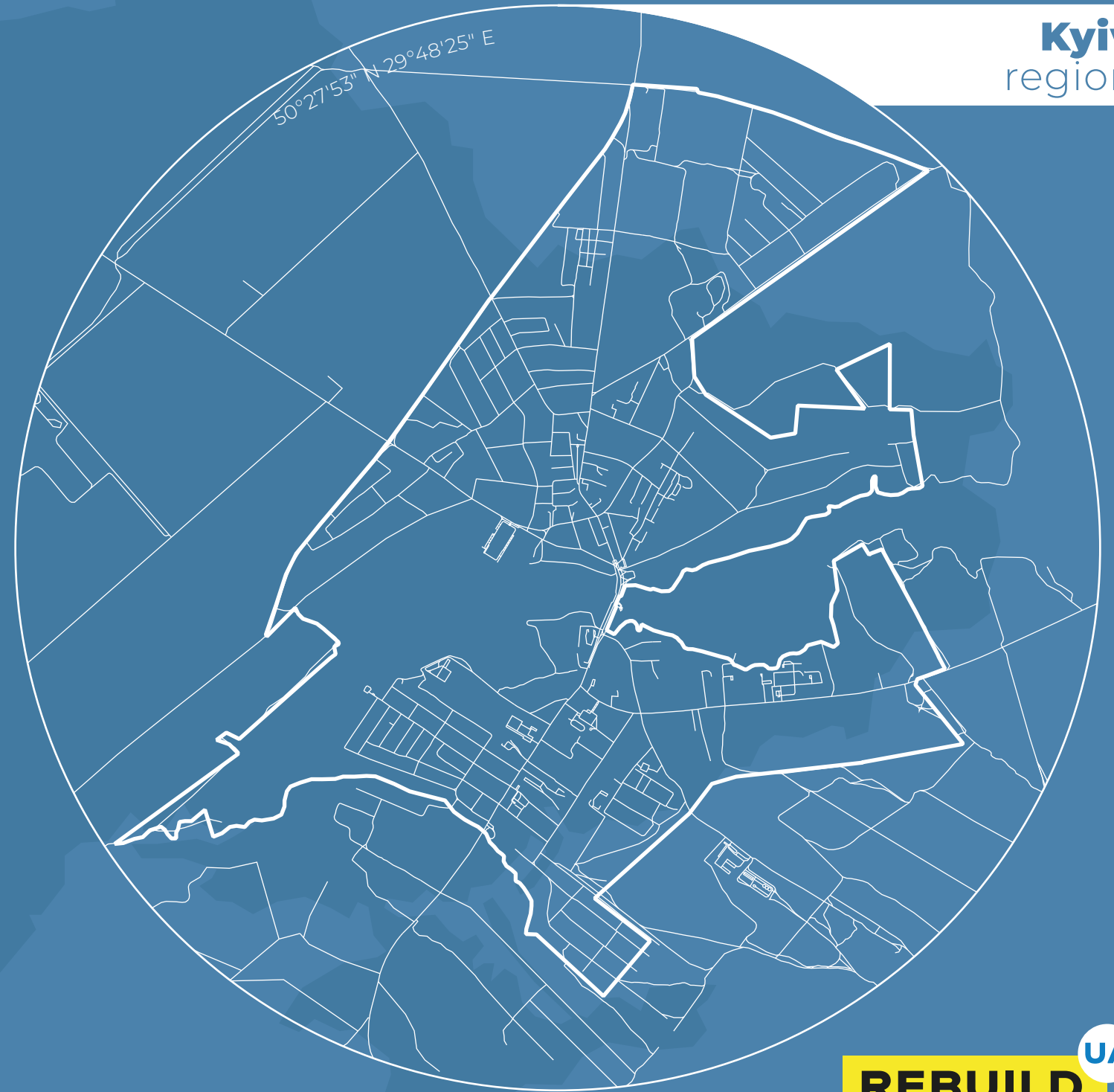


MAKARIV
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**DIGITIZATION
OF DESTROYED
INFRASTRUCTURE**

Kyiv
region



REBUILD 

ABOUT THE PROJECT

Background

The Russian aggression has caused a large amount of damage and destruction in almost all regions of Ukraine — housing and infrastructure have been destroyed, and 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:



The initiative is being financially and technically supported by the United Nations Development Programme in Ukraine.

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

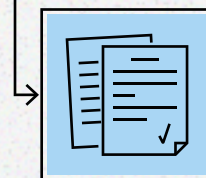
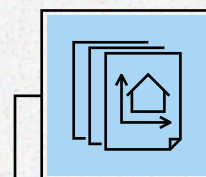
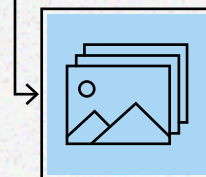
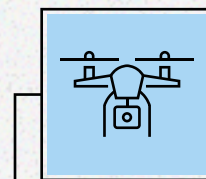
To ensure completeness of the input data, the project team captures photos and videos, as well as collects additional information from verified sources.

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

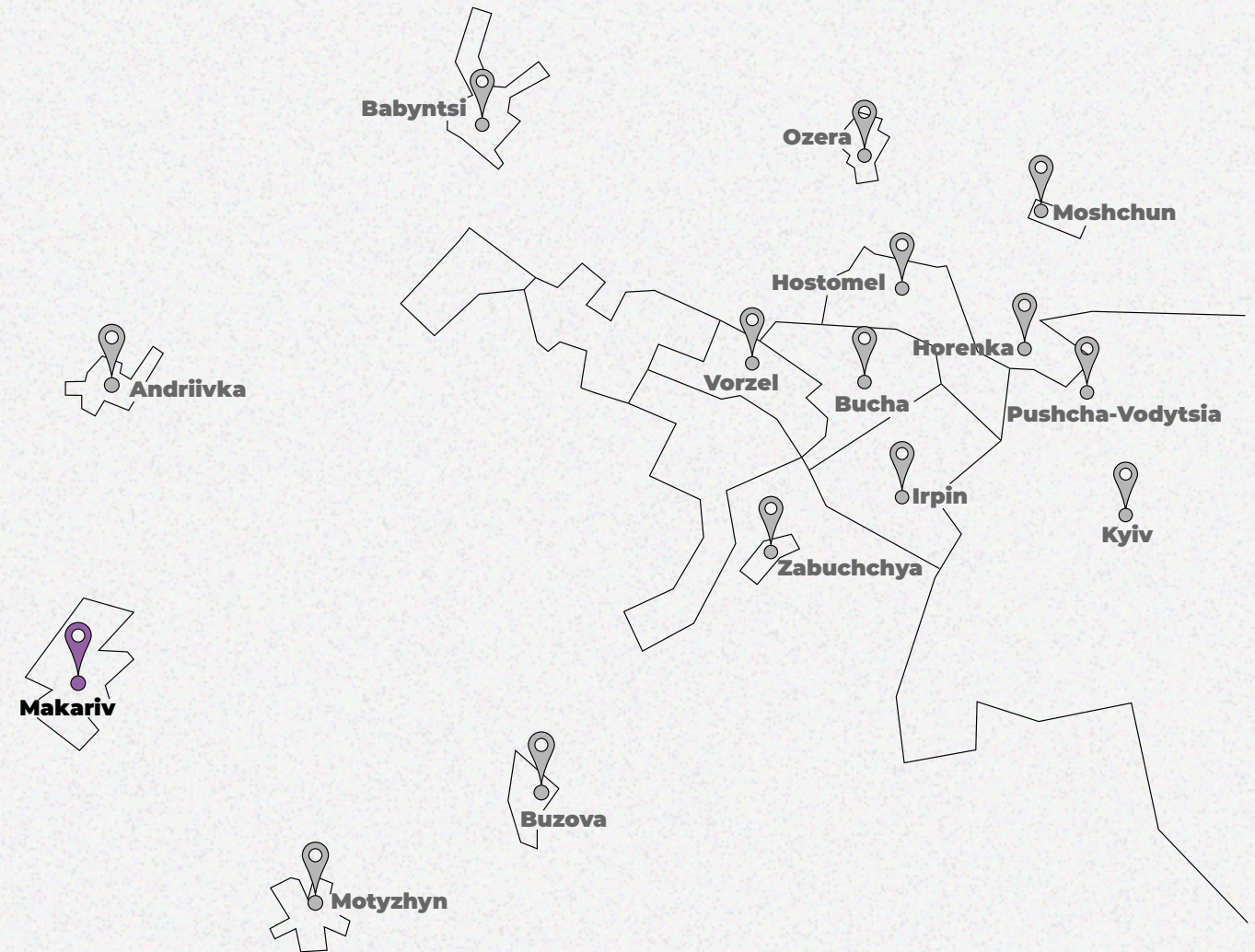
Makariv in Kyiv region suffered from constant rocket and artillery shelling from the end of February until April. War criminals showed unprecedented brutality here, destroyed a local hospital, fire station, police station, schools, kindergartens and almost the entire infrastructure of the community. Local residents and the Armed Forces of Ukraine heroically defended the settlement and did not allow it to be occupied, thereby preventing the advance of enemy troops to Kyiv.

The RebuildUA team has digitized the destruction and analyzed the consequences of the war for the settlement.



 rebuildua.net

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



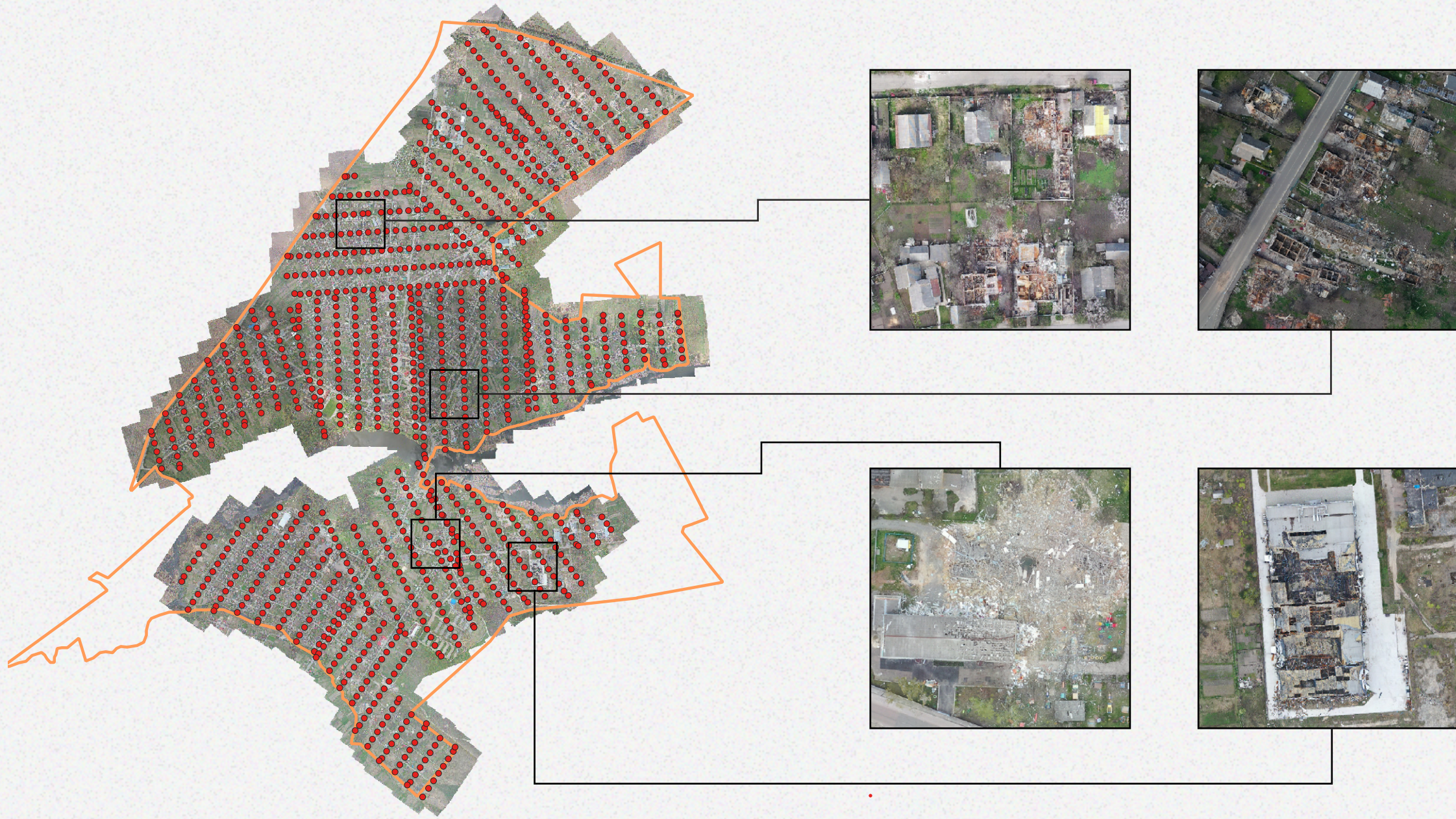
Region
District
Community

Kyiv
Buchanskyi
Makarivska


Area
6.3 km²


Population
9,790 people

DIGITIZATION PROCESS



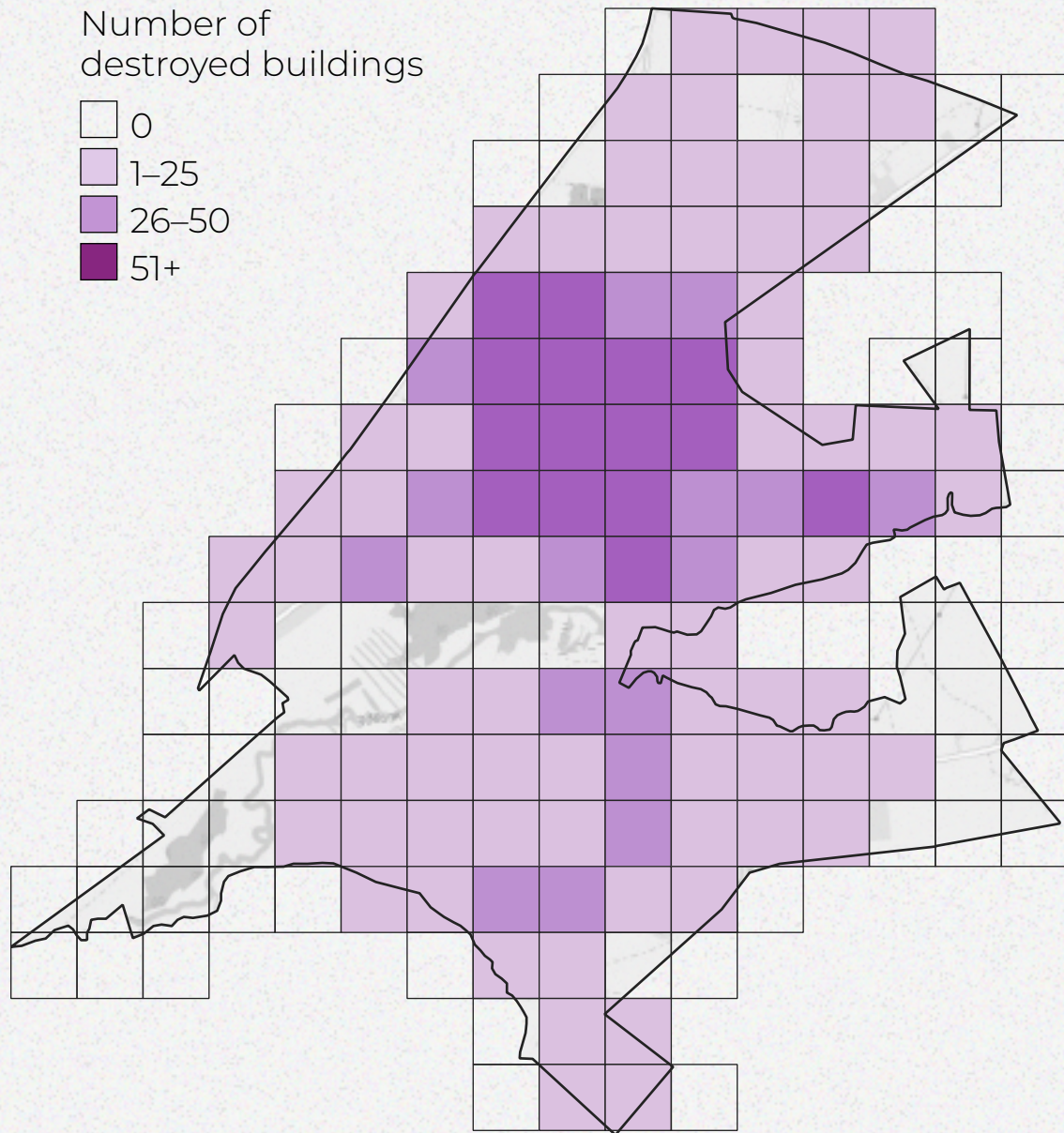
11 flight missions
1,118 pictures for orthophoto
240 hours of data processing
11 Gigabytes of data

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

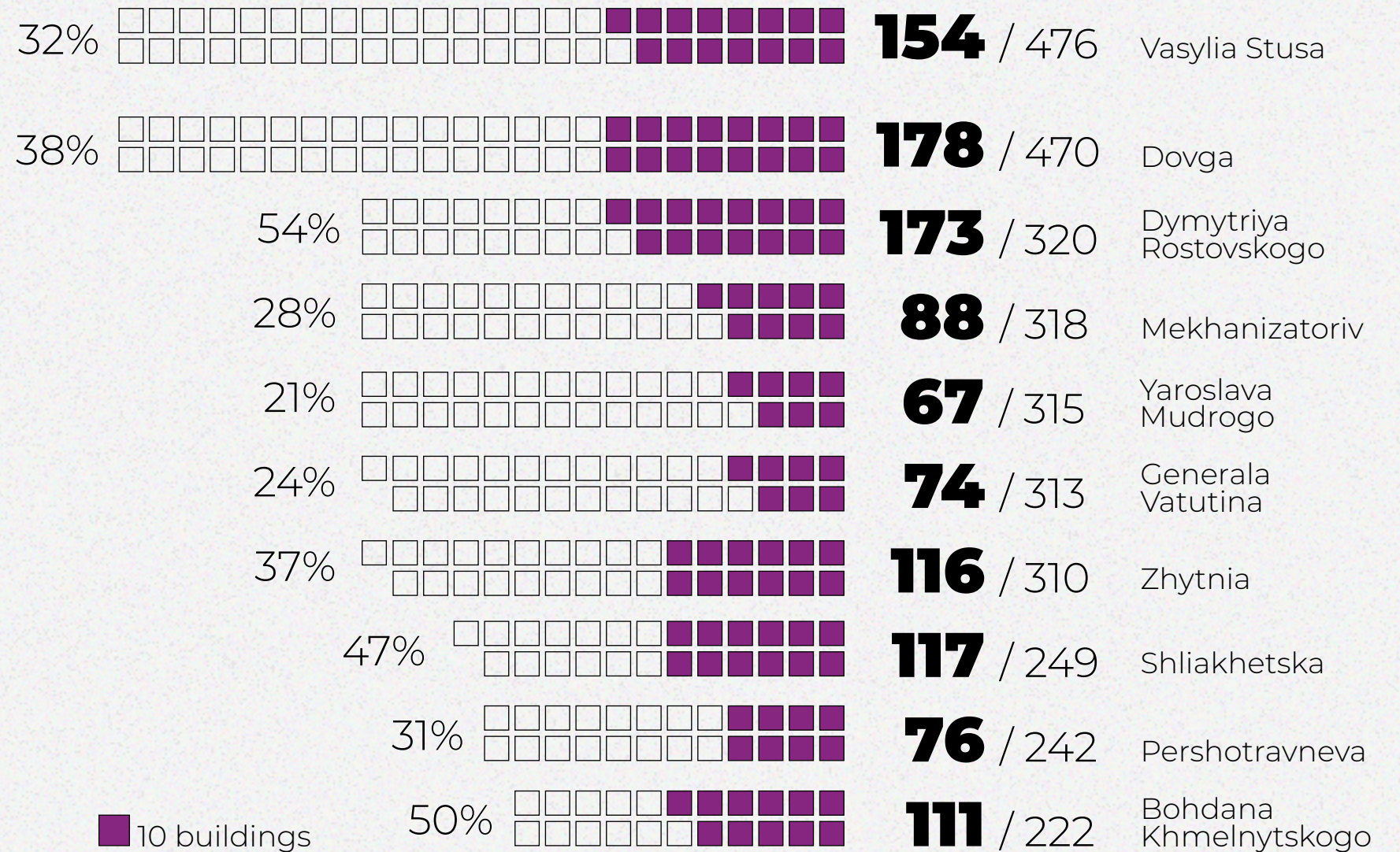
THERMAL MAP OF DESTRUCTION

Number of destroyed buildings

- 0
- 1-25
- 26-50
- 51+



Destruction of the largest streets

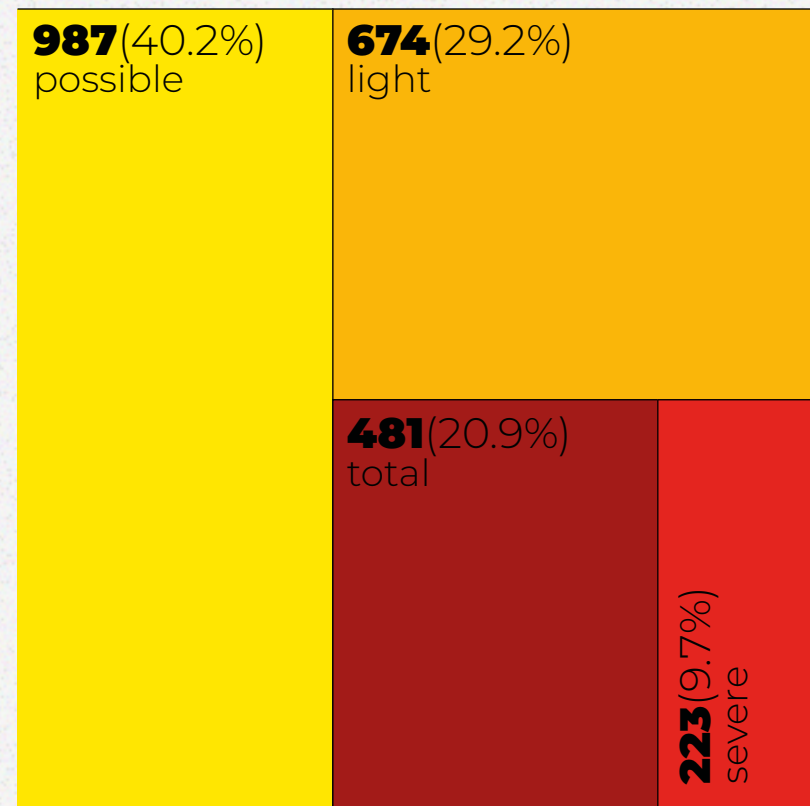


LEVELS OF DESTRUCTION

Buildings destroyed:

2,305 / 7,757

Level of destruction, number of buildings



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



TYPES OF DESTROYED OBJECTS

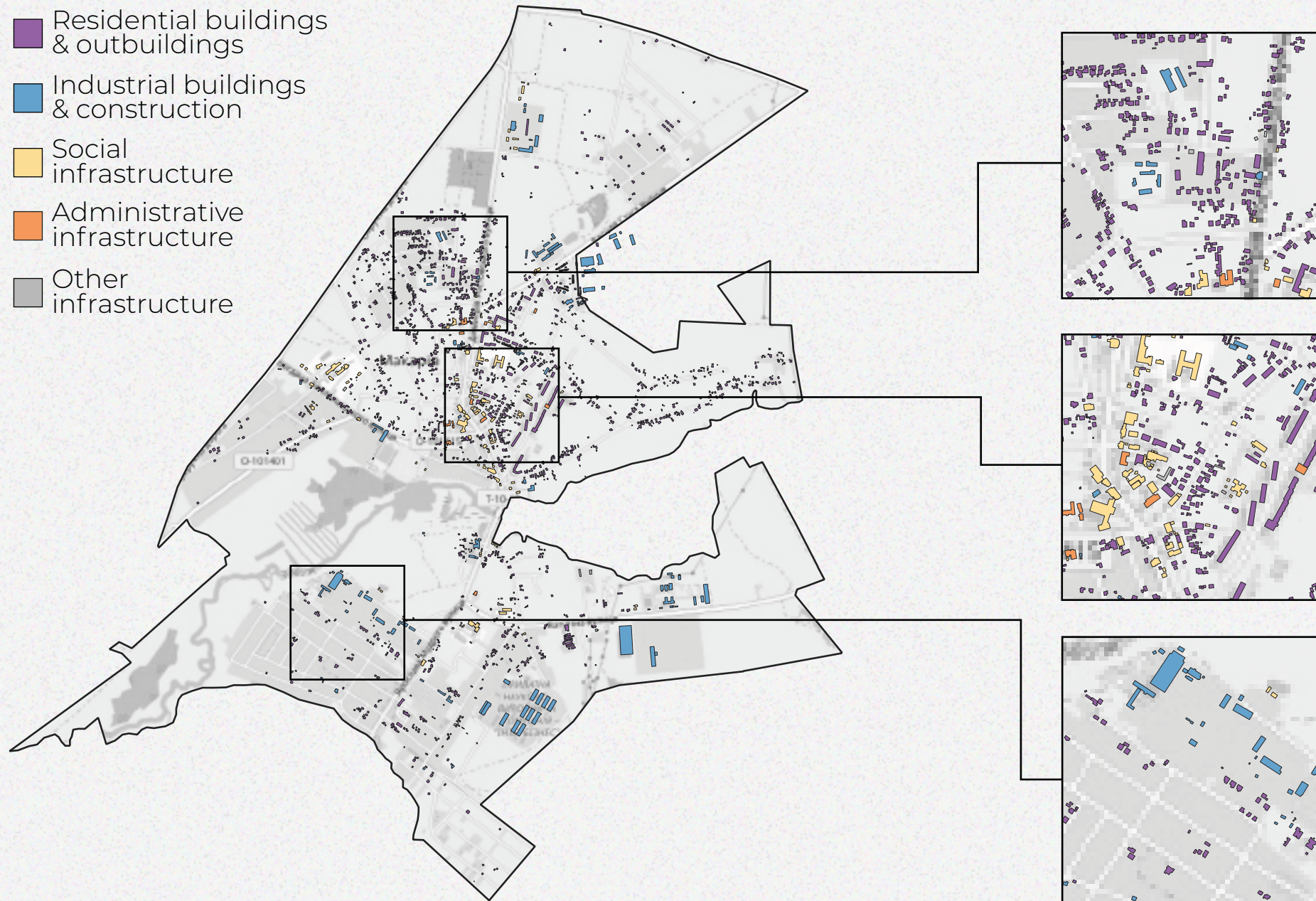
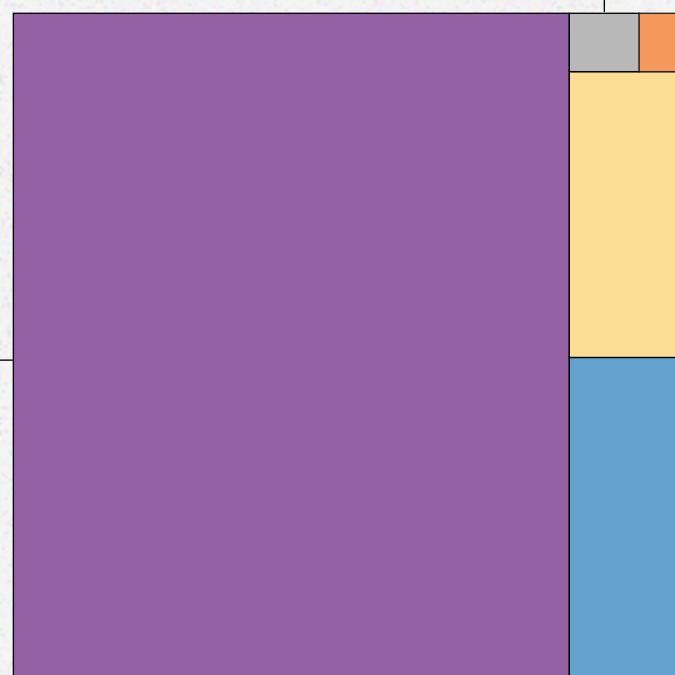
Residential buildings & outbuildings **1,942** (84.3%)

Industrial buildings & construction **176** (7.6%)

Social infrastructure **153** (6.6%)

Administrative infrastructure **13** (0.5%)

Other infrastructure **21** (0.9%)

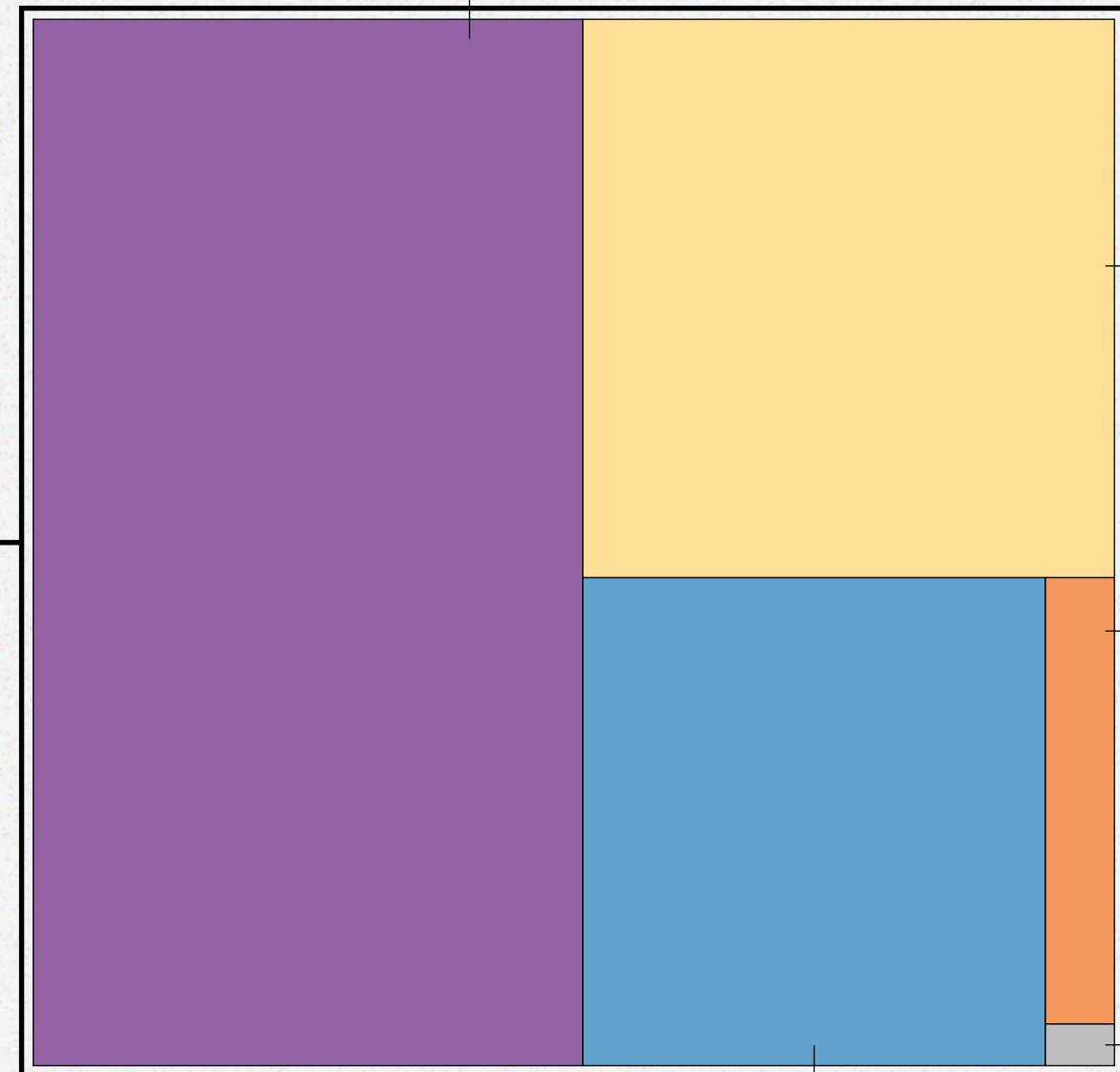


ASSESSMENT OF DAMAGES

Damages by types of buildings

Total damages

\$133.5 million



\$67.03 million
Residential buildings
& outbuildings

\$34.21 million
Social infrastructure

\$4.59 million
Administrative infrastructure

\$0.37 million
Other infrastructure

\$27.29 million
Industrial buildings
& construction

RESIDENTIAL BUILDINGS & OUTBUILDINGS

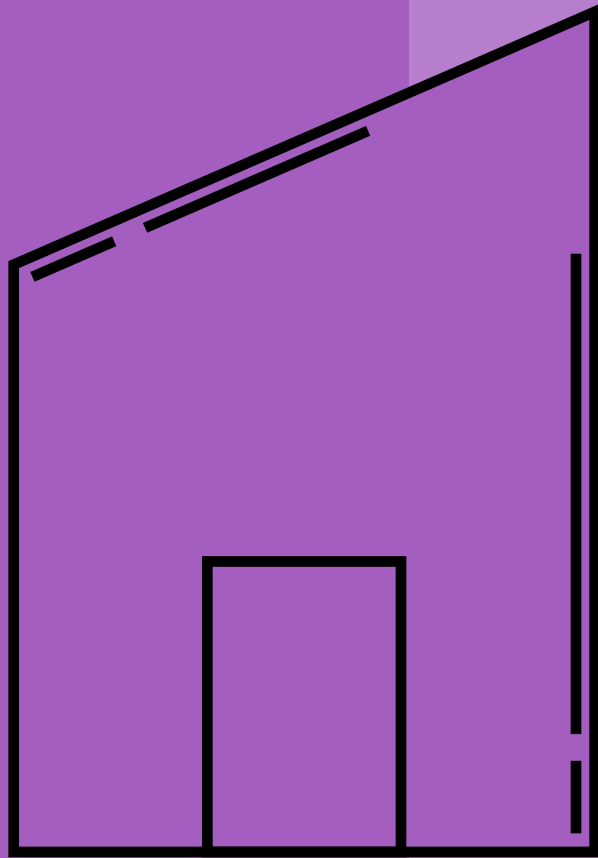


Photo: Decentralization



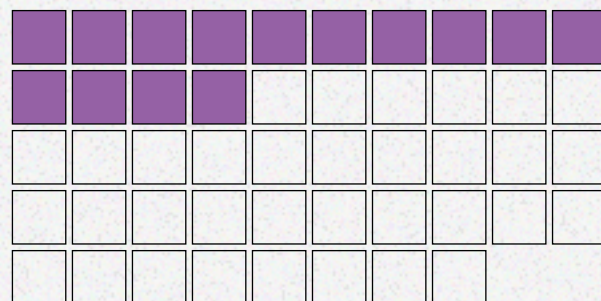
REBUILD

UA

SCALE OF DESTRUCTION

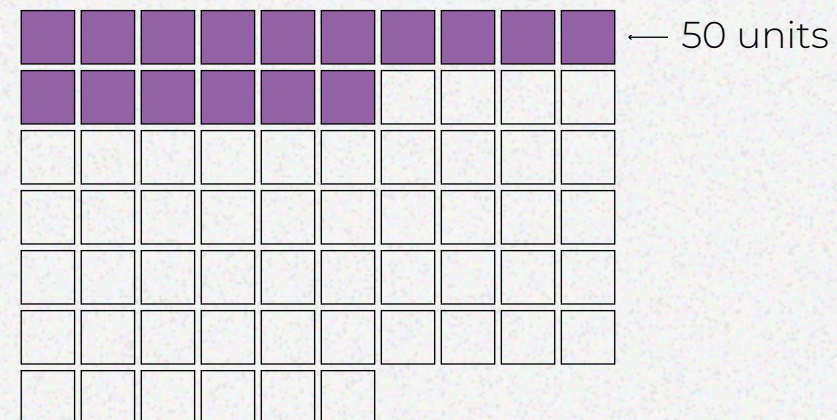
Residential buildings & outbuildings

Private houses



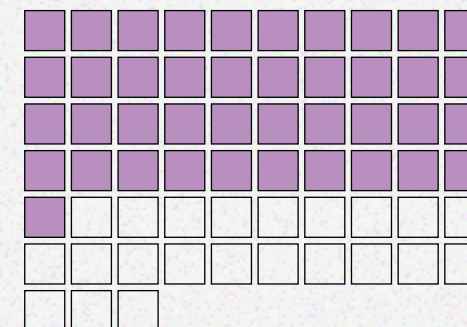
732
/ 2,411

Outbuildings



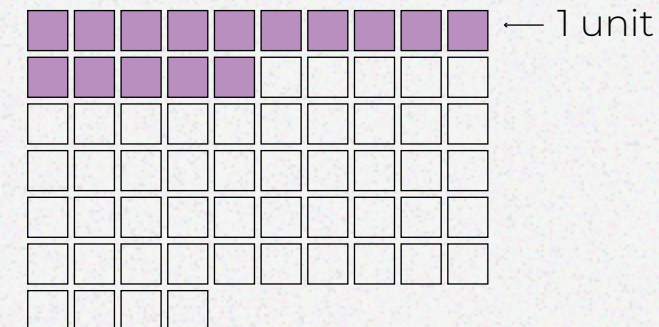
797
/ 3,283

Apartment buildings



41
/ 63

Greenhouses



15
/ 64

Garages & parking spaces



345
/ 1,073

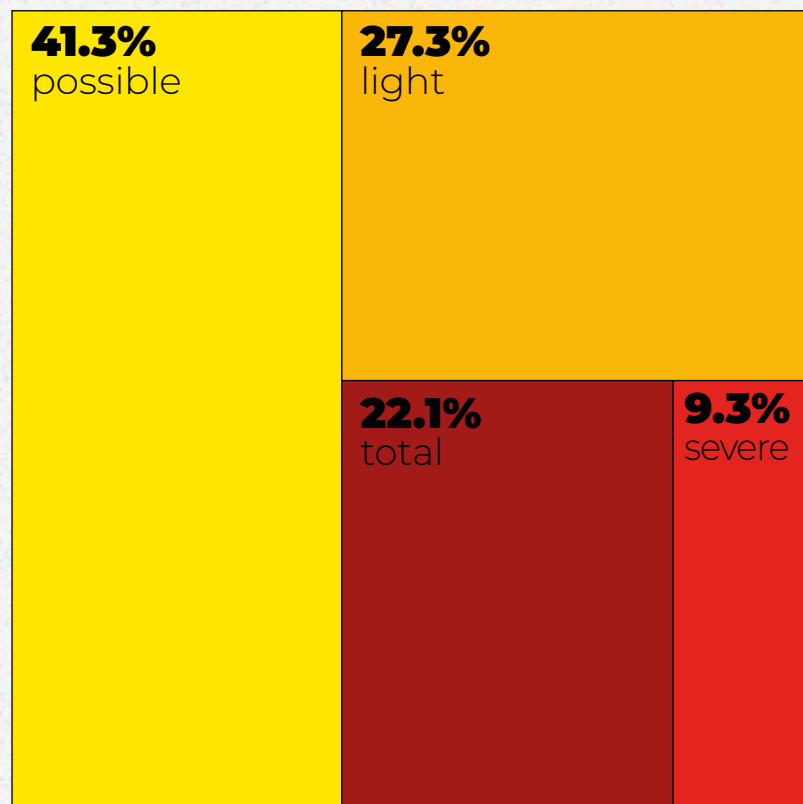
Townhouses & duplexes



12
/ 37

SCALE OF DESTRUCTION

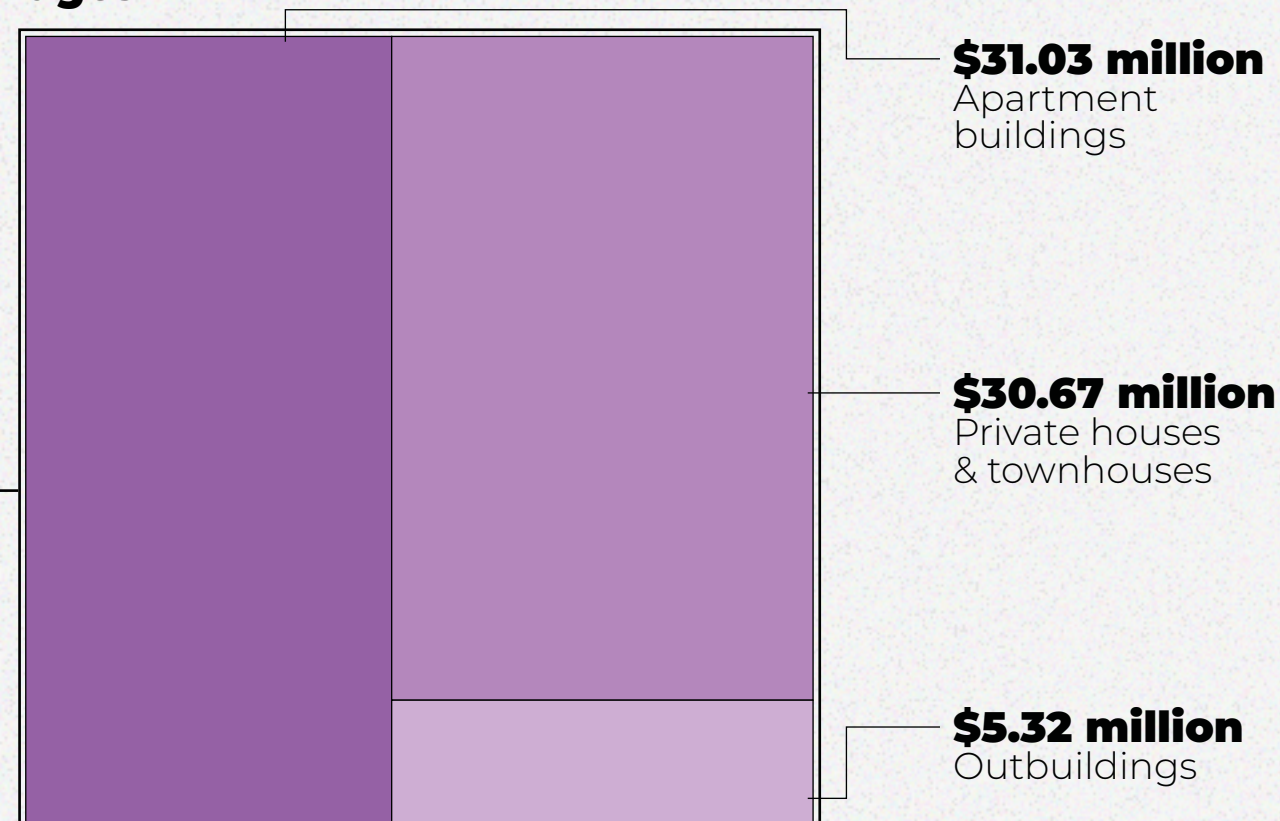
Level of destruction



Assessment of damages

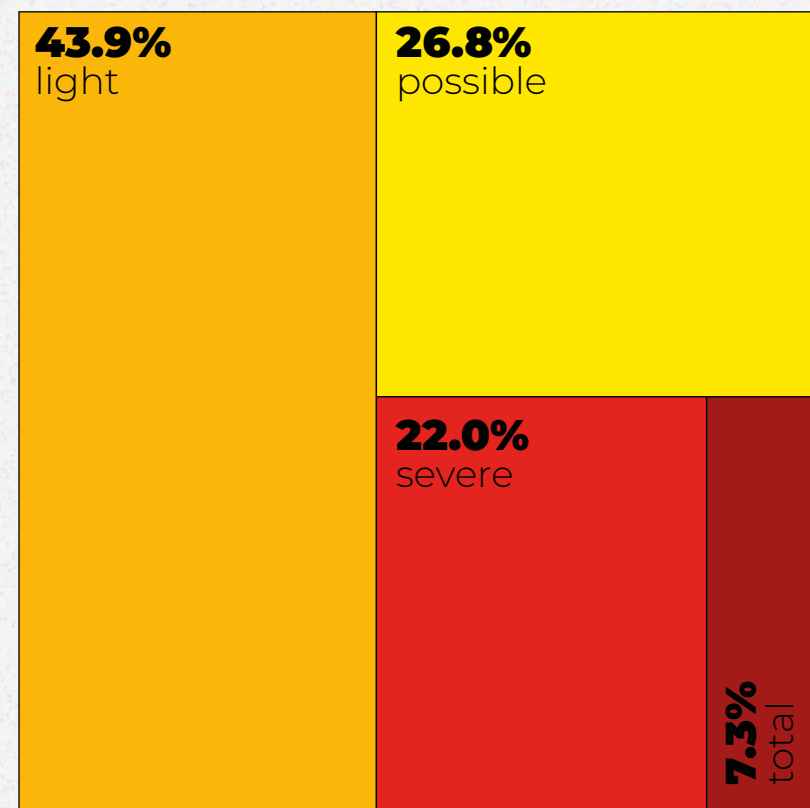
Total damages

\$67.0 million



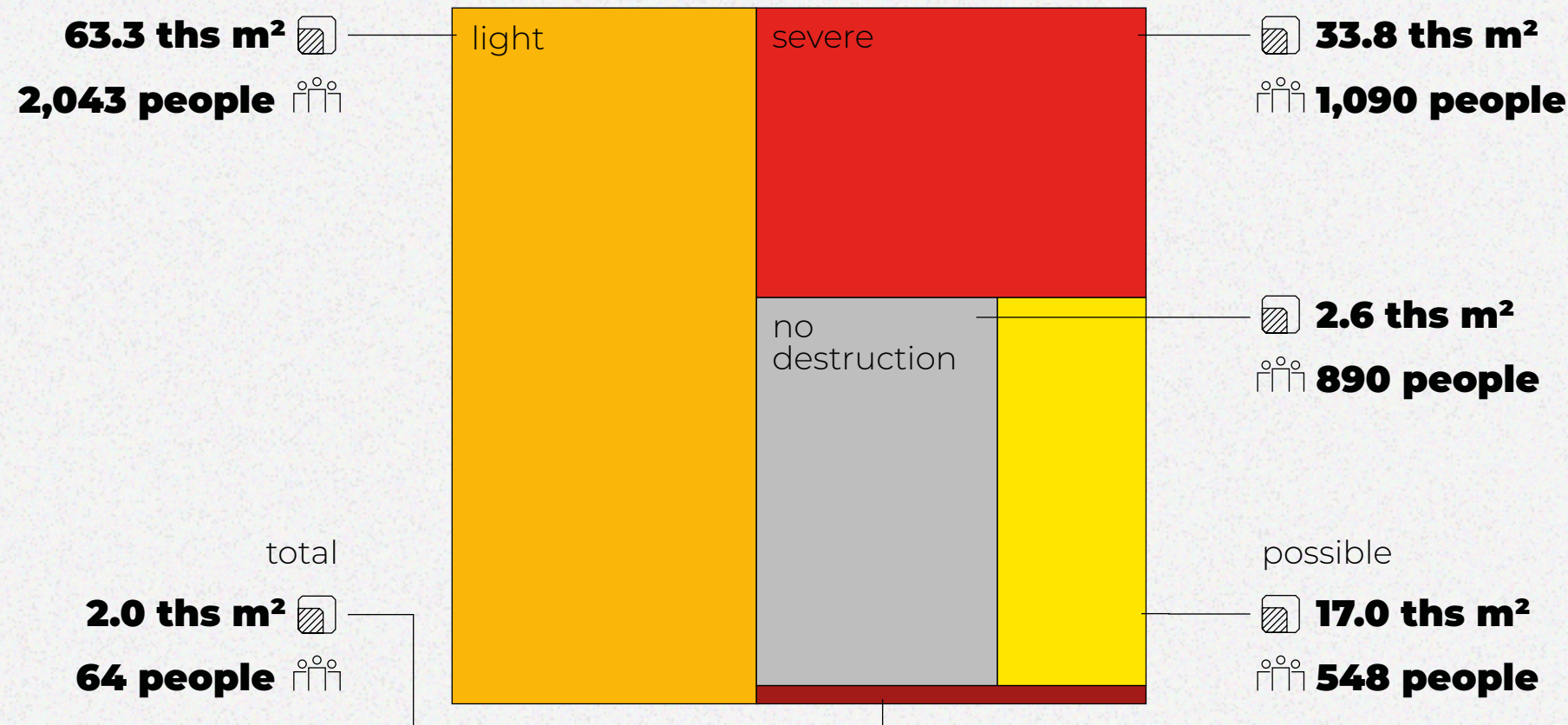
APARTMENT BUILDINGS

Level of destruction



Total damages
\$31.0 million

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

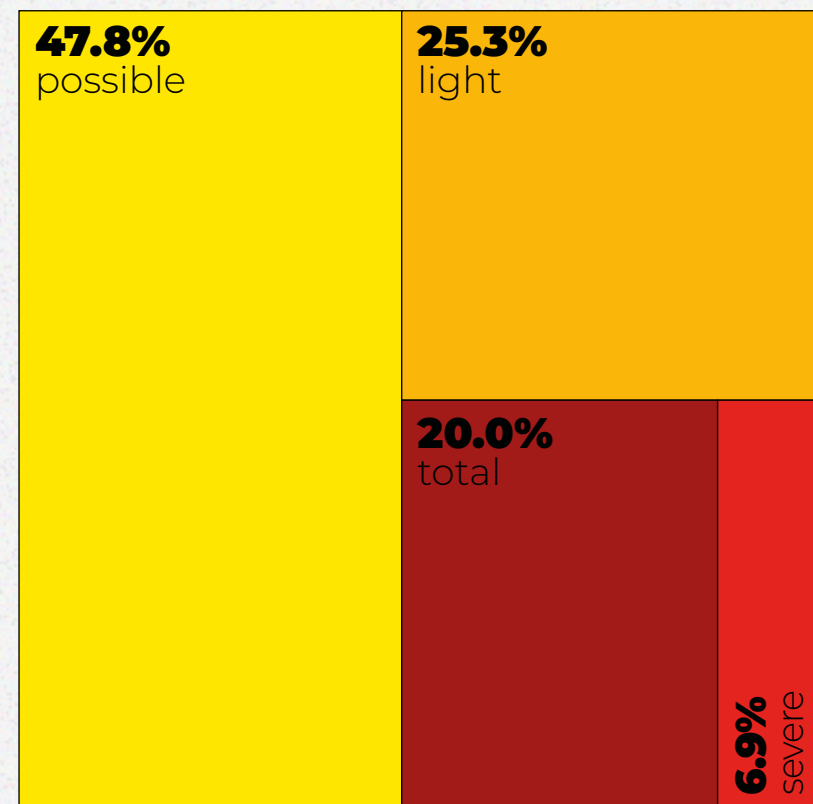


Total area of damage
116.1 ths m²

Number of residents affected
3,745 people

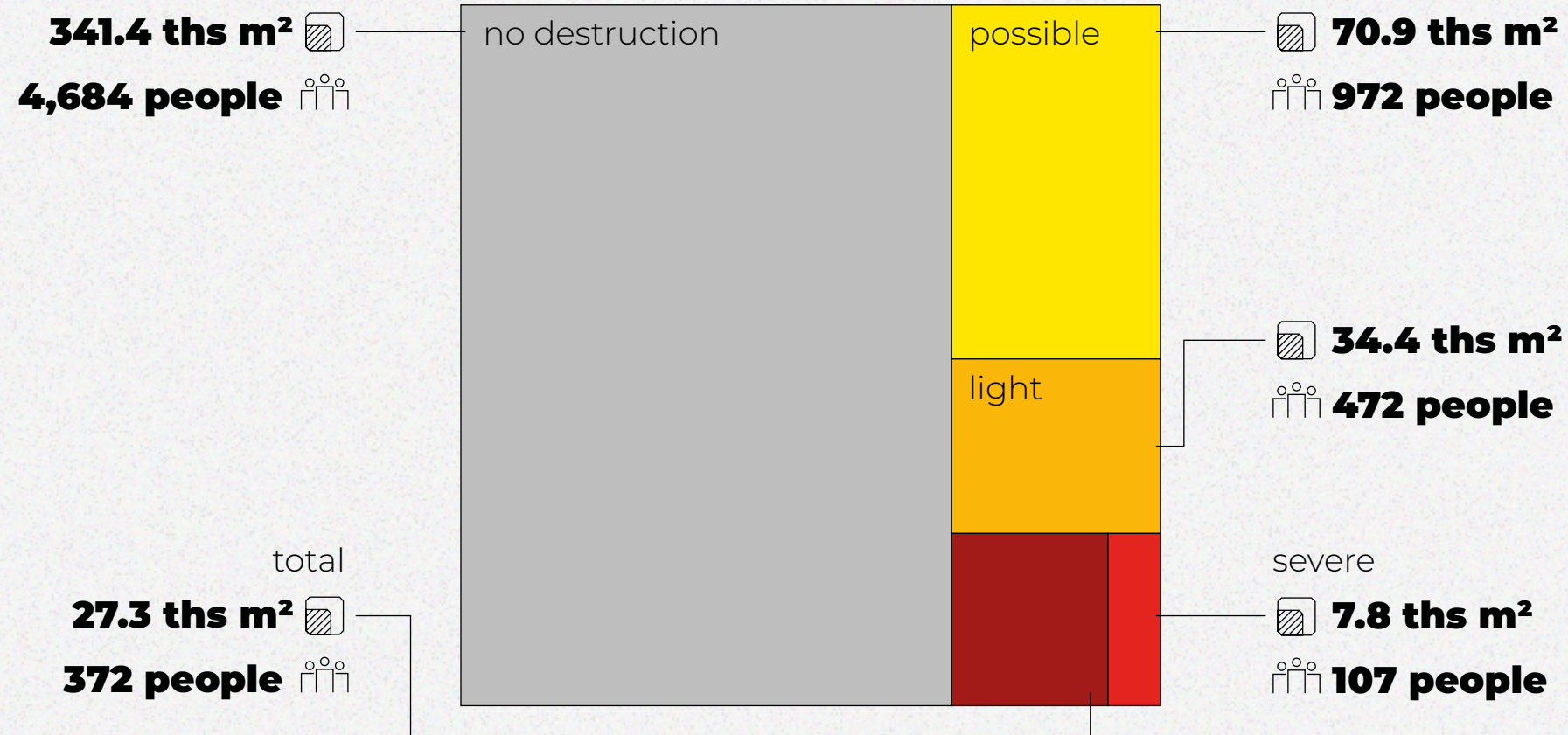
PRIVATE HOUSES & TOWNHOUSES

Level of destruction



Total damages
\$30.7 million

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

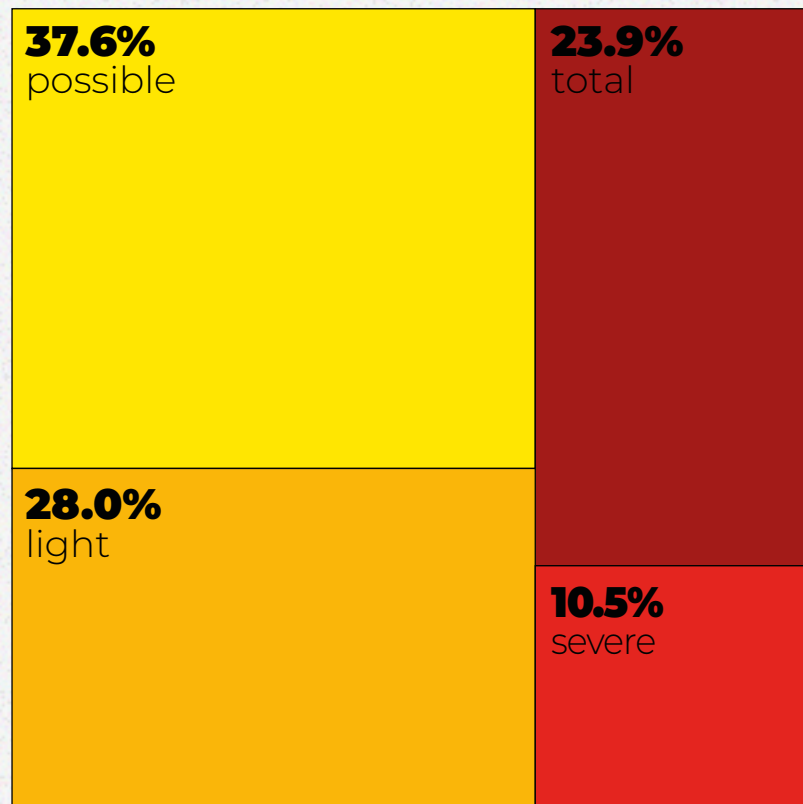


Total area of damage
140.3 ths m²

Number of residents affected
1,923

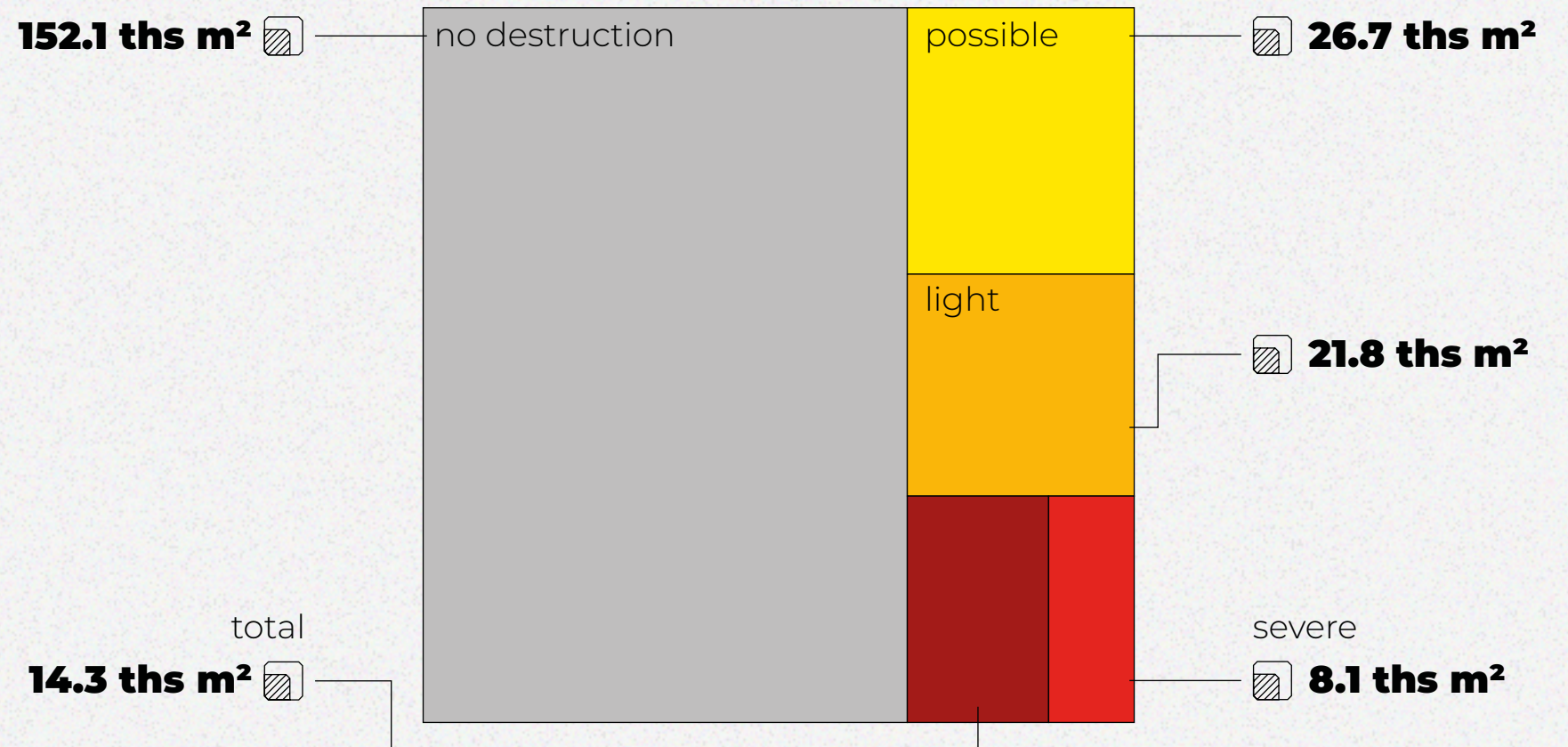
OUTBUILDINGS

Level of destruction



Total damages
\$5.3 million

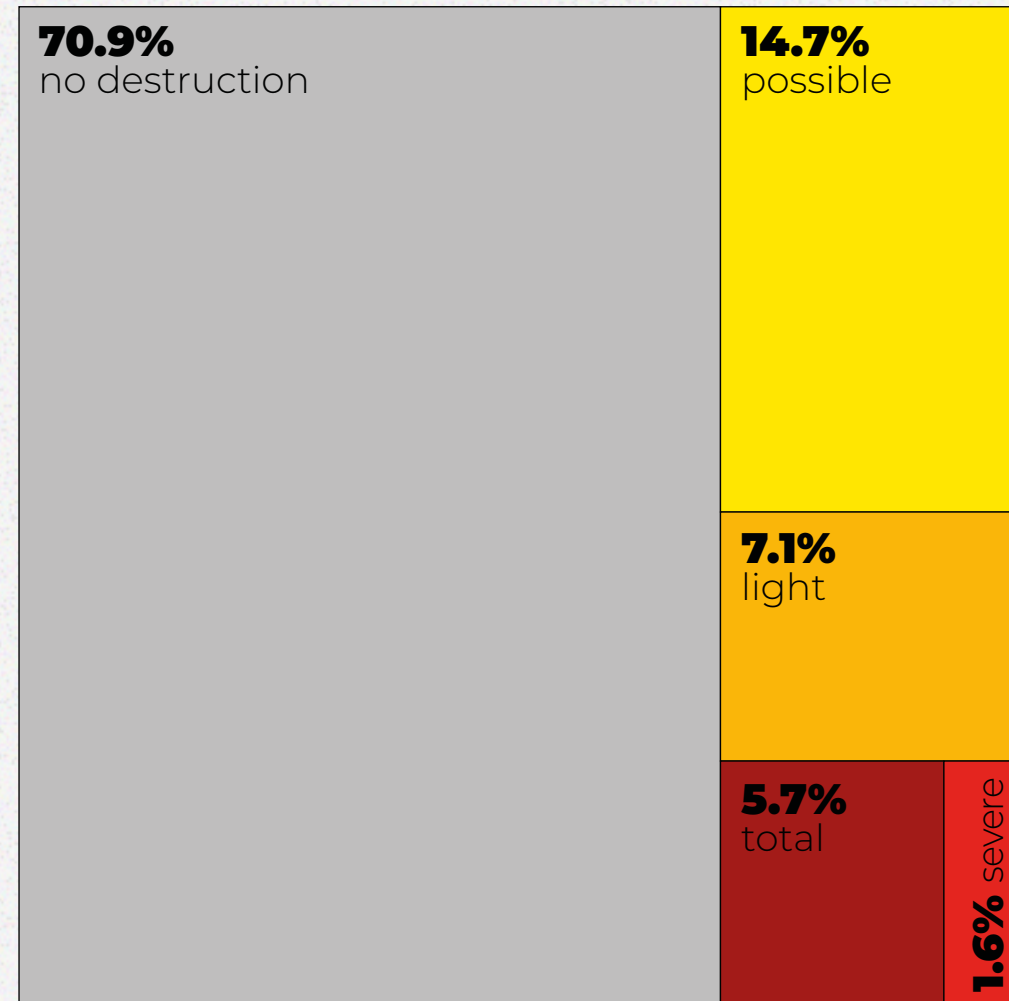
Area of destruction



Total area of damage
70.9 ths m²

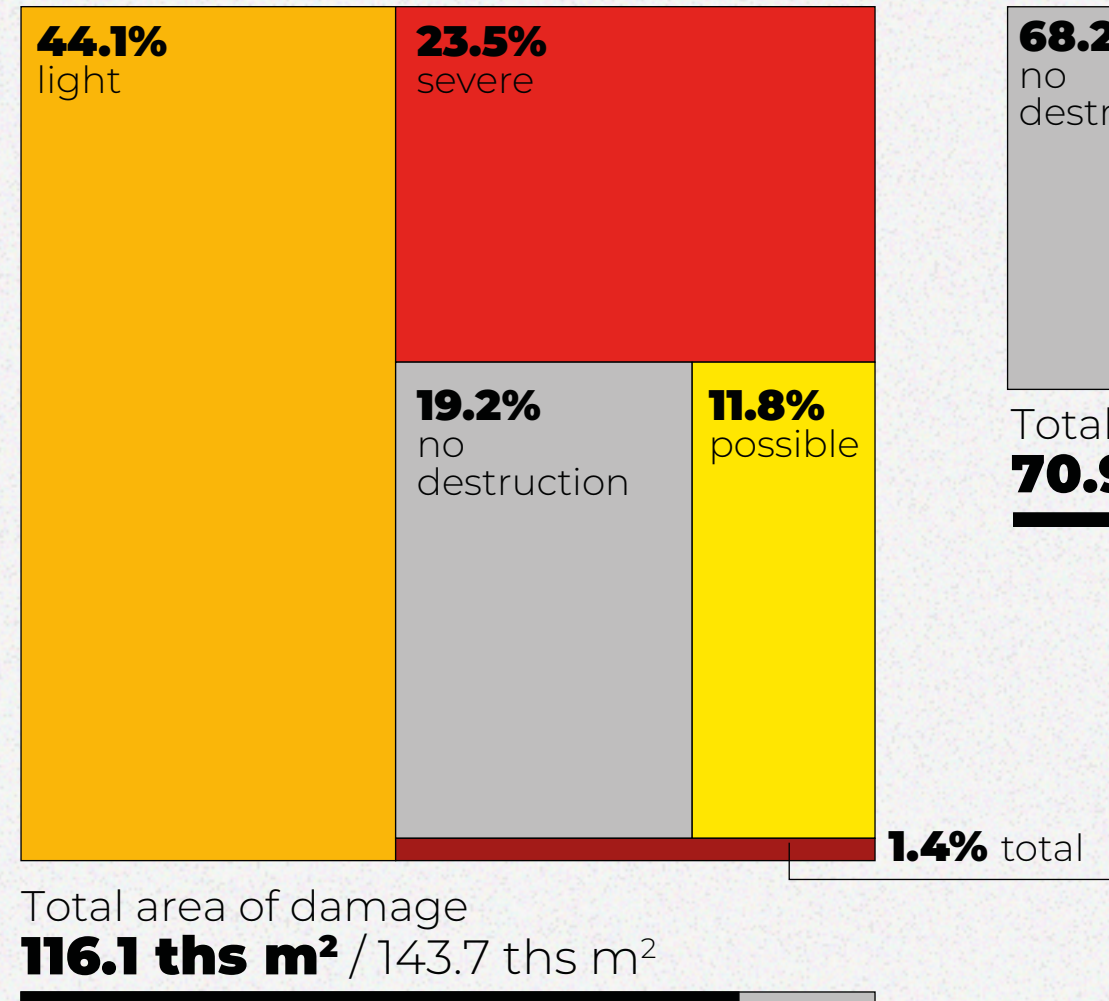
AREA OF DESTRUCTION

Private houses & townhouses



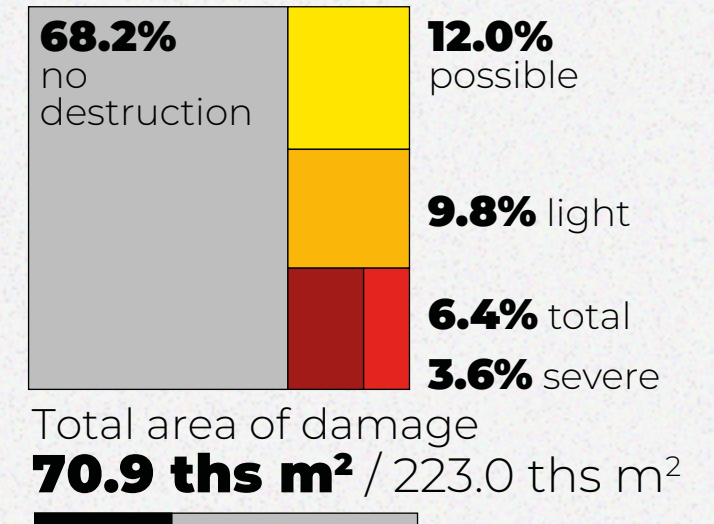
Total area of damage
140.3 ths m² / 481.7 ths m²

Apartment buildings



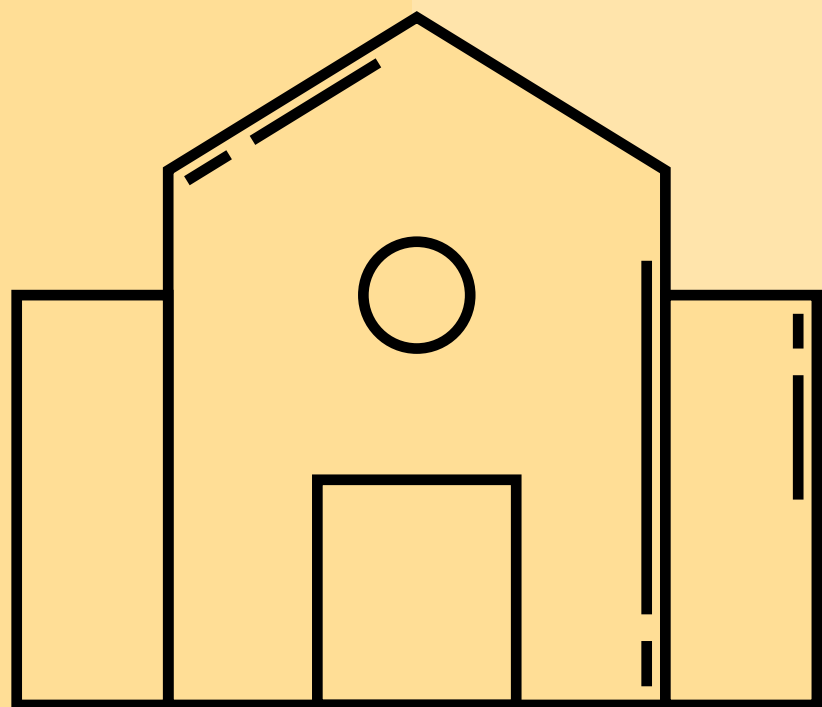
Total area of damage
116.1 ths m² / 143.7 ths m²

Outbuildings



Total area of damage
70.9 ths m² / 223.0 ths m²

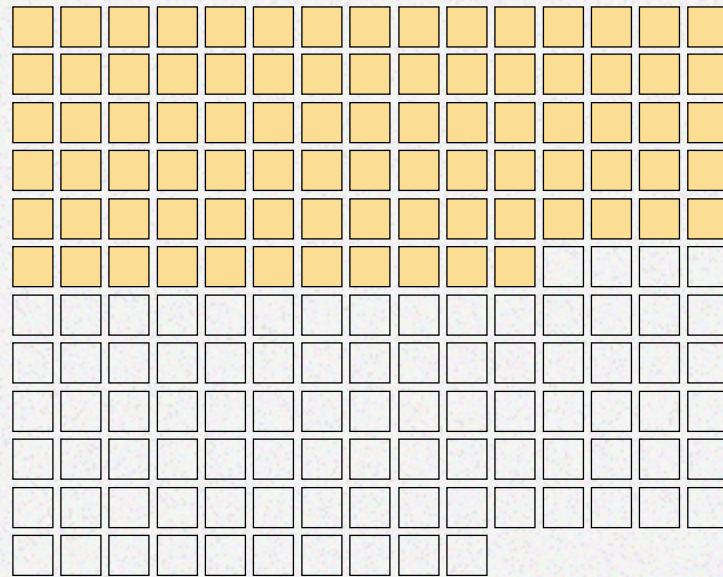
SOCIAL INFRASTRUCTURE



SCALE OF DESTRUCTION

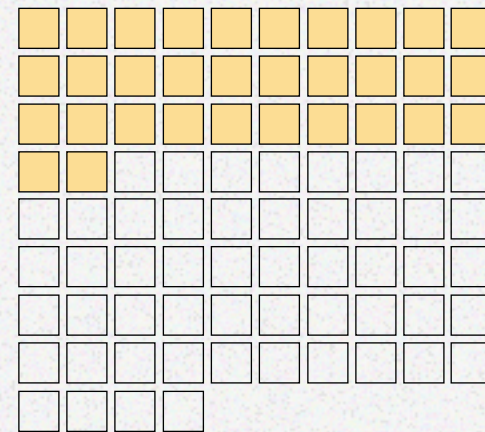
Number of destroyed buildings

Trade & commerce



86
/175

Buildings of
general purpose



32
/84

Offices & hotels



6/11

Healthcare institutions



16
/25

Culture, religion &
sports institutions



6
/20

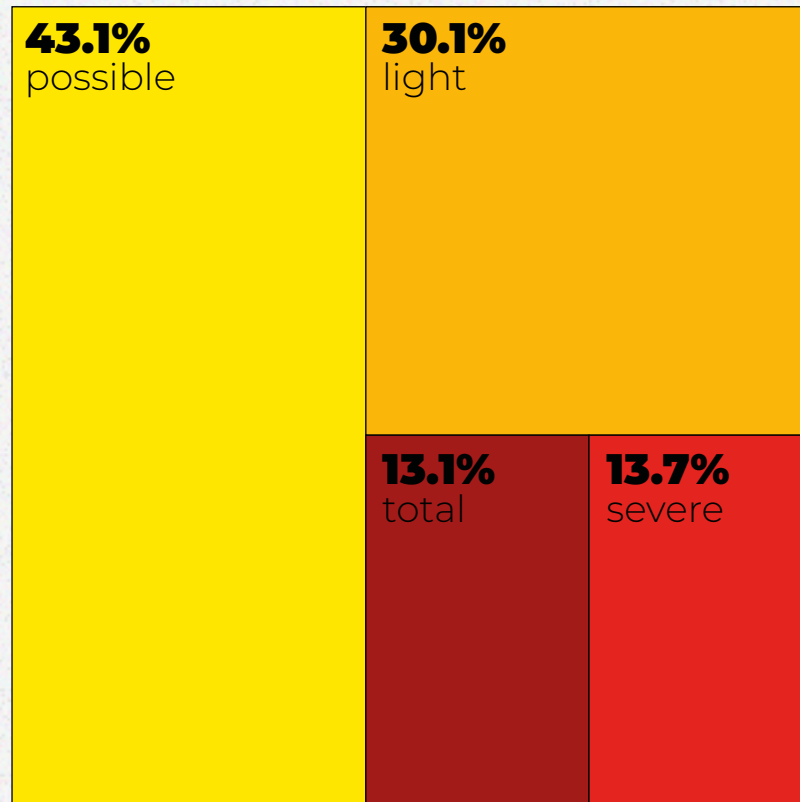
Educational institutions



7/8

SCALE OF DESTRUCTION

Level of destruction



Assessment of damages

\$13.47 million
Healthcare institutions

\$10.47 million
Trade & commerce

\$2.26 million
Culture, religion & sports institutions

\$1.58 million
Offices & hotels

\$6.38 million
Educational institutions

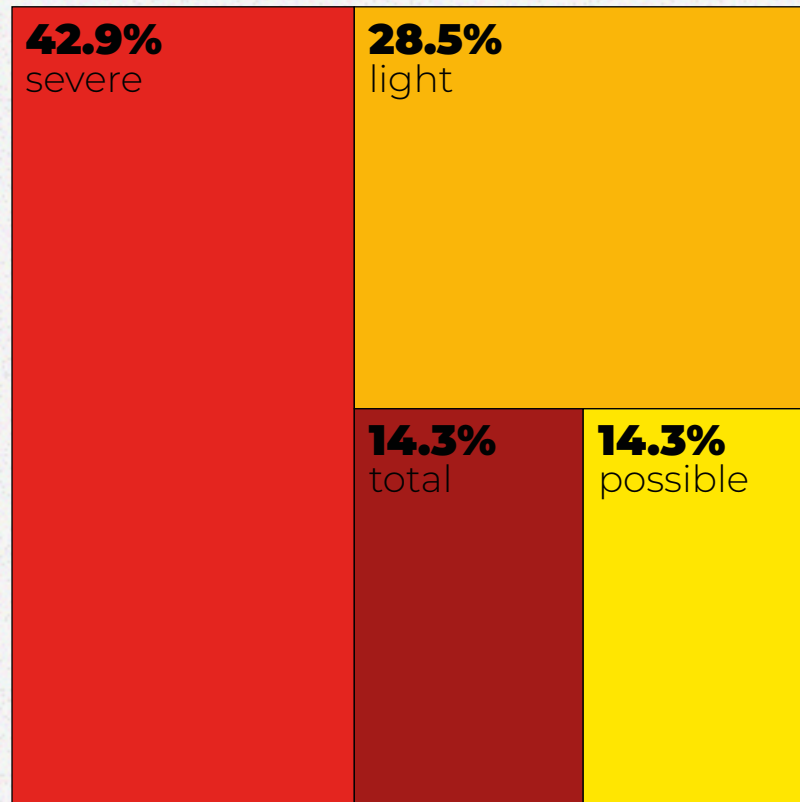
\$0.06 million
Buildings of general purpose

Total damages

\$34.2 million

EDUCATIONAL INSTITUTIONS

Level of destruction



Total damages

\$6.4 million

Number of destroyed buildings

Kindergarten



3 / 3

School / college



3 / 4

Library



1 / 1

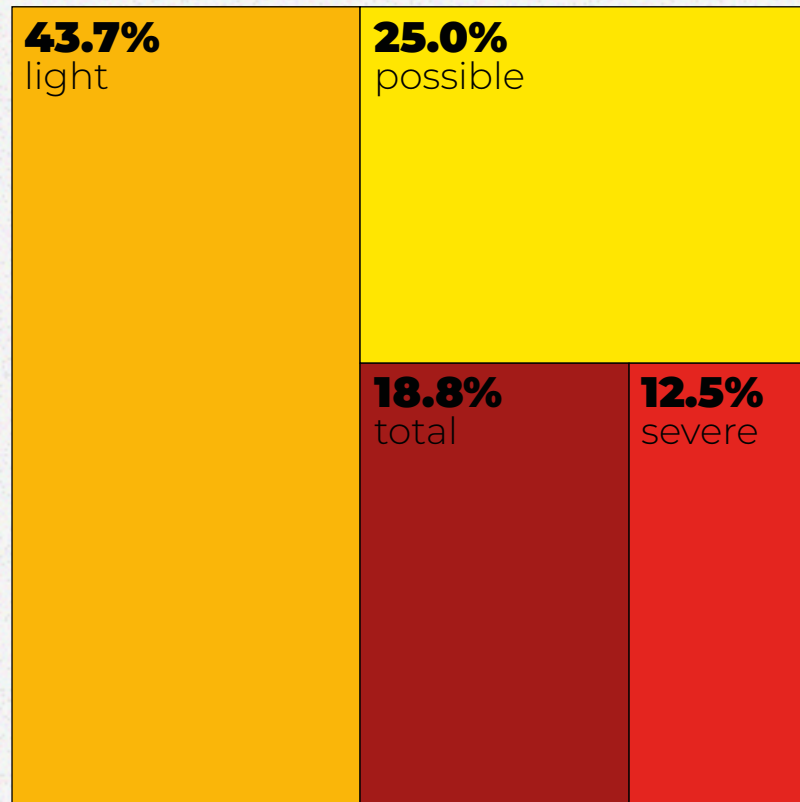
Library



Photo: censor.net

HEALTHCARE INSTITUTIONS

Level of destruction

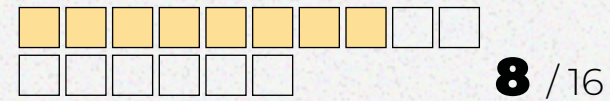


Total damages

\$13.5 million

Number of destroyed buildings

Hospital



Veterinary clinic



Laboratory



Private clinic



Rehabilitation center



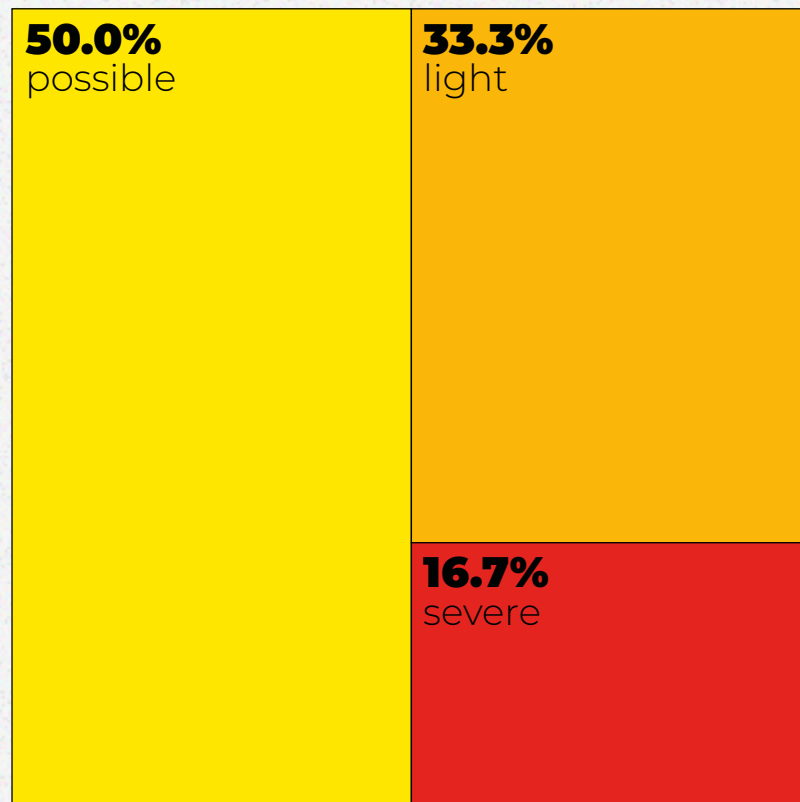
Hospital



Photo: Telegram-channel of Oleksiy Kuleba

CULTURE, RELIGION & SPORT

Level of destruction

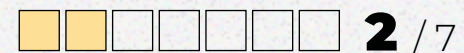


Total damages

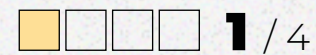
\$2.3 million

Number of destroyed buildings

Museum



Church



Radio tower



Institutions of culture and arts



Cinema



Radio tower

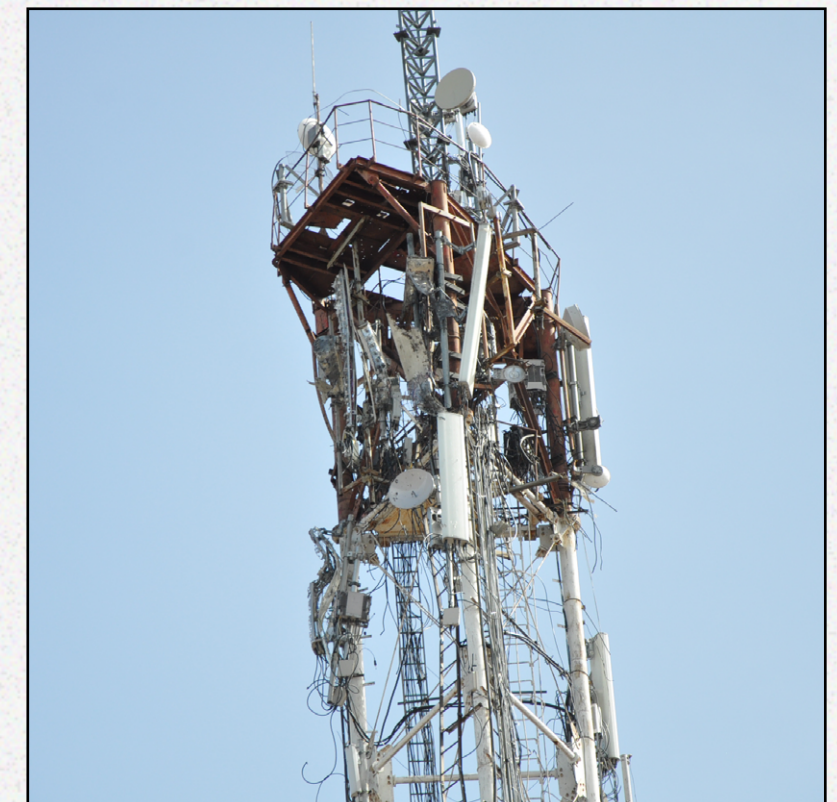
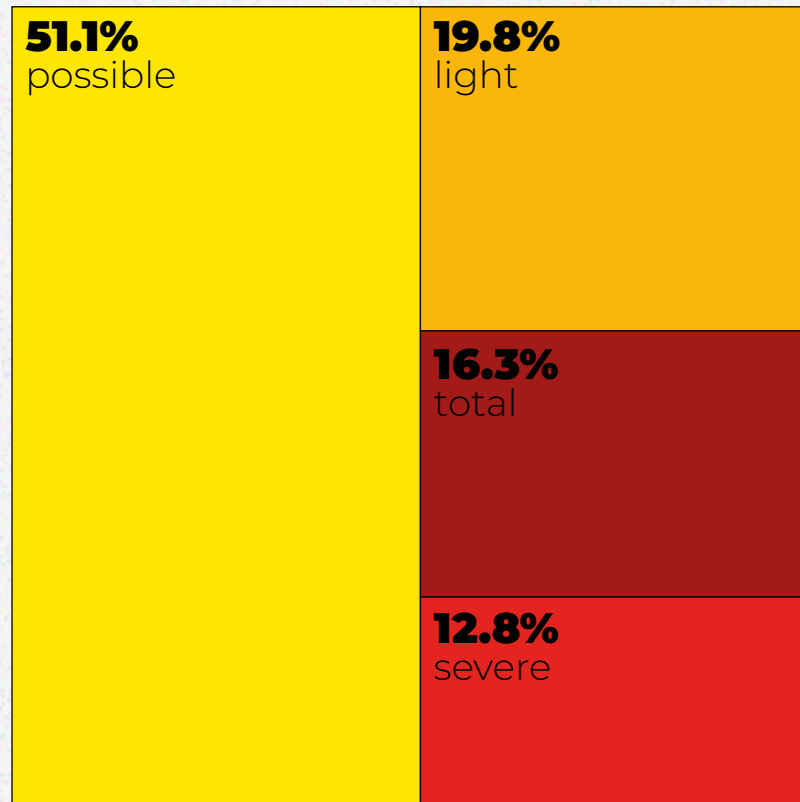


Photo: censor.net

COMMERCIAL BUILDINGS

Level of destruction

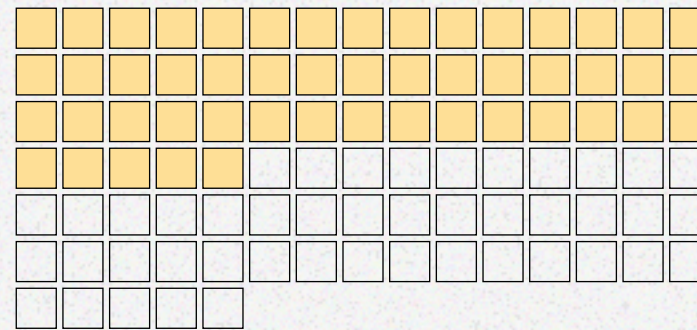


Total damages

\$10.5 million

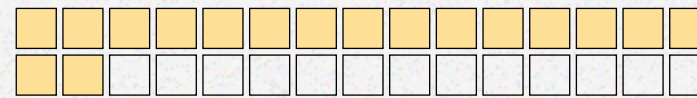
Number of destroyed buildings

Commercial services and institutions



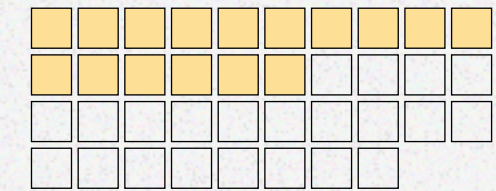
50 / 95

Grocery stores



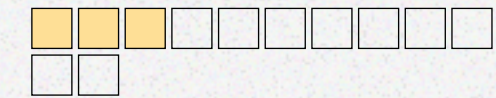
17 / 30

Trade



16 / 38

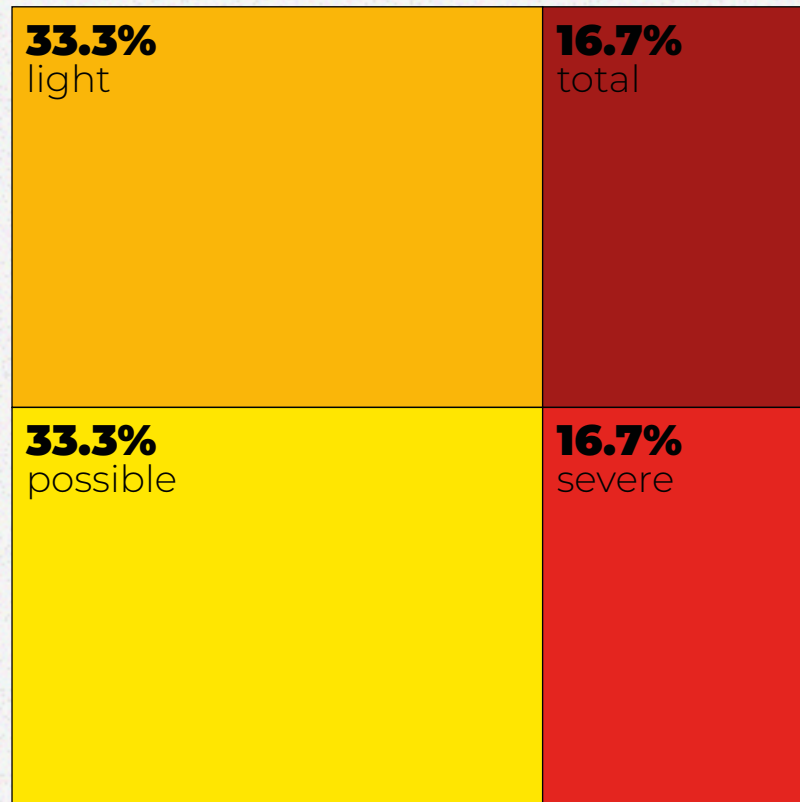
Cafes & restaurants



3 / 12

OFFICES & HOTELS

Level of destruction

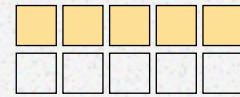


Total damages

\$1.6 million

Number of destroyed buildings

Offices



5 / 10

Hotels

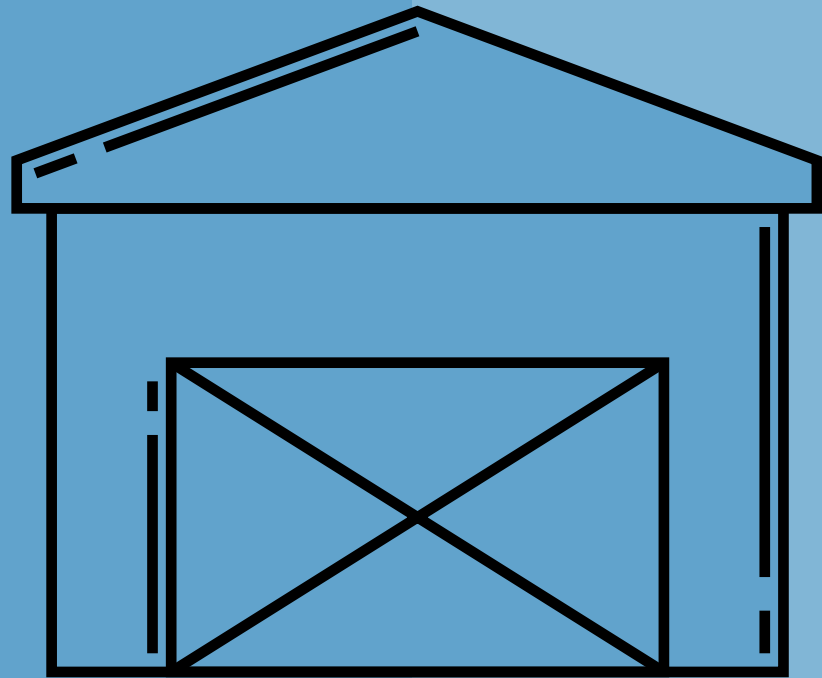


1 / 1

Hotel «Povorot»



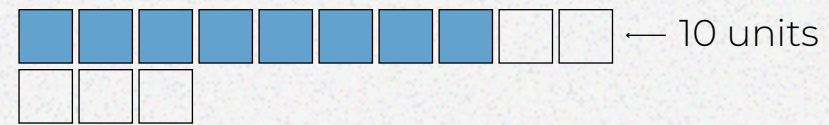
INDUSTRIAL INFRASTRUCTURE



SCALE OF DESTRUCTION

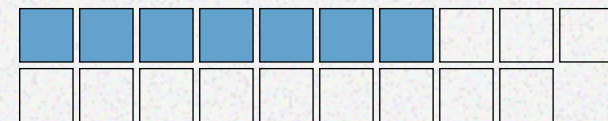
Number of destroyed buildings

Industrial buildings



78 / 132

Utility buildings



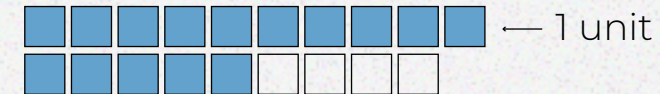
71 / 186

Construction



12 / 90

Warehouses



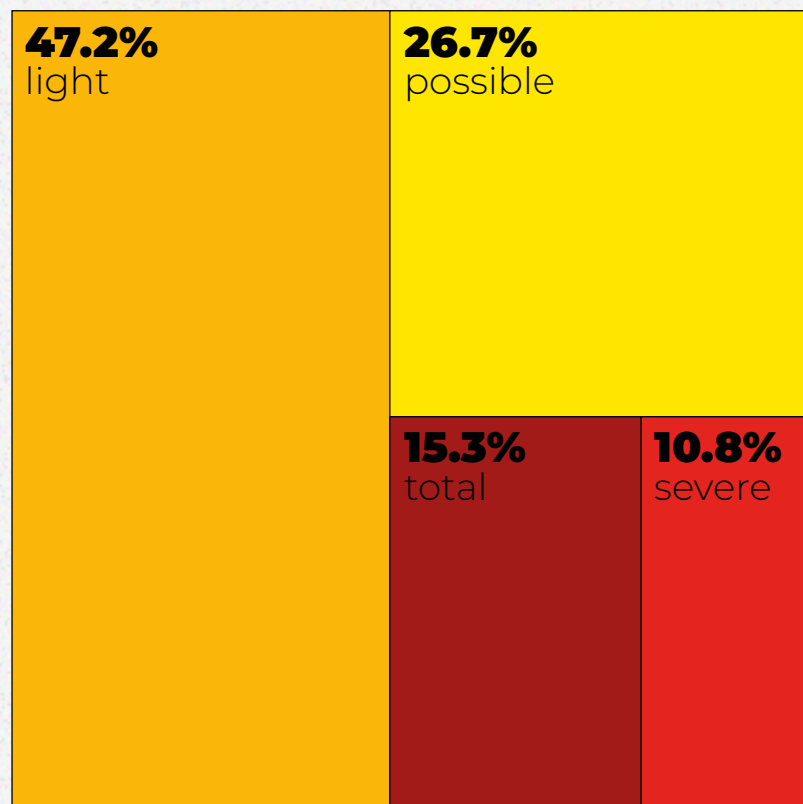
15 / 19

Warehouse complex MAKARIV

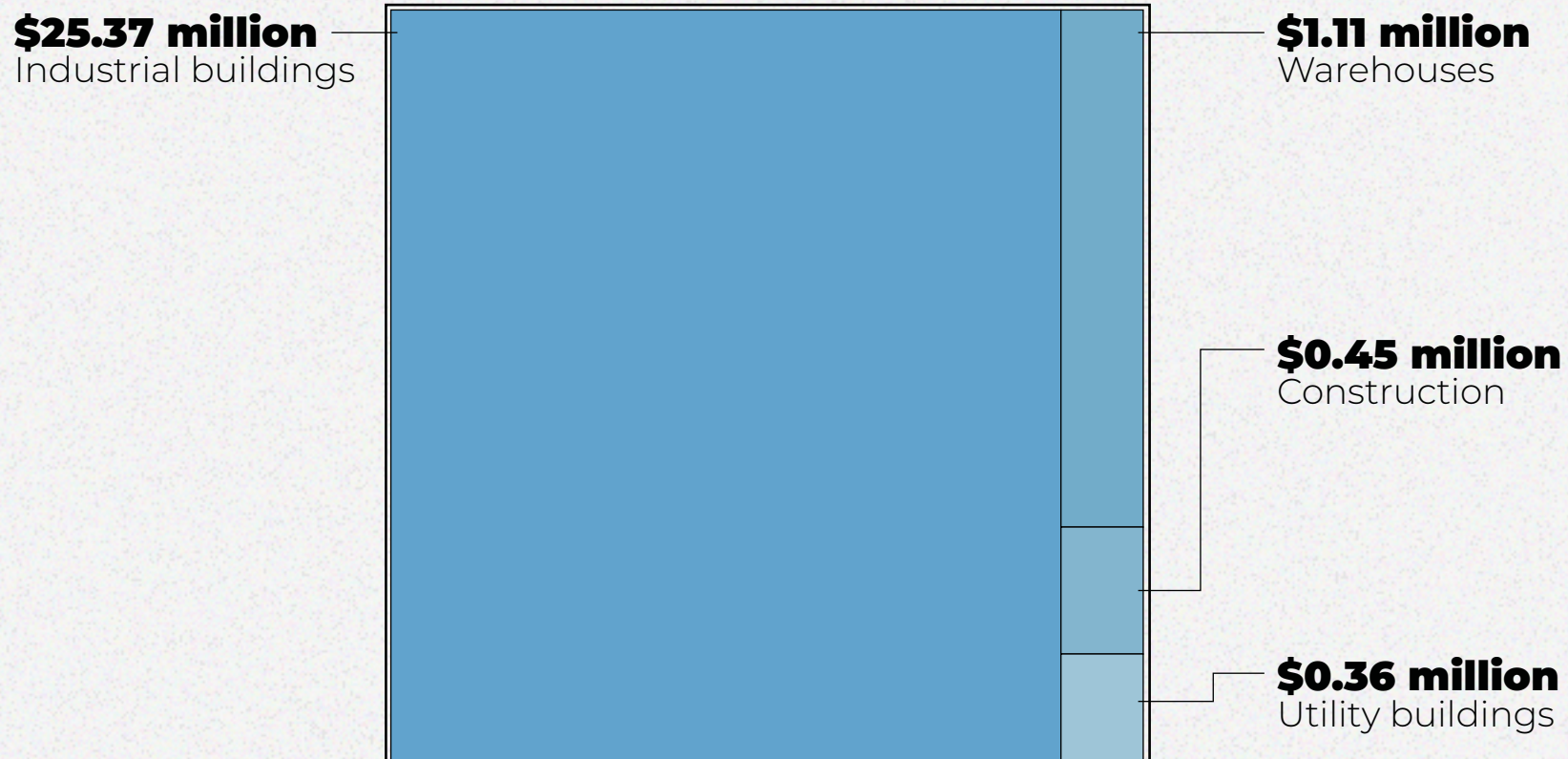


SCALE OF DESTRUCTION

Level of destruction



Assessment of damages



Total damages

\$27.3 million

ADMINISTRATIVE INFRASTRUCTURE



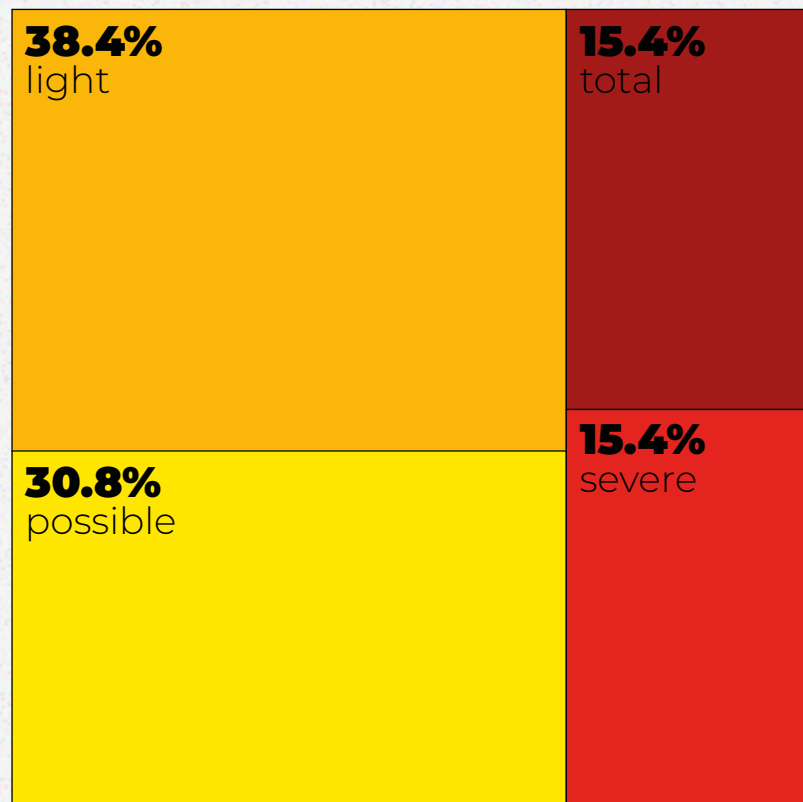
Photo: KyivVlada

REBUILD

UA

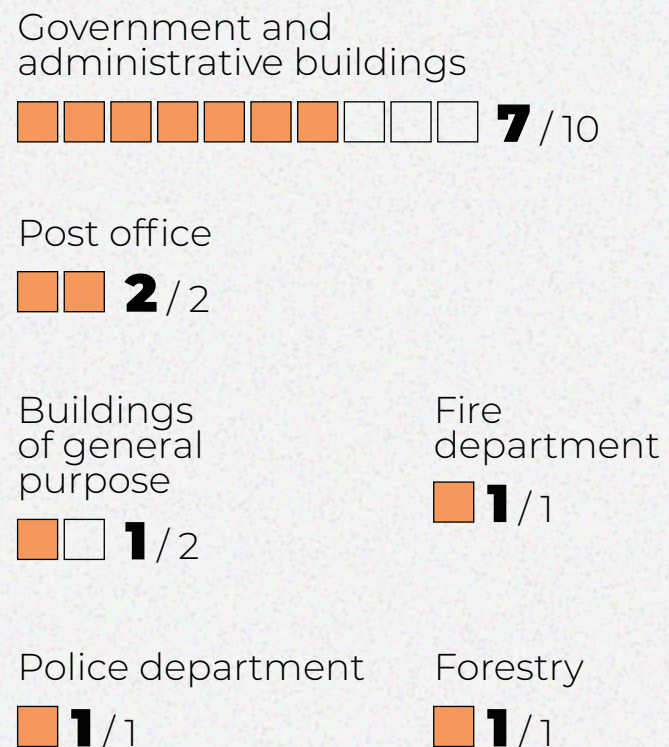
SCALE OF DESTRUCTION

Level of destruction



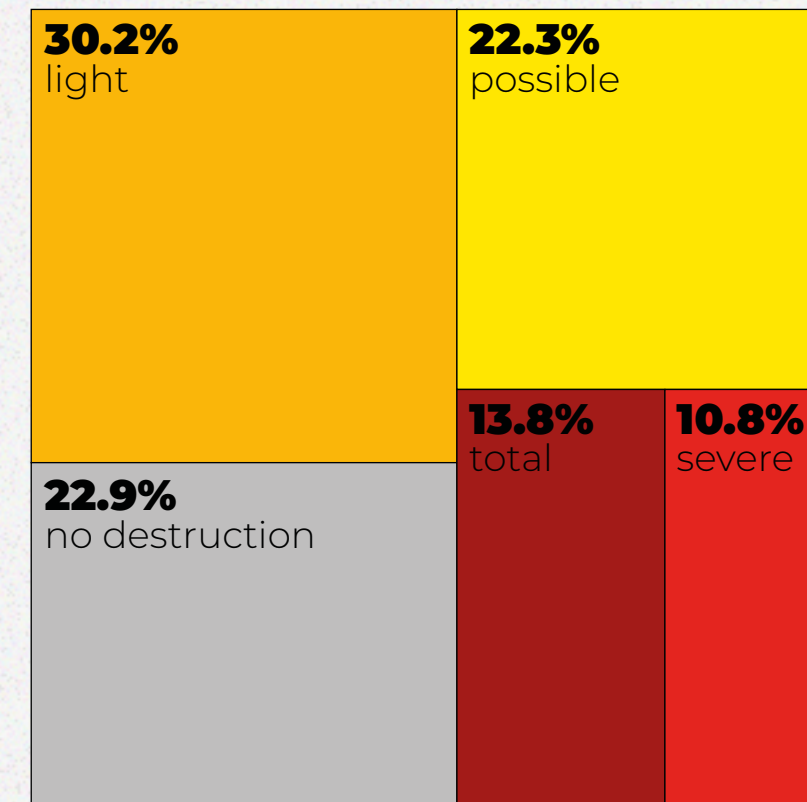
Total damages
\$4.6 million

Number of destroyed buildings



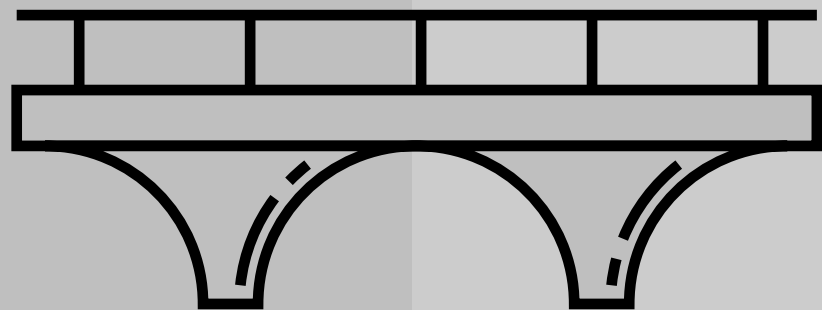
Lost places for work
495 / 641

Area of destruction



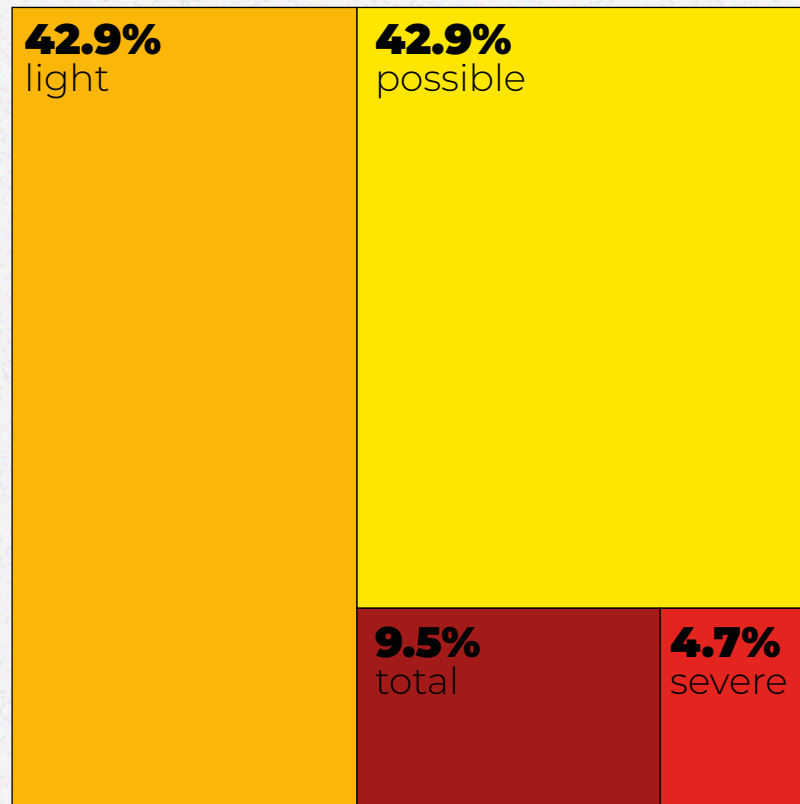
Total area of damage
5.0 ths m²

OTHER INFRASTRUCTURE



SCALE OF DESTRUCTION

Level of destruction



Total damages
\$0.4 million

Number of destroyed buildings

Electricity



Buildings of communal economy



Gas supply



Heat supply



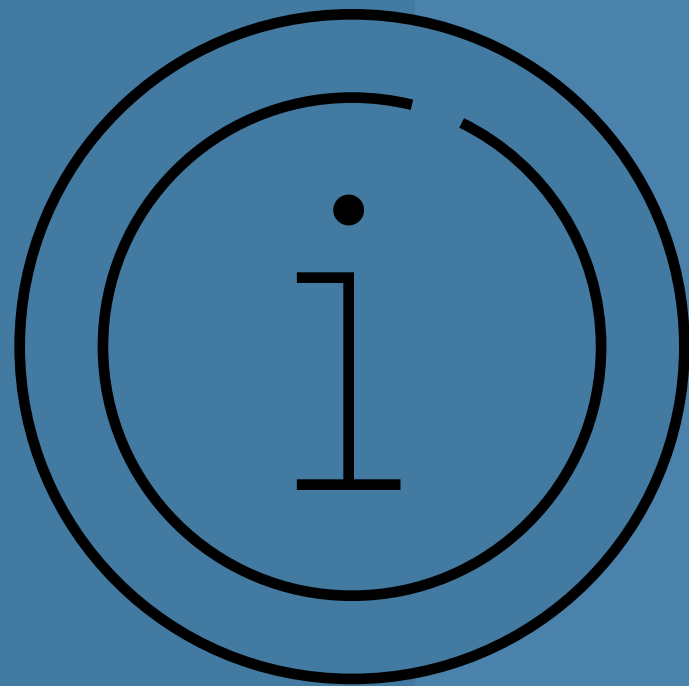
Water supply



Power station



METHODOLOGIES AND ADDITIONAL INFORMATION



HOW WE DETERMINE LEVELS OF DESTRUCTION

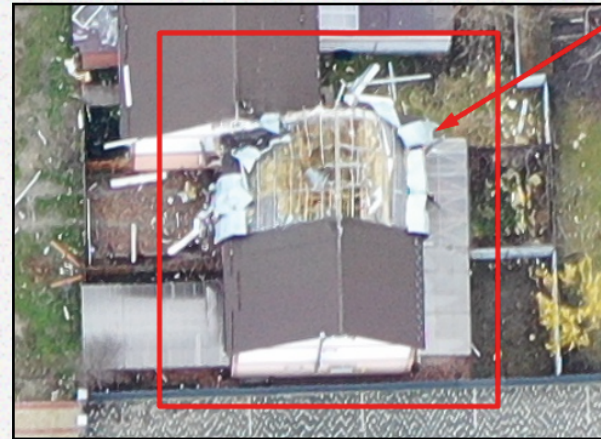
Total destruction



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.

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



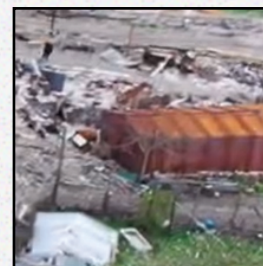
Large objects

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).

PHOTO EVIDENCE

Pharmacy



Private house



Commercial object



Palace of Culture



Outbuilding



Private house



Apartment building



Apartment building



Library

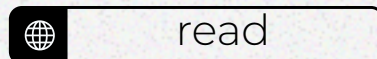


Commercial object

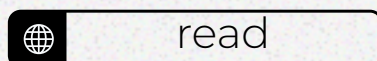


MAKARIV THROUGH THE EYES OF BEHOLDERS

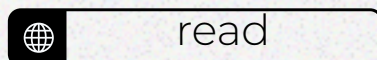
The Russian war against Ukraine:
how Makariv recovers after the battles



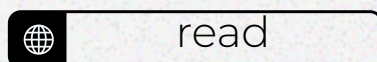
Shell craters and destroyed buildings.
What liberated Makariv in Kyiv Oblast looks like



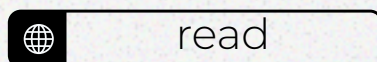
«My boys and I defended the city for 32 days.»
Interview of the Makariv village head



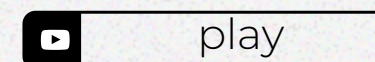
Makariv: Why no one will ever
defeat the Ukrainians



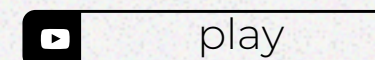
The bodies of 132 residents were found
in Makariv — the village head



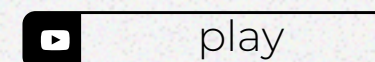
Three hundred against three
thousand. How they defended
Makariv



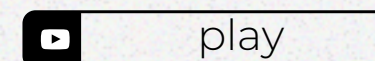
Makariv was never
under occupation!



Atrocities of the Russian aggressors:
133 people were found murdered
in the village of Makariv



«A lot of people are already buried
in the garden»: what is happening in
the village of Makariv in Kyiv region



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 Makariv:

Kevin Casey

Vasyl Khodos

Kateryna Kulyk

Maxim Lazavenko

Anna Lomonos

Oleksandr Nabilskyi

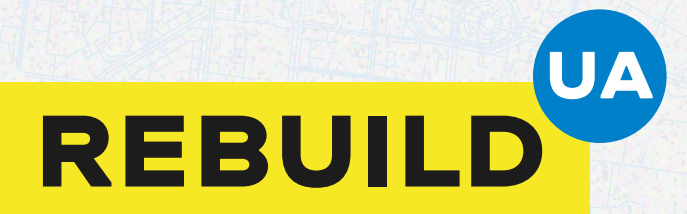
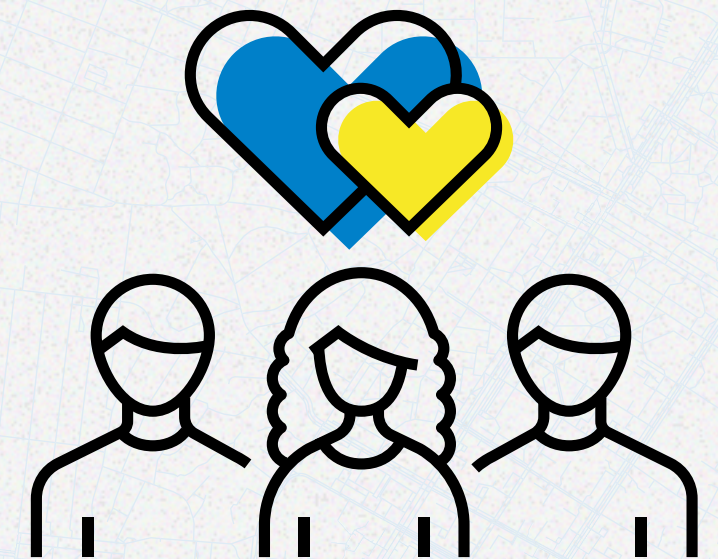
Vladyslav Poda

Sergey Sheludyakov

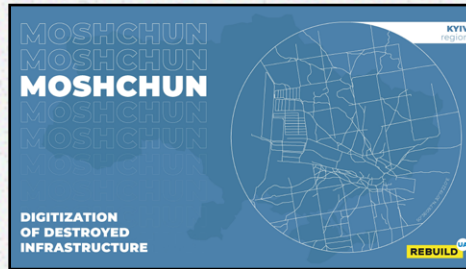
Valentin Shklyarenko

Artem Sorokin

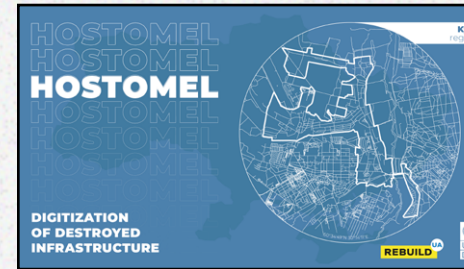
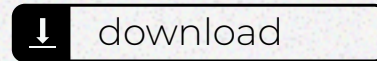
Anna Zelinska



PREVIOUS REPORTS



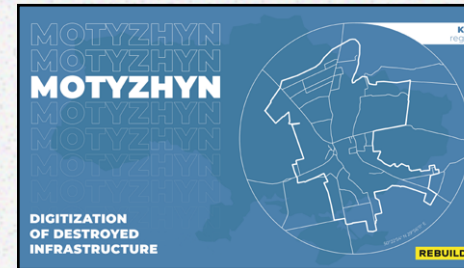
Moshchun,
Buchanskyi district,
Kyiv region



Hostomel,
Buchanskyi district,
Kyiv region



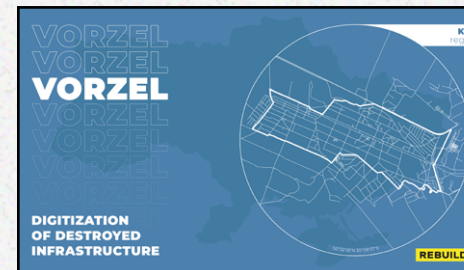
Horenka,
Buchanskyi district,
Kyiv region



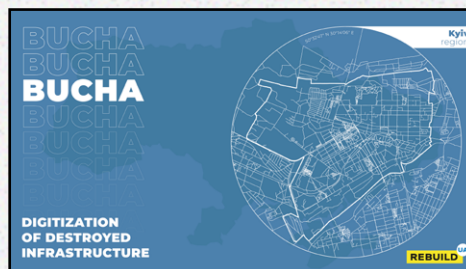
Motyzhyn,
Buchanskyi district,
Kyiv region



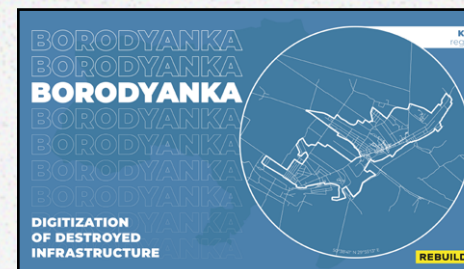
Irpin,
Buchanskyi district,
Kyiv region



Vorzel,
Buchanskyi district,
Kyiv region



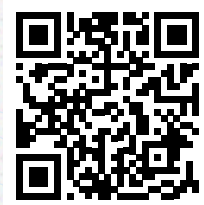
Bucha,
Buchanskyi district,
Kyiv region



Borodyanka,
Buchanskyi district,
Kyiv region



REBUILD



rebuildua.net

Partners:

Assessment of losses and damages, budgeting:



Financial and technical support



Shooting of settlements



Digitization of geospatial information:



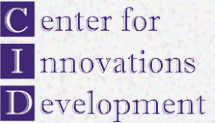
Visual style and content:



Support in cooperation with public authorities:



Cooperation & analysis of community economy, Vkursi Hromada:



Creation of an online map of destroyed new buildings



Supported by:

