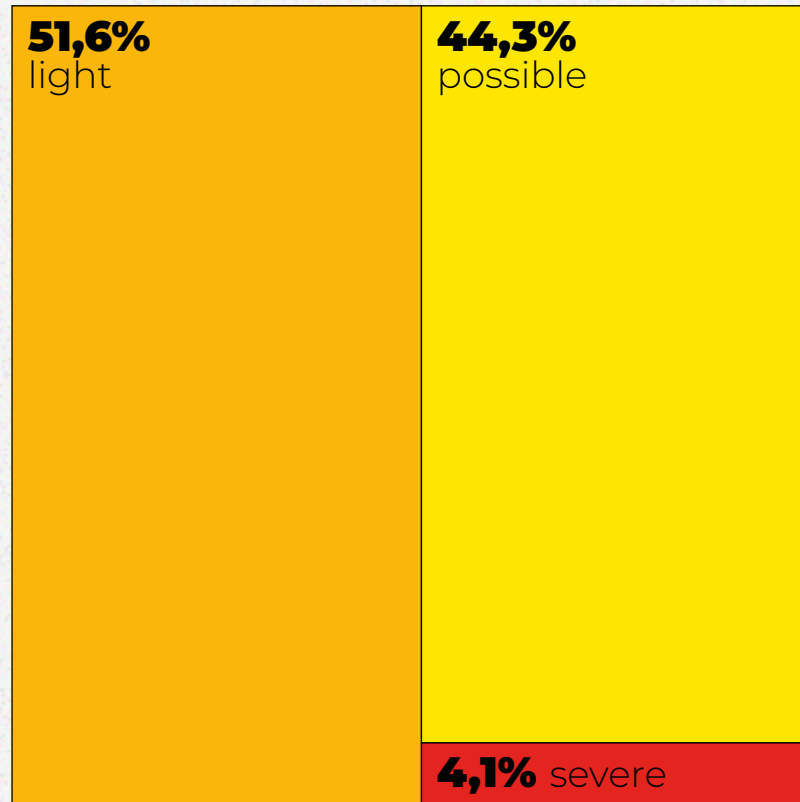


Assessment of damages



APARTMENT BUILDINGS

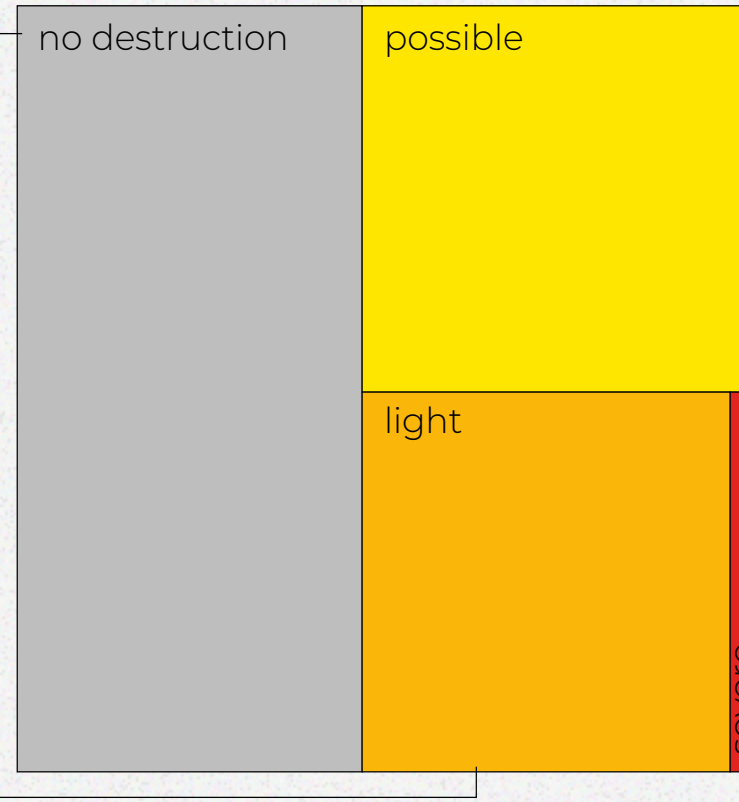
Level of destruction



Total damages
\$62,3 mln

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

732,8 ths m²
23 637 people



417,9 ths m²
13 483 people

381,3 ths m²
12 289 people

25,0 ths m²
807 people

Total area of damage
824,3 ths m²

Number of residents affected
26 589

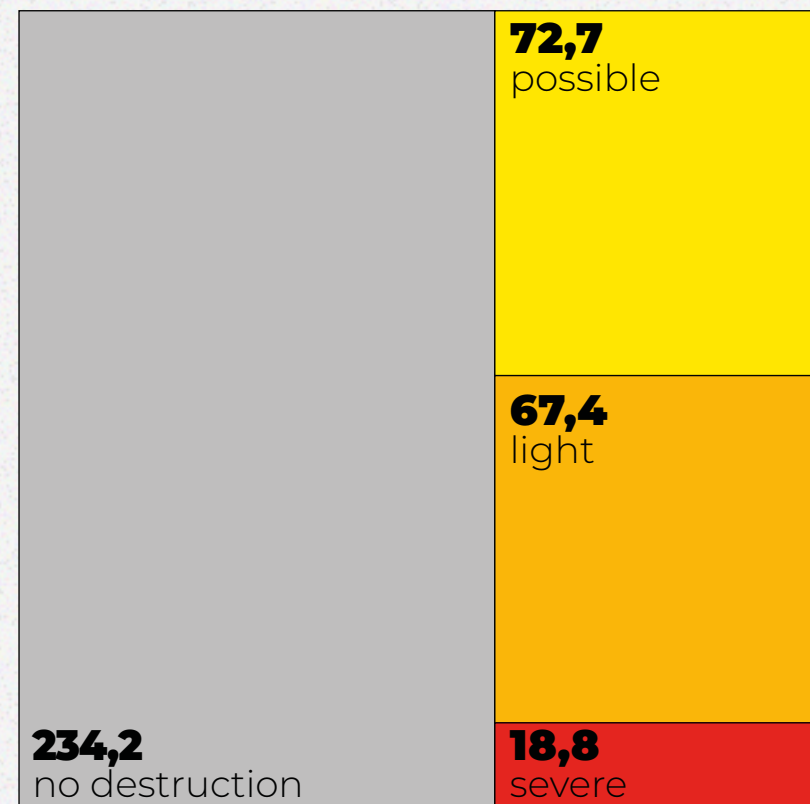
APARTMENT BUILDINGS

Area of destruction by number of floors



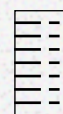
5 floors

(ths m²)



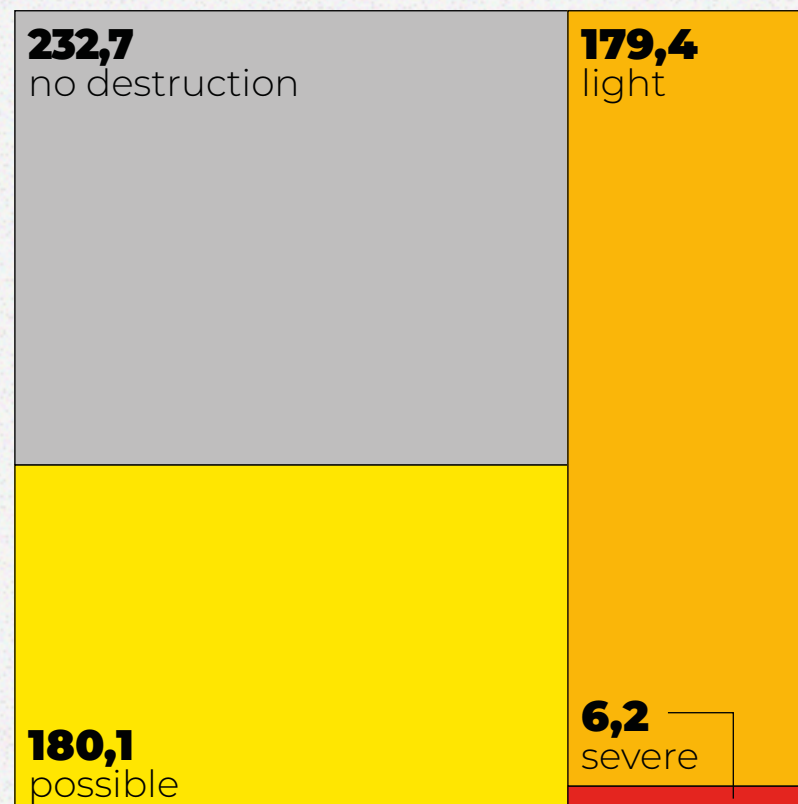
Total area of damage

158,8 ths m²



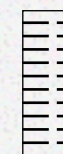
6-9 floors

(ths m²)



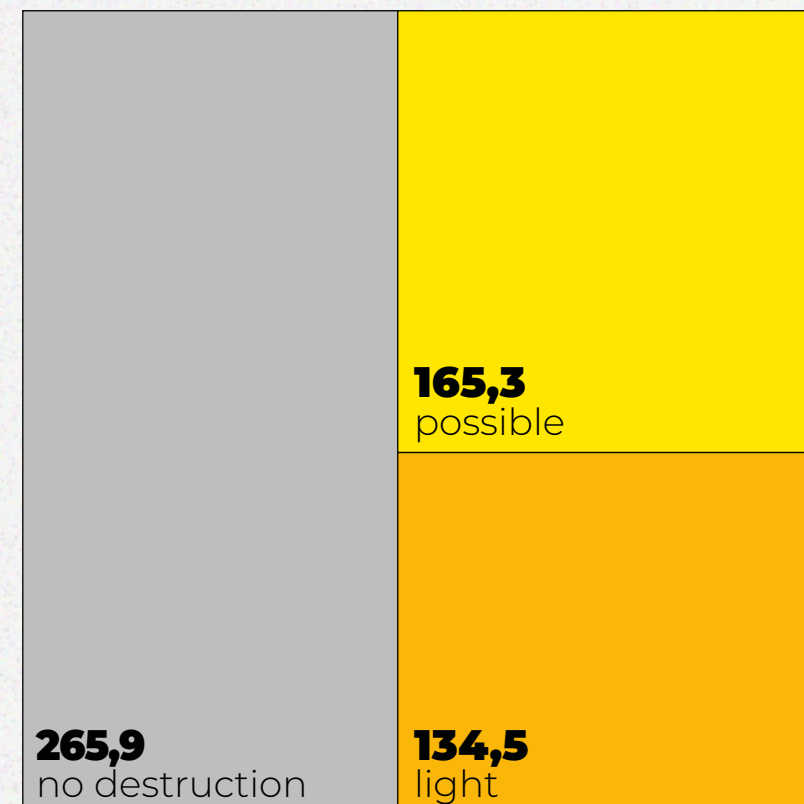
Total area of damage

365,7 ths m²



10+ floors

(ths m²)

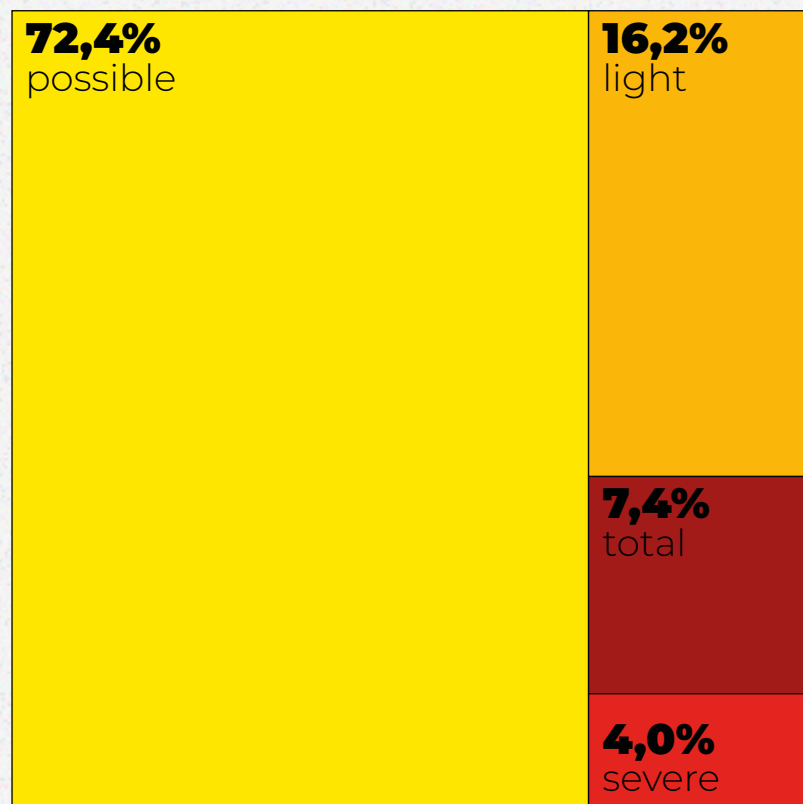


Total area of damage

299,8 ths m²

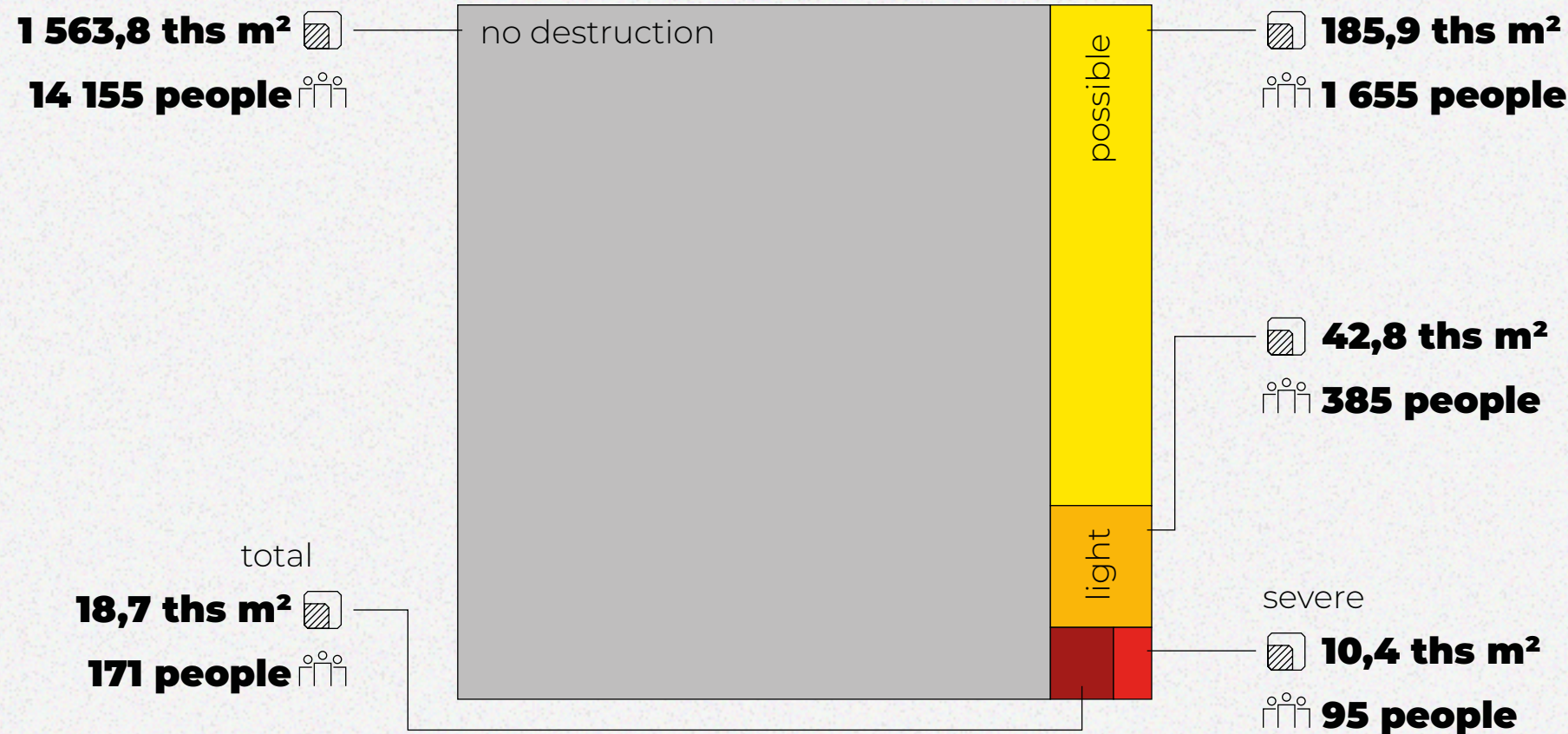
PRIVATE HOUSES & TOWNHOUSES

Level of destruction



Total damages
\$24,9 mln

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

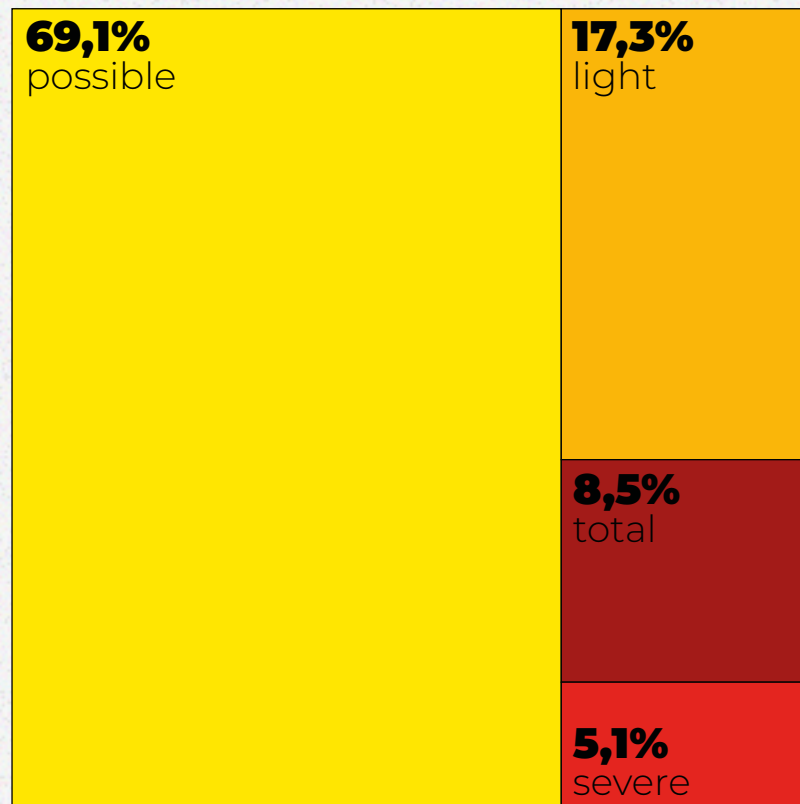


Total area of damage
257,8 ths m²

Number of residents affected
2 308

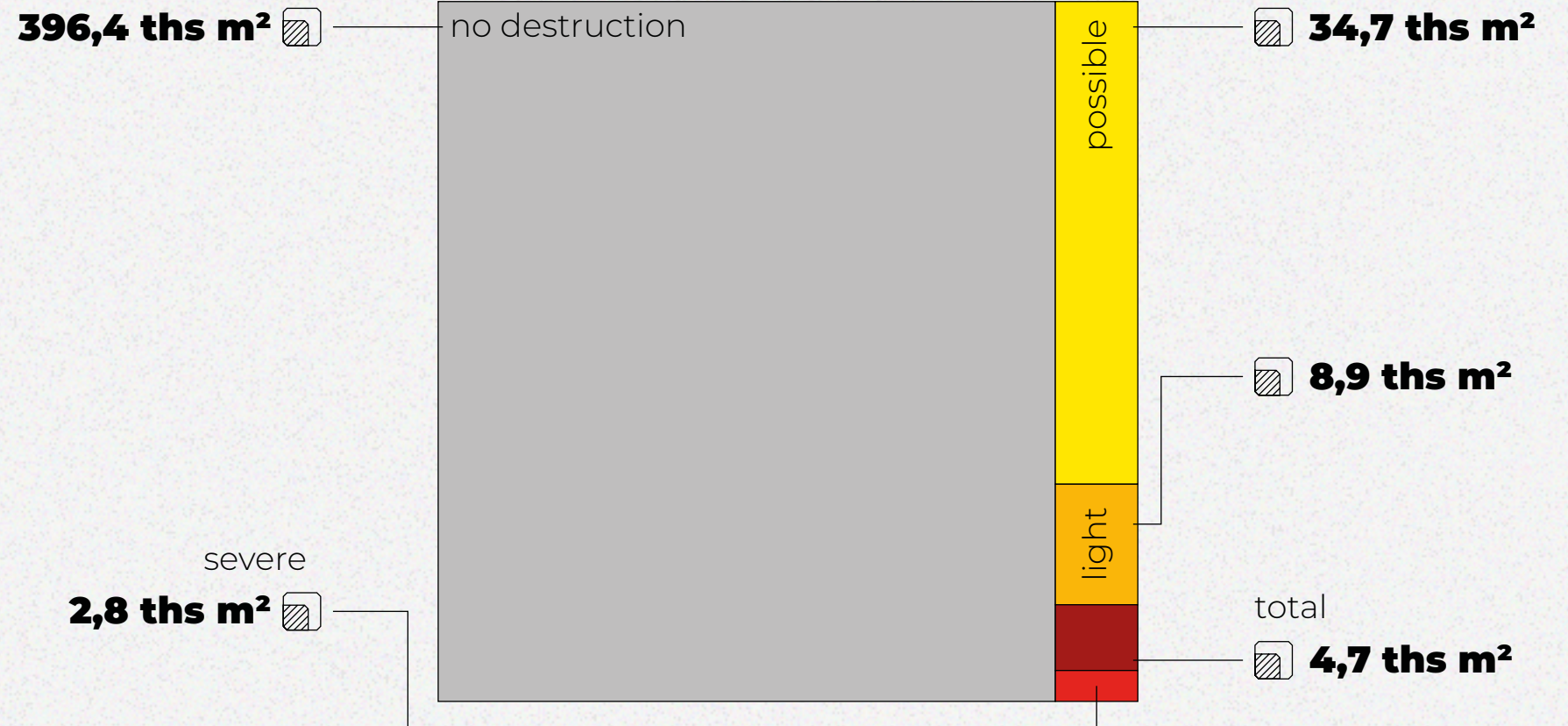
OUTBUILDINGS

Level of destruction



Total damages
\$1,5 mln

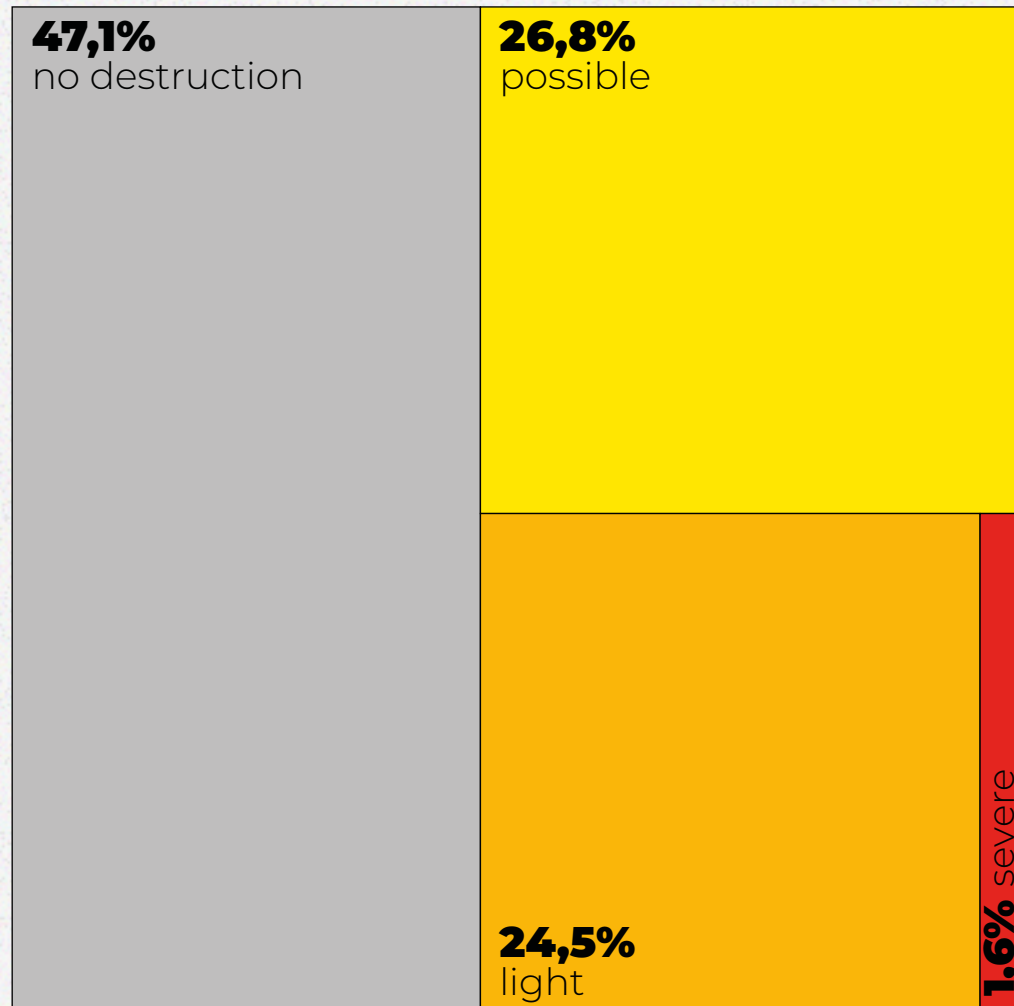
Area of destruction



Total area of damage
51,1 ths m²

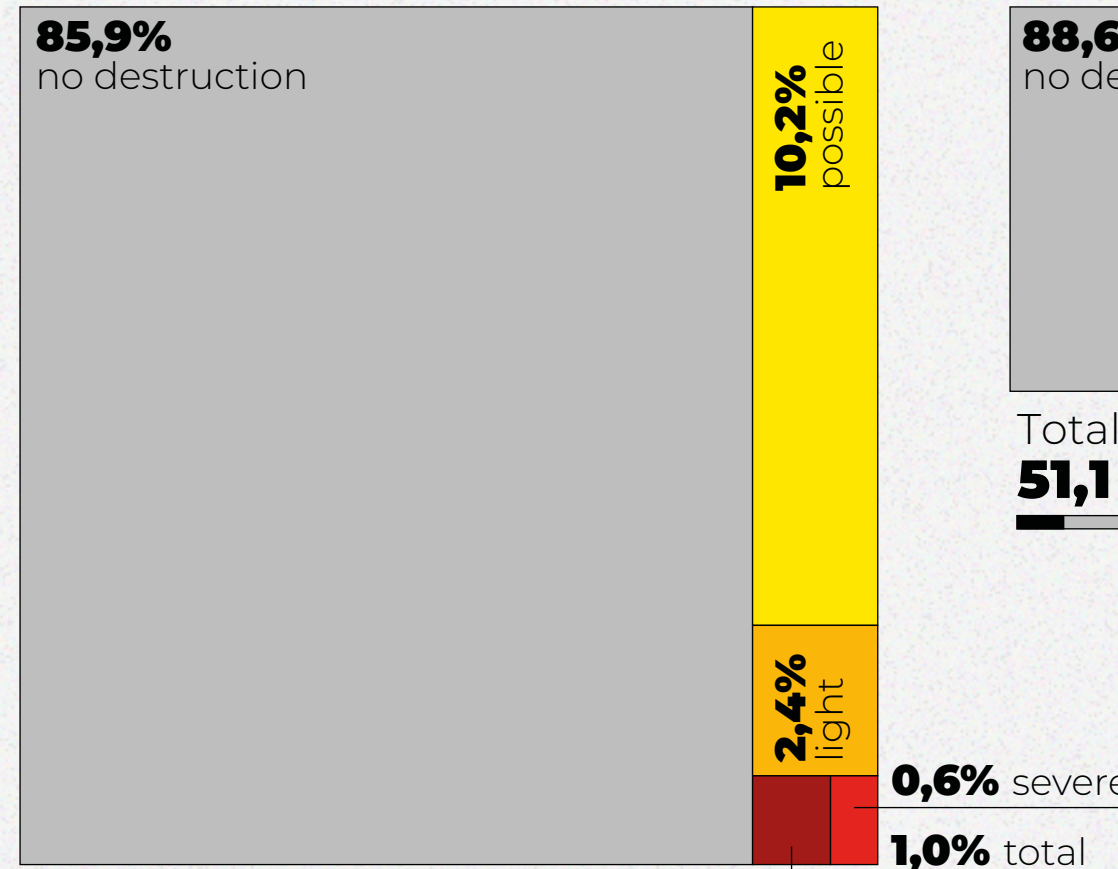
TOTAL AREA OF DESTRUCTION

Apartment buildings



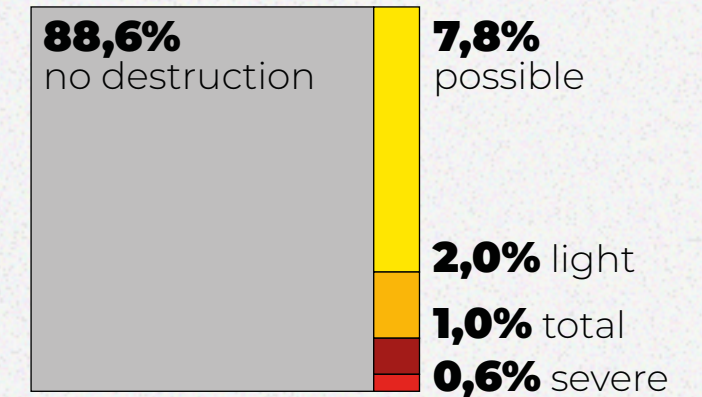
Total area of damage
824,3 ths m² / 1,6 mln m²

Private houses & townhouses



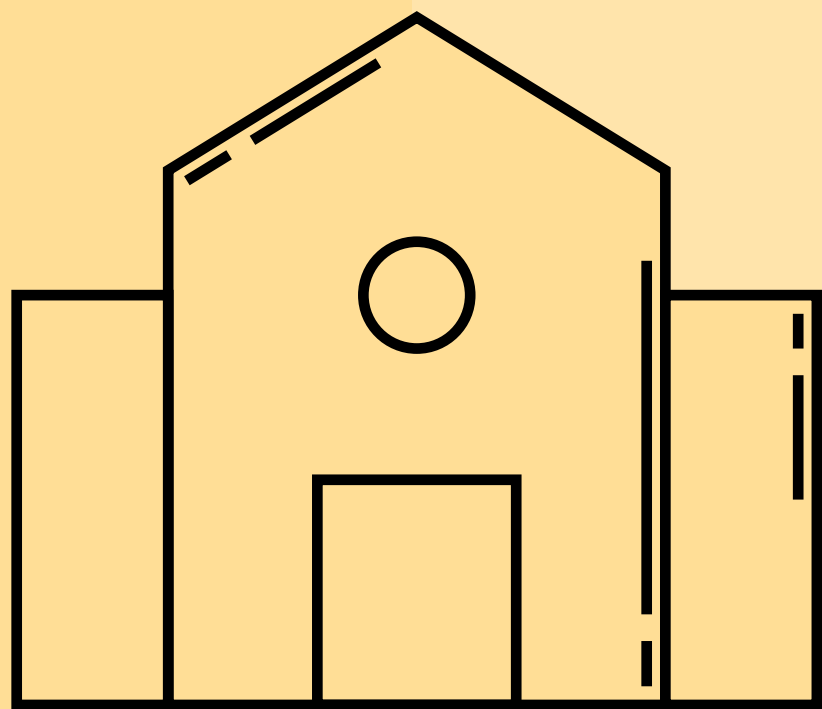
Total area of damage
257,9 ths m² / 1,8 mln m²

Outbuildings



Total area of damage
51,1 ths m² / 447,5 ths m²

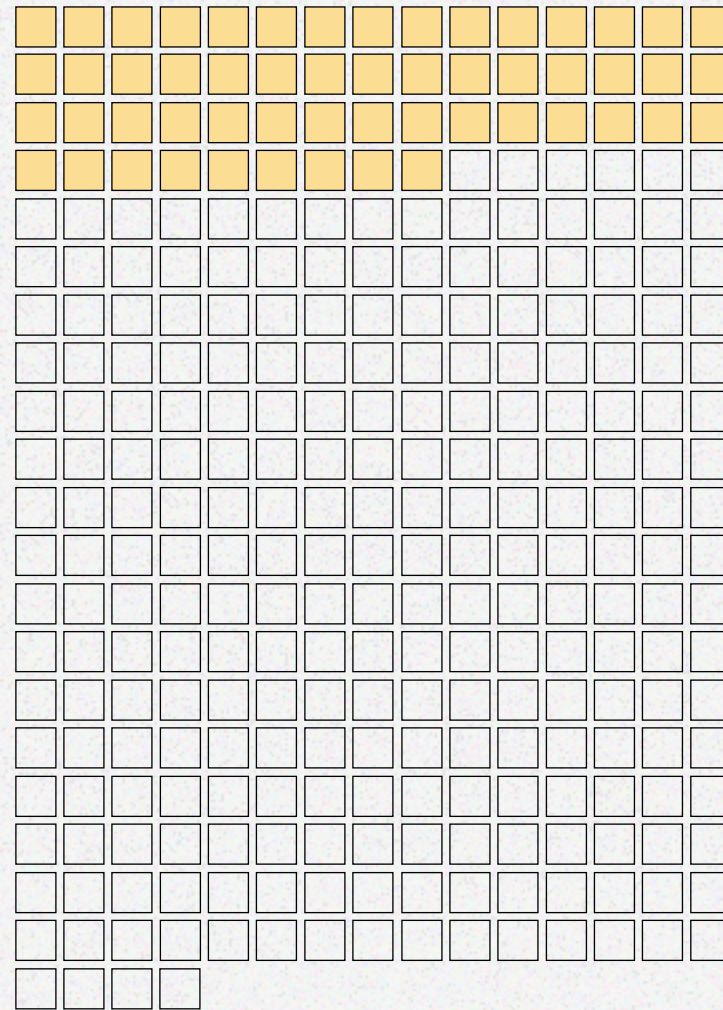
SOCIAL INFRASTRUCTURE



SCALE OF DESTRUCTION

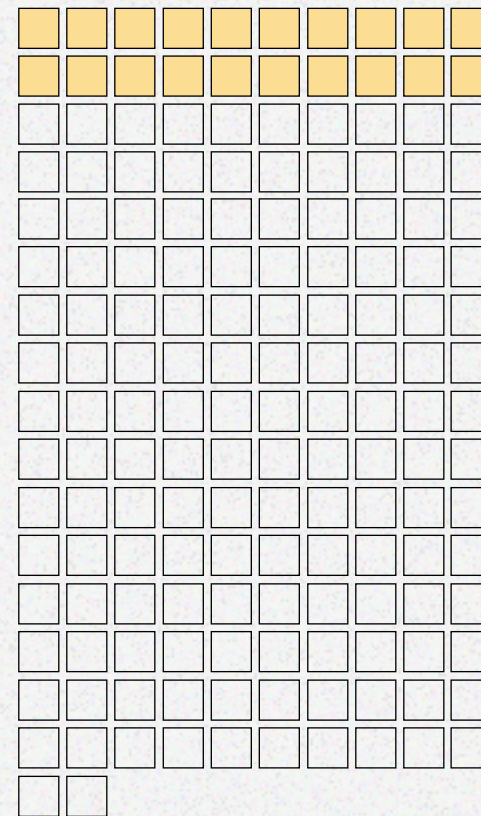
Social infrastructure

Trade and commerce



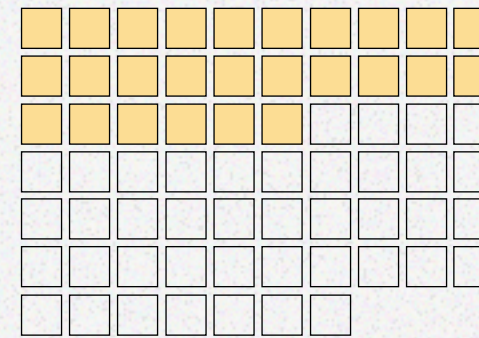
54 / 304

Buildings of general purpose



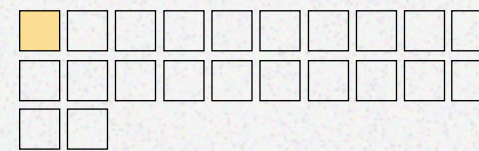
20 / 162

Educational institutions



26 / 67

Sports facilities



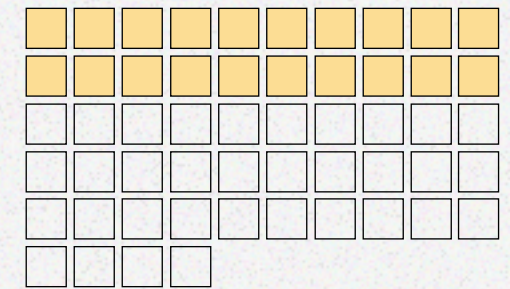
1 / 22

Offices and conference centers



3 / 8

Hotels and recreation facilities



20 / 54

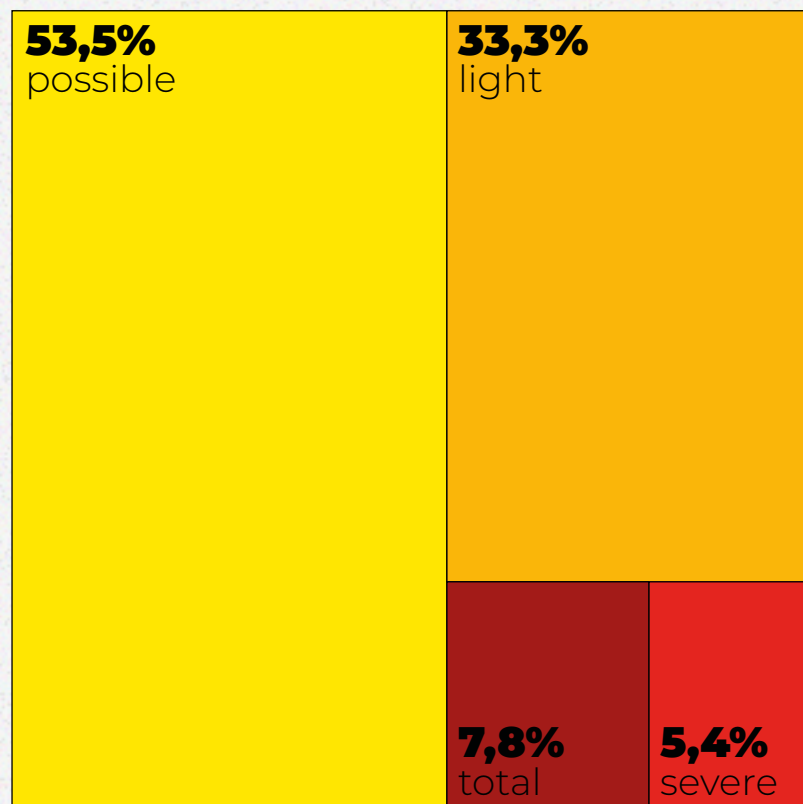
Culture and religion institutions



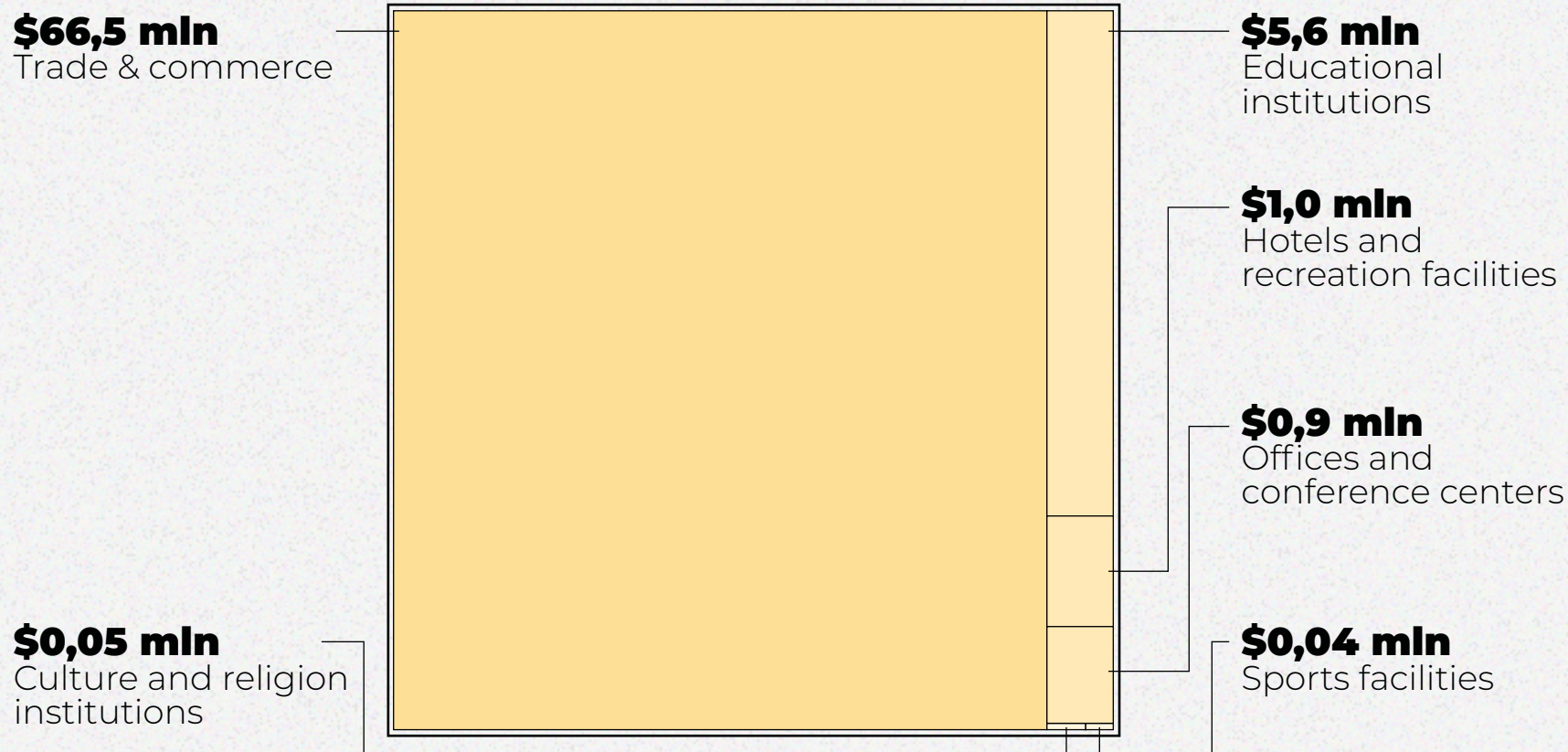
5 / 31

SCALE OF DESTRUCTION

Level of destruction



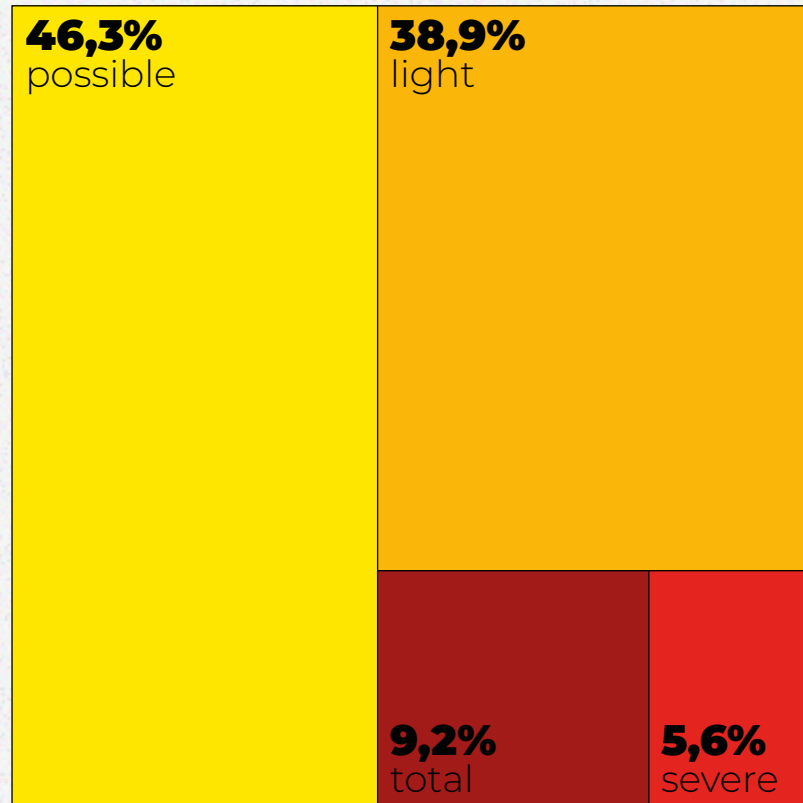
Assessment of damages



Total damages
\$74,1 mln

COMMERCIAL BUILDINGS

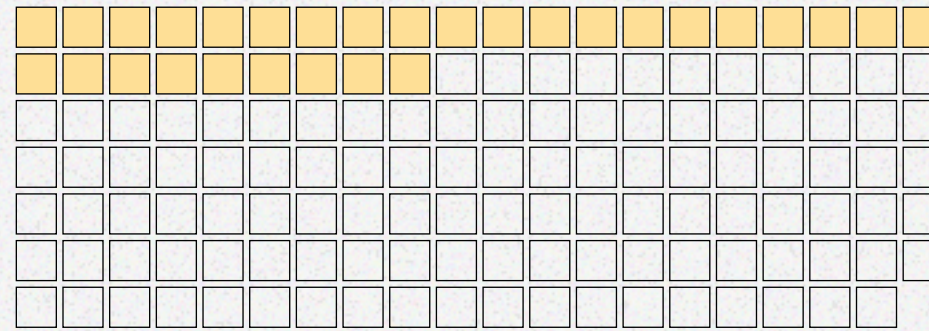
Level of destruction



Total damages
\$66,5 mln

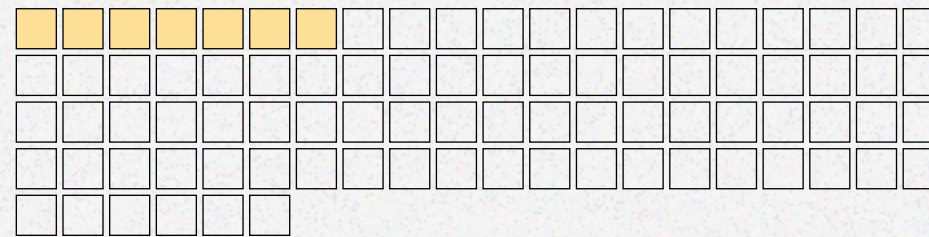
Scale of destruction

Commercial services and institutions



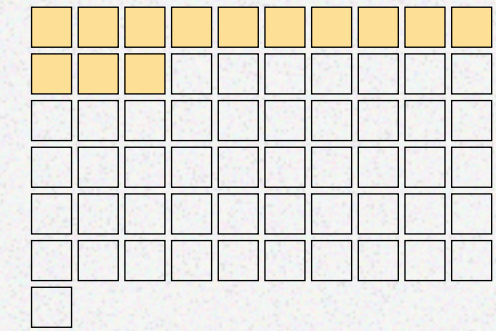
29 / 139

Grocery stores



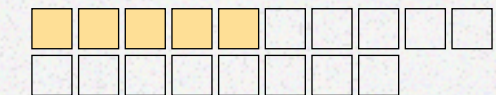
7 / 86

Trade



13 / 61

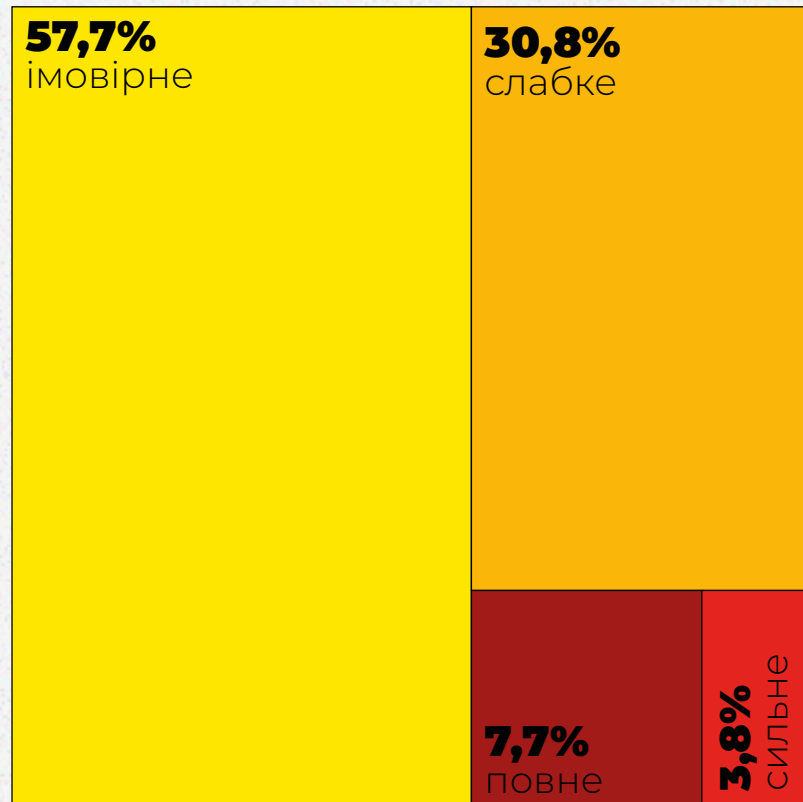
Cafes & restaurants



5 / 18

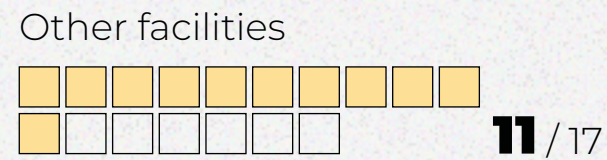
EDUCATIONAL INSTITUTIONS

Level of destruction



Total damages
\$5,6 mln

Scale of destruction



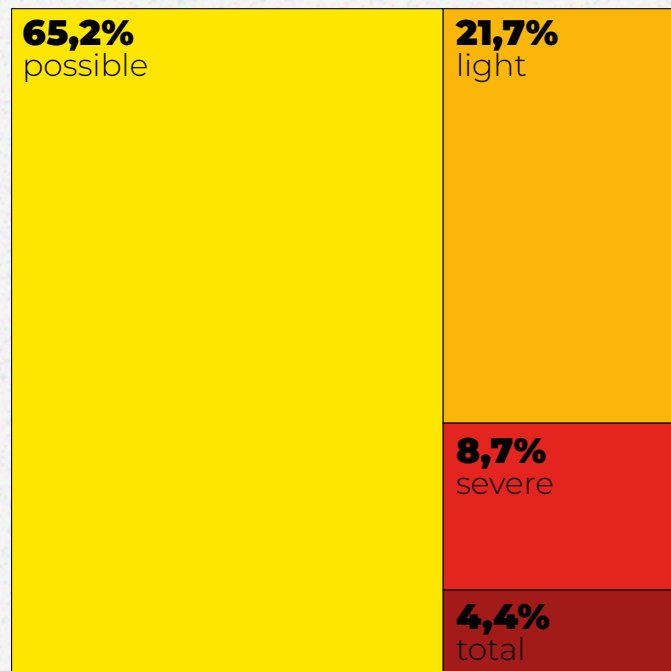
Local school



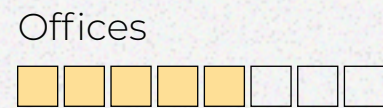
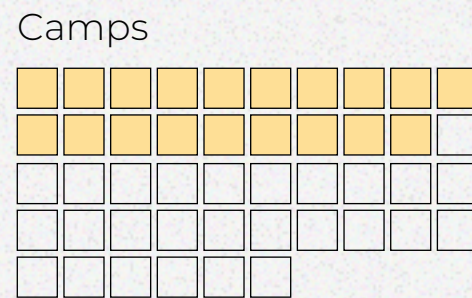
OTHER BUILDINGS

Recreation, hotels, offices

Level of destruction



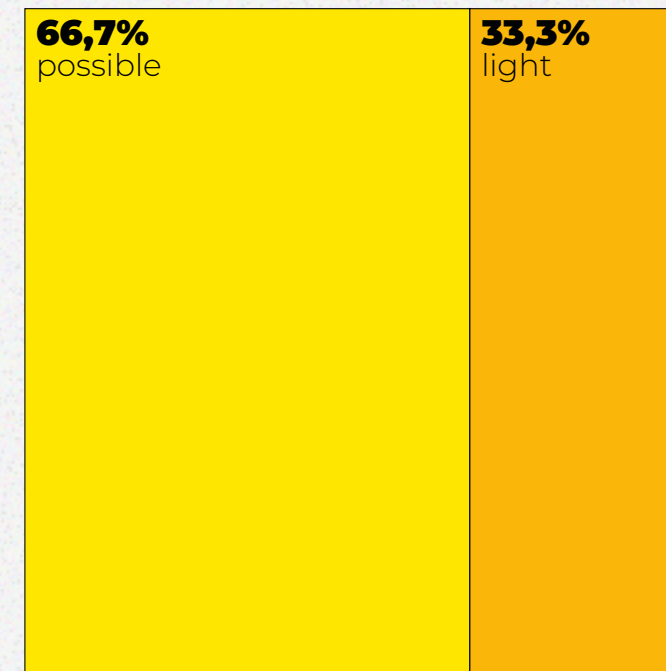
Scale of destruction



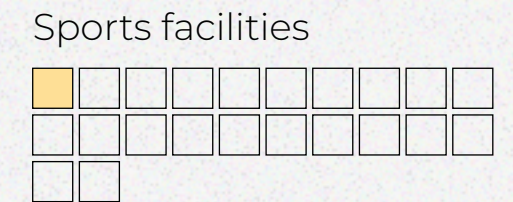
Total damages
\$1,9 mln

Culture, religion, sports facilities

Level of destruction

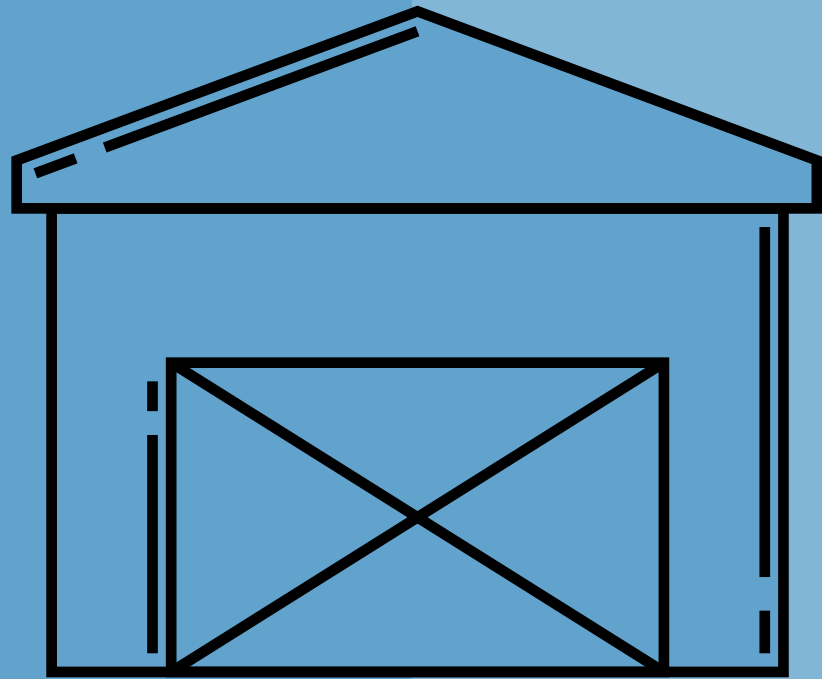


Scale of destruction



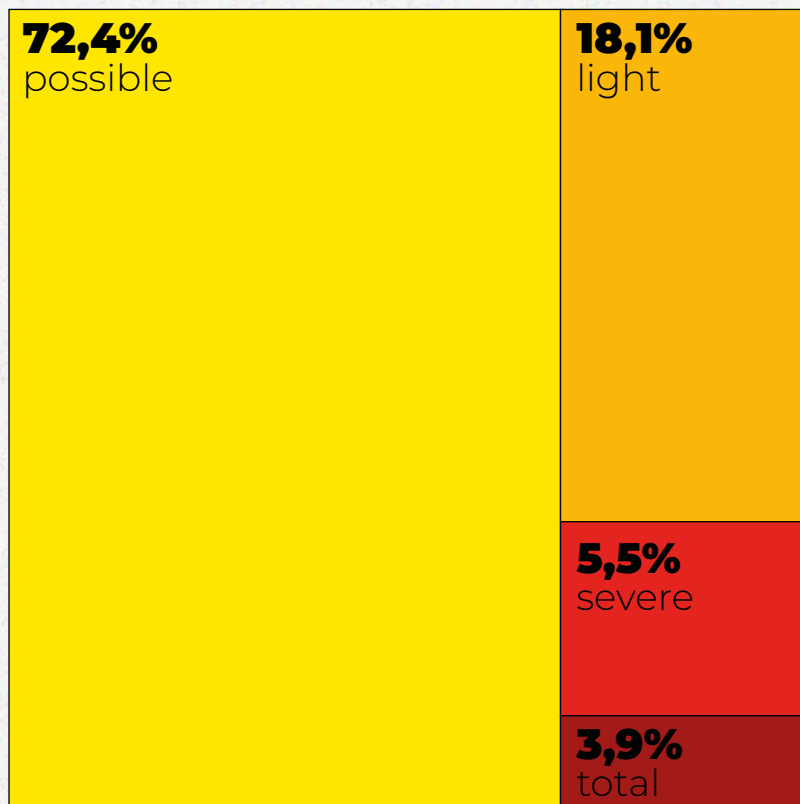
Total damages
\$0,09 mln

INDUSTRIAL BUILDINGS & CONSTRUCTION



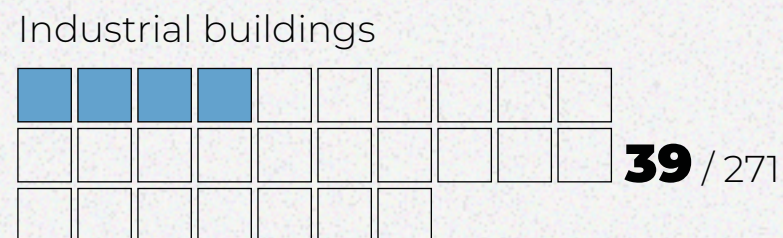
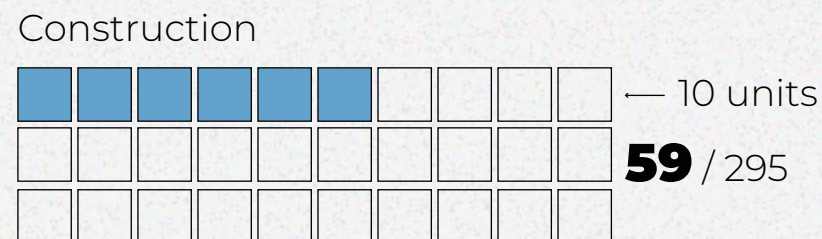
SCALE OF DESTRUCTION

Level of destruction



Total damages
\$10,6 mln

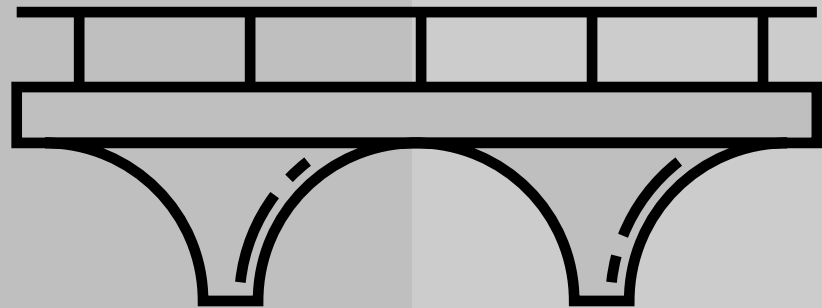
Scale of destruction



Industrial object

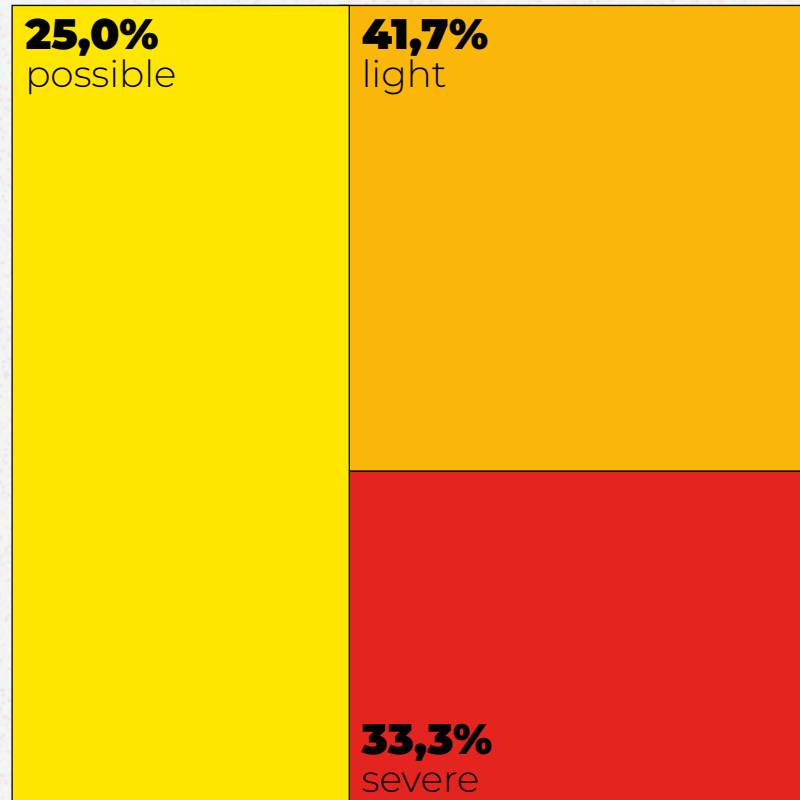


OTHER INFRASTRUCTURE



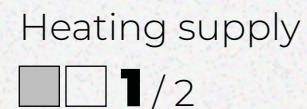
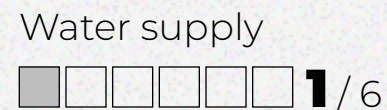
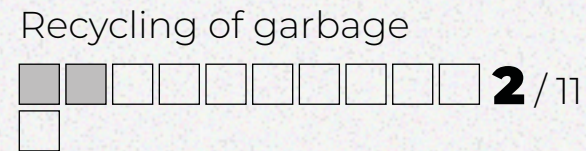
SCALE OF DESTRUCTION

Level of destruction



Total damages
\$17,9 mln

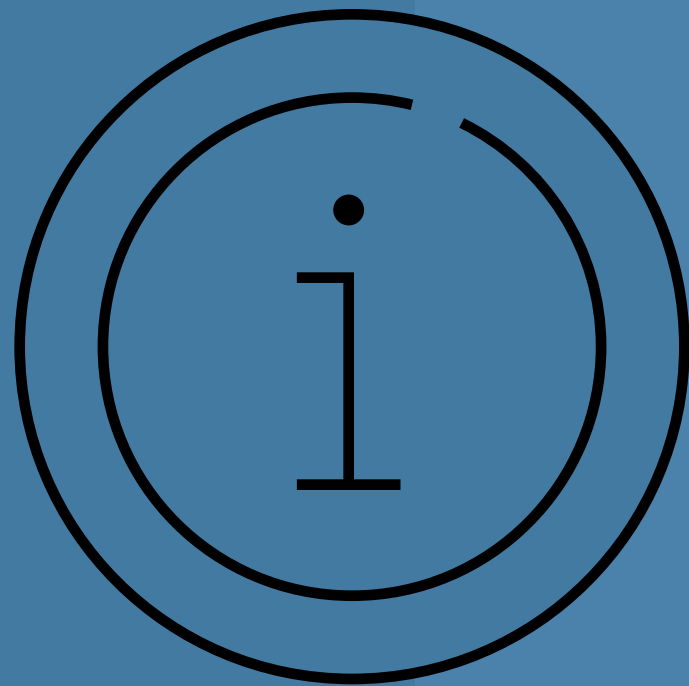
Scale of destruction



Boiler house



METHODOLOGIES & 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



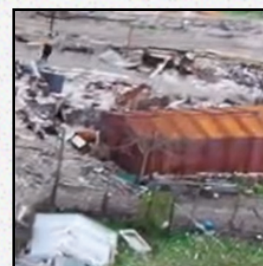
Large objects

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



Supermarket



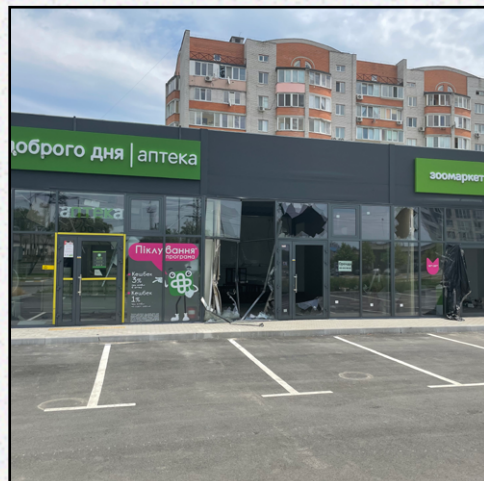
Private house



Garage



Commercial objects



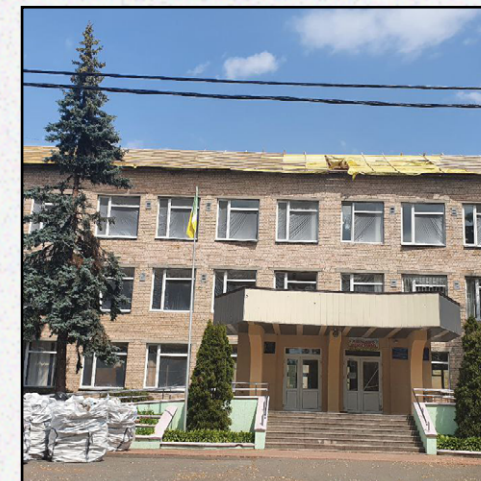
Apartment building



Apartment building



School



Commercial object



BUCHA THROUGH THE EYES OF BEHOLDERS

Mass graves and destruction in Bucha and Hostomel



Devastation and Loss in Bucha, Ukraine.
Life for Civilians in a Town Encircled by Russian Forces



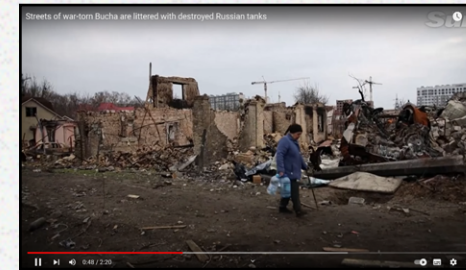
Ukraine war: Bucha street littered with burned-out tanks and corpses



In Bucha, death, devastation and a graveyard of mines



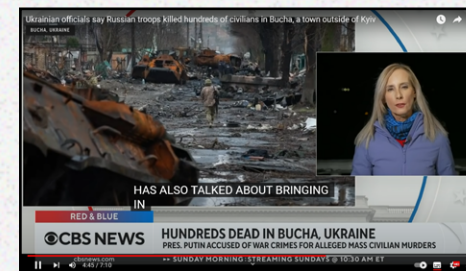
Bodies tied up, shot and left to rot in Bucha hint at gruesome reality of Russia's occupation in Ukraine



Streets of war-torn Bucha are littered with destroyed Russian tanks



Zelensky visits battered Bucha, fears of widespread civilian massacres



Ukrainian officials say Russian troops killed hundreds of civilians in Bucha, a town outside of Kyiv



Drone footage shows destroyed apartment complex in Bucha, Ukraine



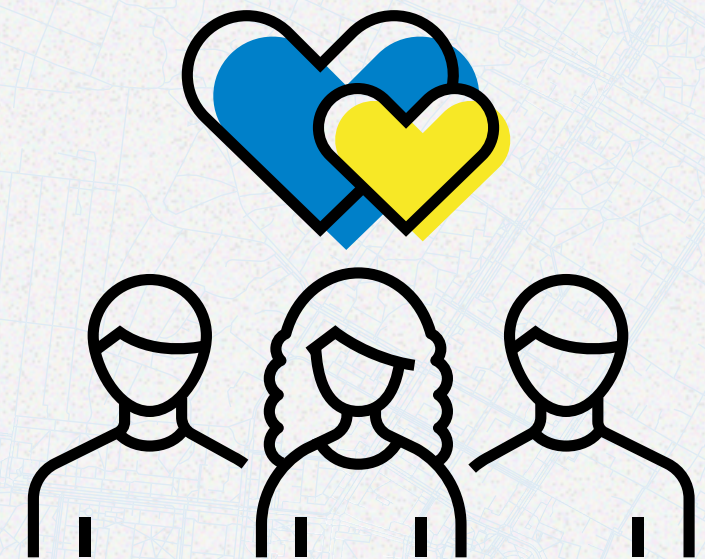
GRATITUDE TO VOLUNTEERS

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.

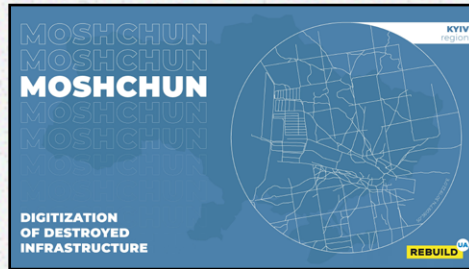
These people helped RebuildUA to digitize the destruction of Bucha:

Anton Hagen
Kolya Gorokhov
Lidia Davybida
Alina Yerkeeva
Anna Zelinska
Kateryna Kapuschak
Kevin Casey
Kateryna Kulyk
Tatyana Kupach

Maxim Lazavenko
Anna Lomonos
Maria Lyashchenko
Oleksandr Nabilskyi
Vladyslav Poda
Serhiy Ponomarenko
Anya Solianyuk
Sofia Yarytska



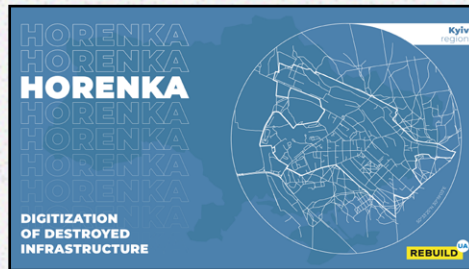
PREVIOUS REPORTS



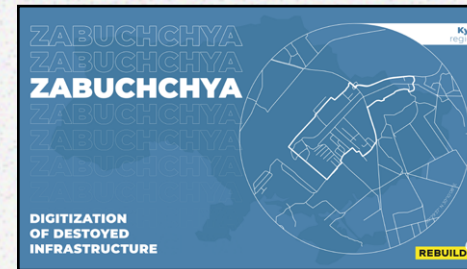
Moshchun,
Buchanskyi district,
Kyiv region



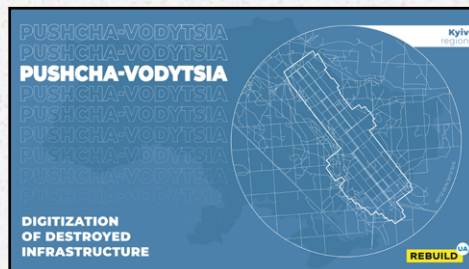
Ozera,
Borodianskyi district,
Kyiv region



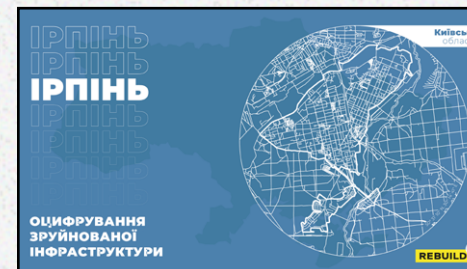
Horenka,
Buchanskyi district,
Kyiv region



Zabuchchya,
Buchanskyi district,
Kyiv region



Pushcha-Vodytsia,
district of Kyiv



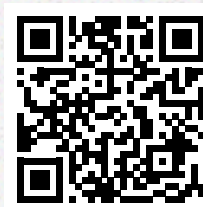
Irpın,
Buchanskyi district,
Kyiv region



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 damages, 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

Supported by:



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УКРАЇНИ



ДЕПАРТАМЕНТ
МІСТОБУДУВАННЯ
ТА АРХІТЕКТУРИ



ODGERS
BERNDTSON

KERNEL



ОТГ
ВСЕУКРАЇНЬКА
АСОЦІАЦІЯ