TROSTYANETS

Sumy region

50°29'12" N 34°58'59" E

DIGITIZATION OF DESTROYED INFRASTRUCTURE

REBUILD UA
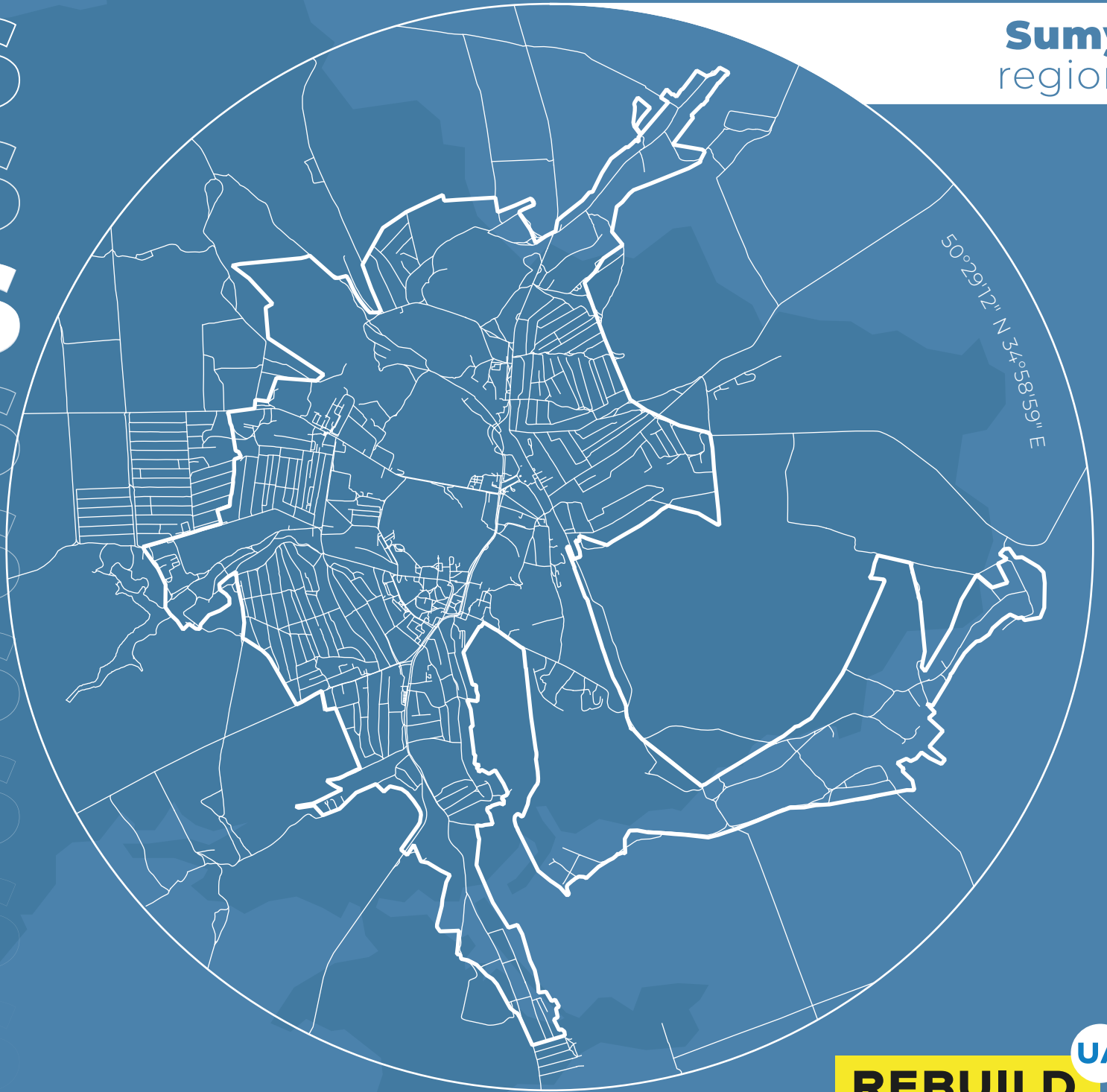
ABOUT THE PROJECT

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:

SMART Farming _

Land analysis and interaction with communities:

VKURSI ZEMLI

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.
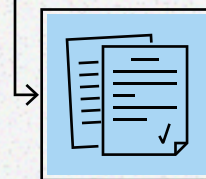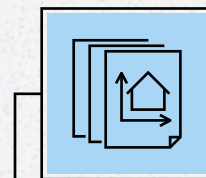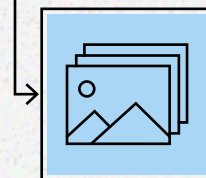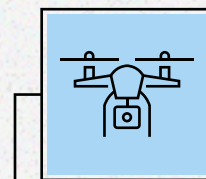
Find out more at the project website: 🌐 rebuildua.net

ABOUT THE PROJECT

Trostyanets is a town near Sumy that suffered occupation by russian invaders over the period February 24 to March 26. From here, the russian military shelled Sumy and Okhtyrka.

After the occupation and military actions, most of the buildings in Trostyanets were destroyed by shelling or burned, and the central part of the town, especially the hospital and the forestry areas, were seriously damaged. The districts located near the key transport infrastructure facilities were ruined.
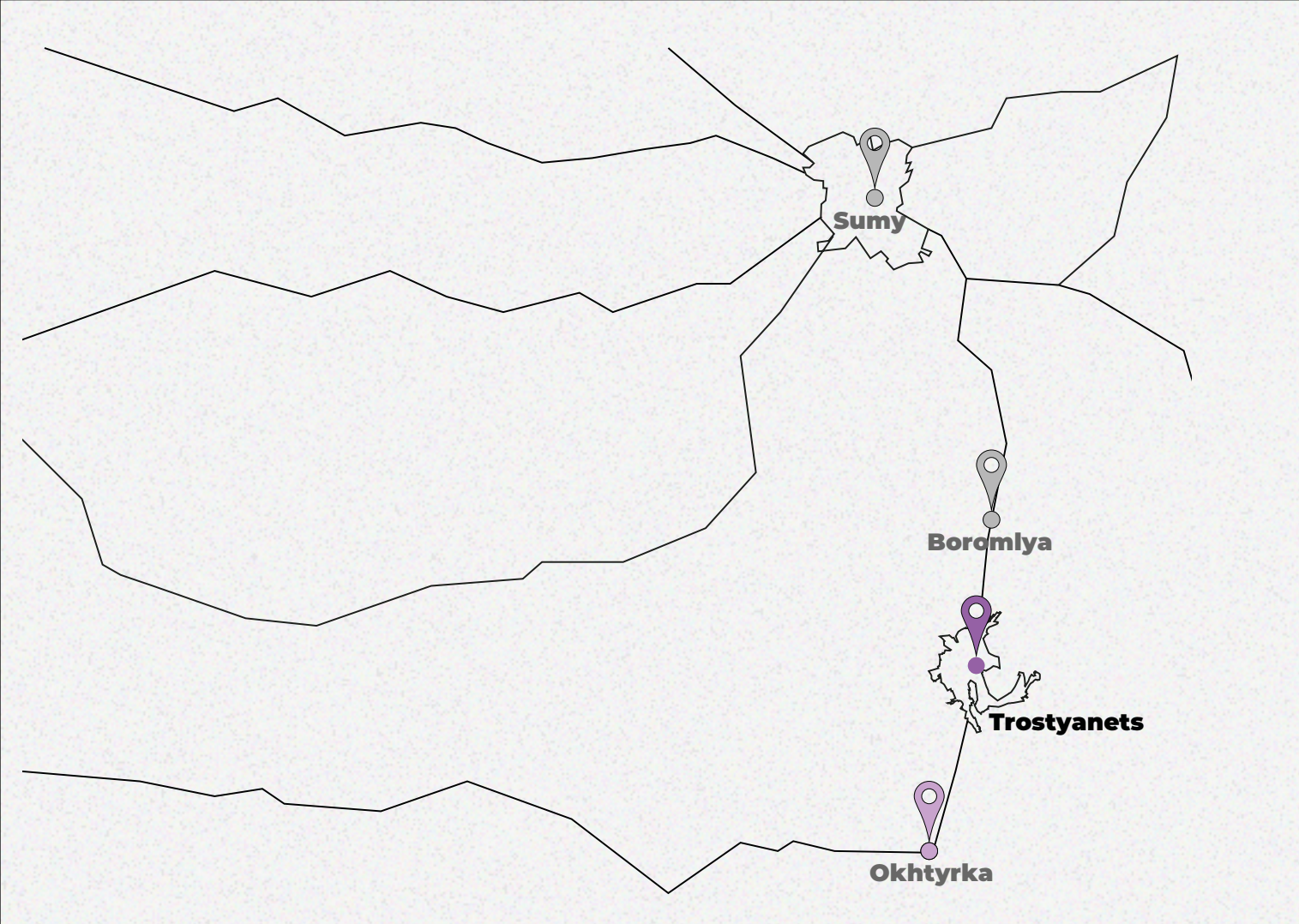
The RebuildUA team analyzed the destruction of Trostyanets and assessed the damage caused.

🌐 rebuildua.net f /rebuildua.net

Photo: destruction.in.ua, open sources

Sumy

Boromlya

Trostyanets

Okhtyrka

Region	**Sumy**			area		population
District	**Okhtyrskyi**			**30.2 km²**		**19,900**
Community	**Trostyanetska**					

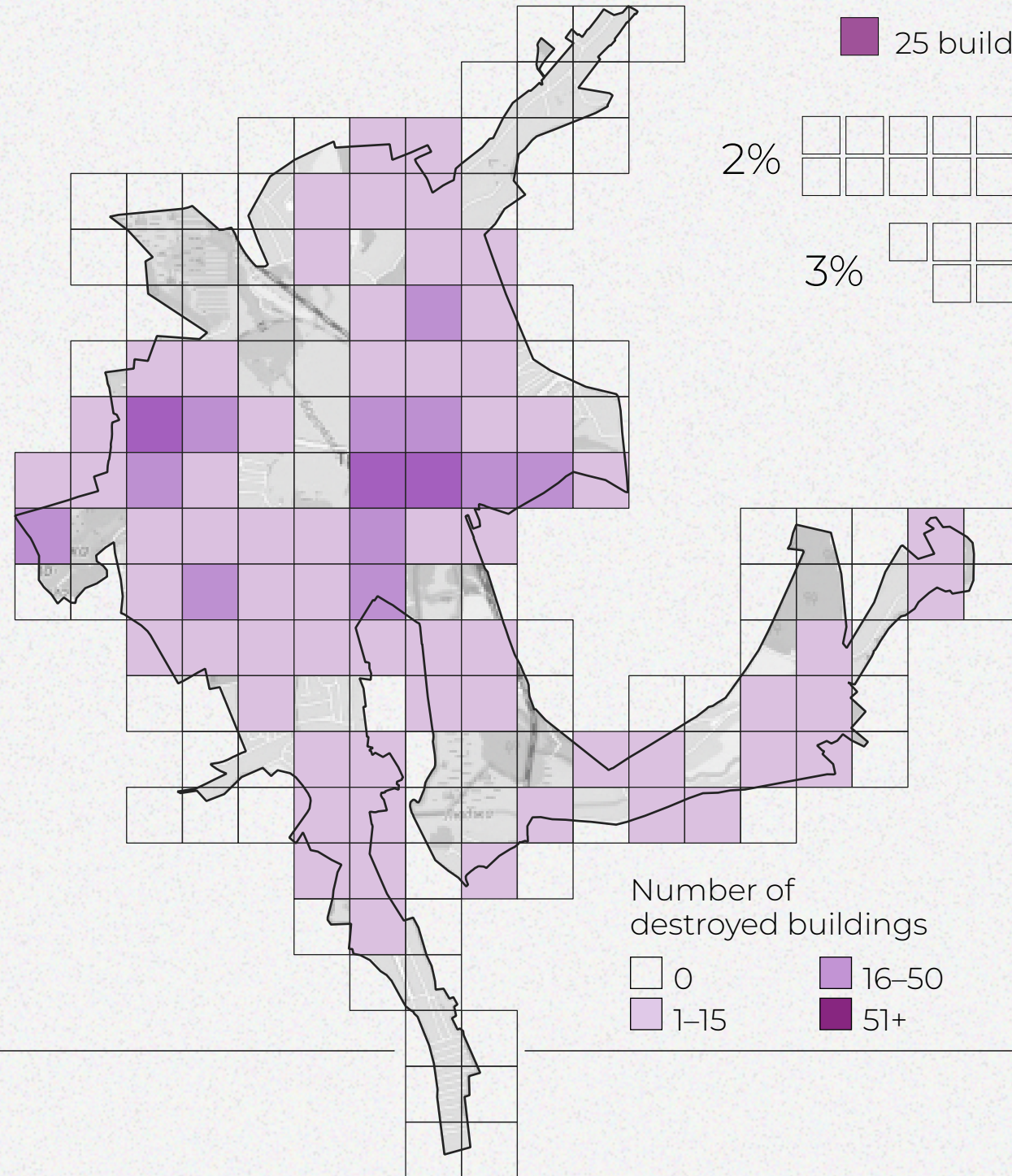# DIGITIZATION PROCESS
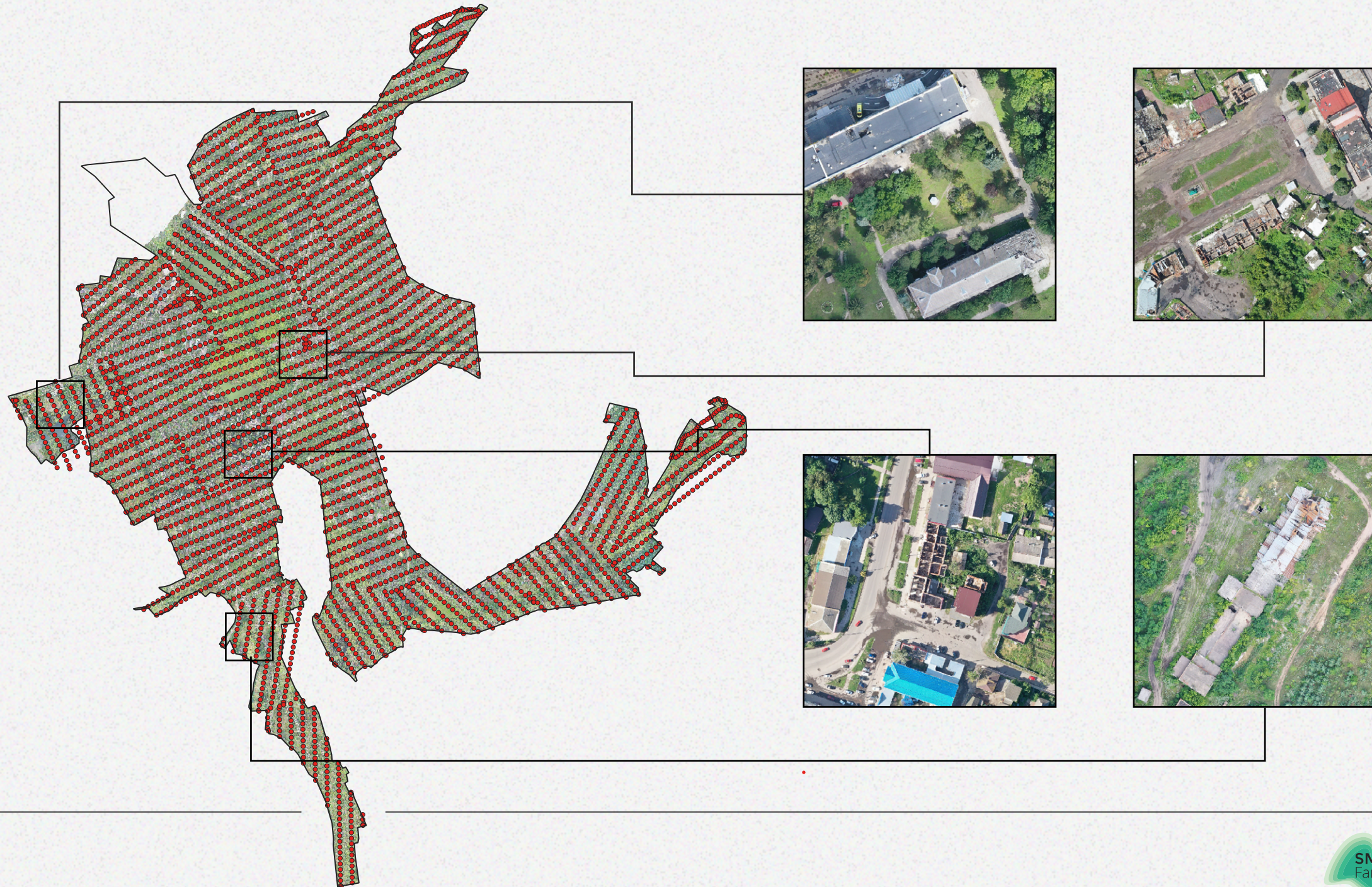
3,196 pictures for orthophoto

610 hours of data processing

40.9 Gigabytes of data

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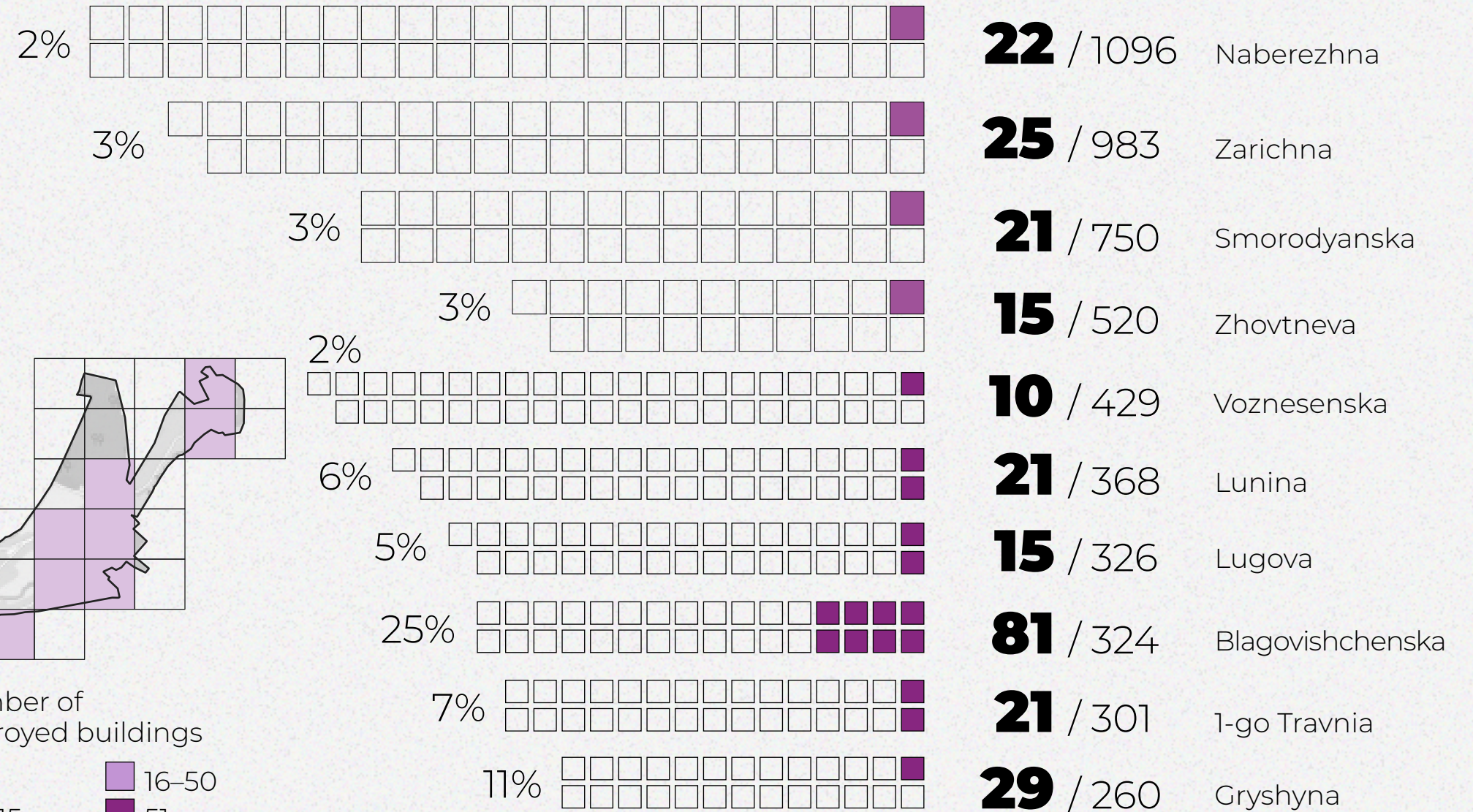
······ trajectory of drone shooting

SMART Farming

VKURSI ZEMLI

TOP LEAD

THERMAL MAP OF DESTRUCTION

25 buildings · **10 buildings**

Destruction of the largest streets

%	Destroyed	Total	Street
2%	22	/ 1096	Naberezhna
3%	25	/ 983	Zarichna
3%	21	/ 750	Smorodyanska
3%	15	/ 520	Zhovtneva
2%	10	/ 429	Voznesenska
6%	21	/ 368	Lunina
5%	15	/ 326	Lugova
25%	81	/ 324	Blagovishchenska
7%	21	/ 301	1-go Travnia
11%	29	/ 260	Gryshyna

Number of destroyed buildings

- 0
- 1–15
- 16–50
- 51+

SMART Farming_   VKURSI ZEMLI   TOP LEAD

LEVELS OF DESTRUCTION

Buildings destroyed:

829 / 20,150

Level of destruction, number of buildings

436 (52.6%)
possible

259 (31.2%)
light

89 (10.7%)
total

45 (5.4%)
severe
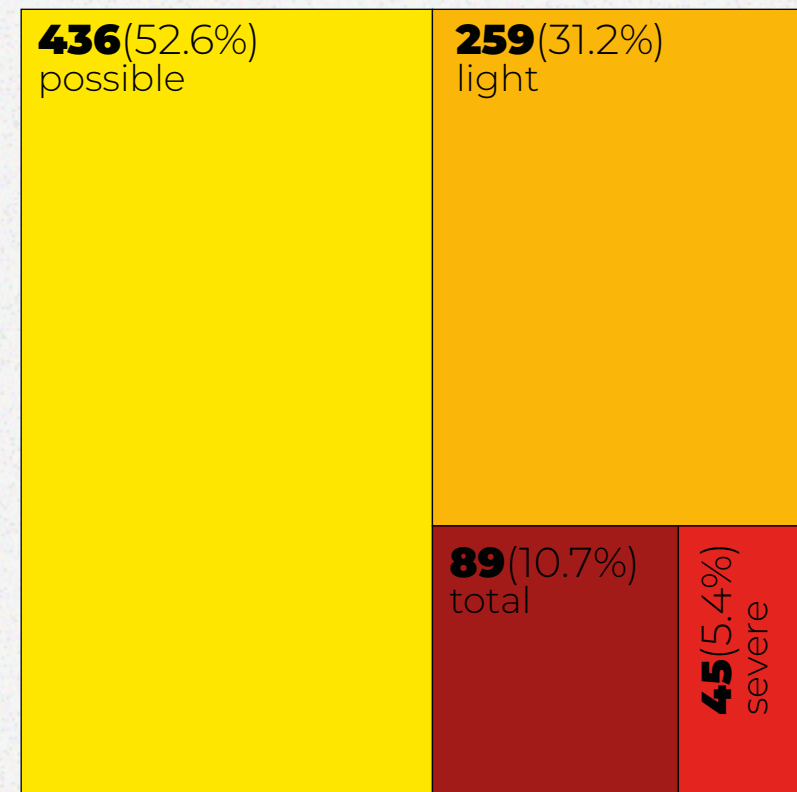
- total destruction
- severe destruction
- light destruction
- possible destruction
- no destruction

SMART Farming _   VKURSI ZEMLI   TOP LEAD

TYPES OF DESTROYED OBJECTS

Residential buildings & outbuildings **660** (79.6%)
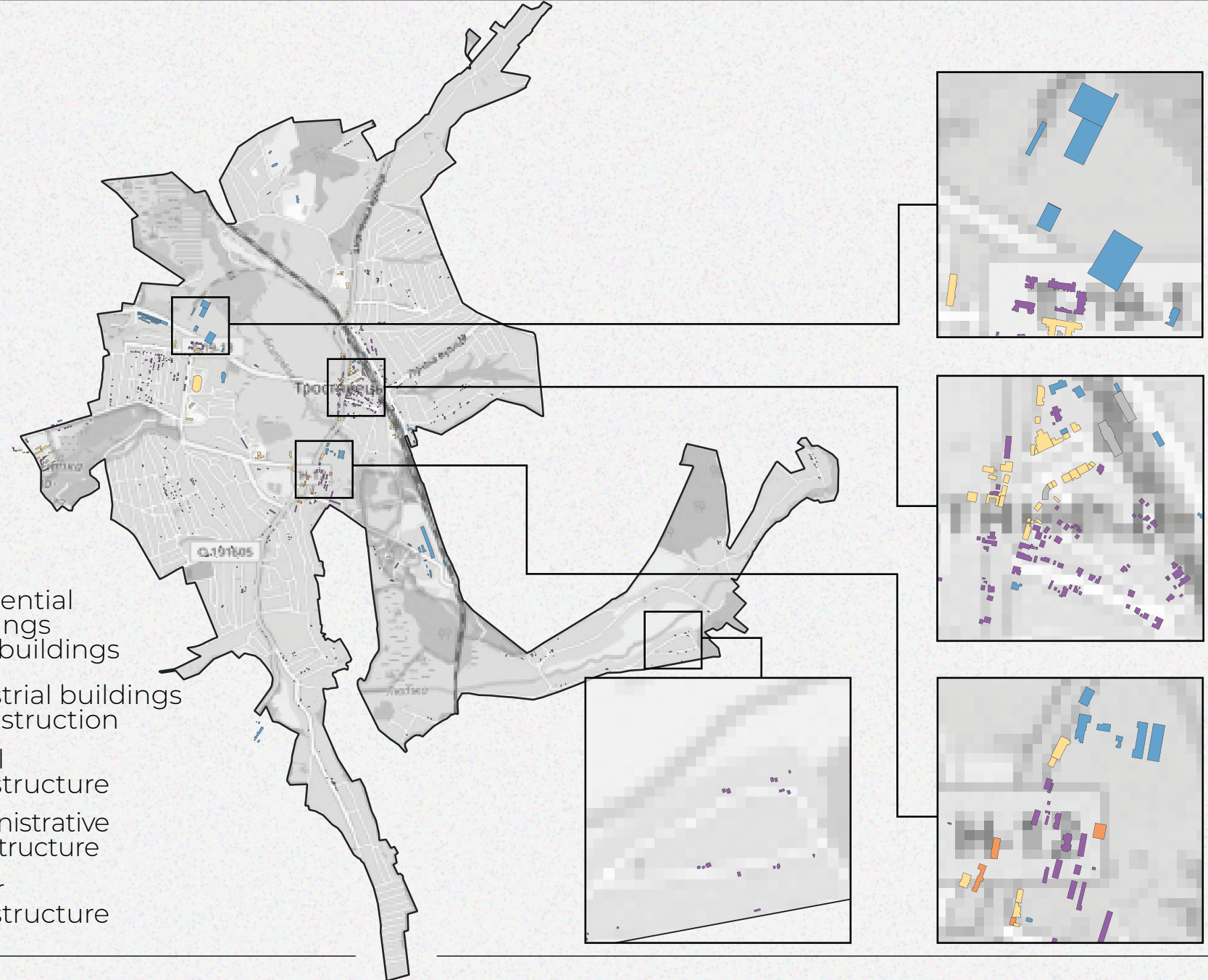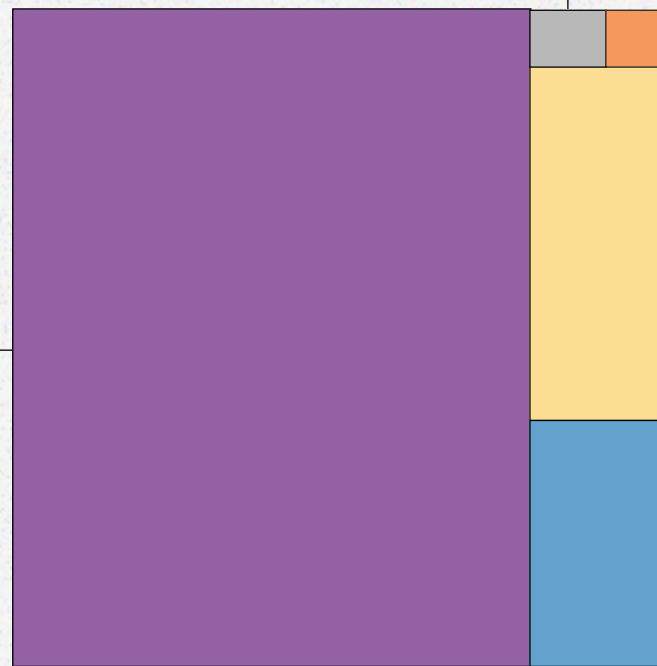
Industrial buildings & construction **63** (7.6%)

Social infrastructure **91** (11.0%)

Administrative infrastructure **7** (0.8%)
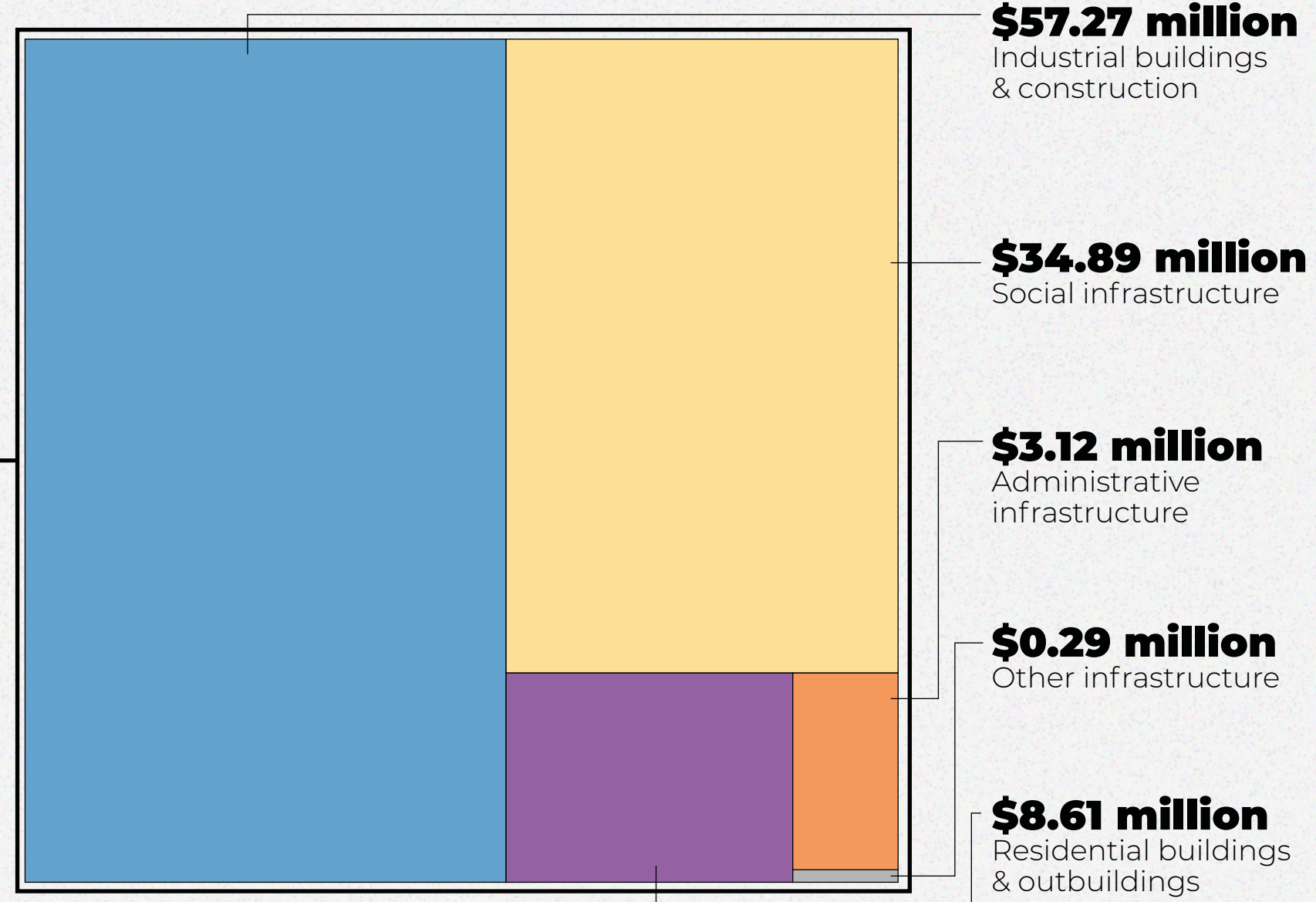
Other infrastructure **8** (1.0%)

■ Residential buildings & outbuildings

■ Industrial buildings & construction

■ Social infrastructure

■ Administrative infrastructure

■ Other infrastructure

SMART Farming

VKURSI ZEMLI

TOP LEAD

ASSESSMENT OF DAMAGES

Damages by types of buildings

$57.27 million
Industrial buildings
& construction

$34.89 million
Social infrastructure

Total damages
$104.17 million

$3.12 million
Administrative
infrastructure

$0.29 million
Other infrastructure

$8.61 million
Residential buildings
& outbuildings

SMART Farming_   VKURSI ZEMLI   TOP LEAD

RESIDENTIAL BUILDINGS & OUTBUILDINGS

REBUILD UA
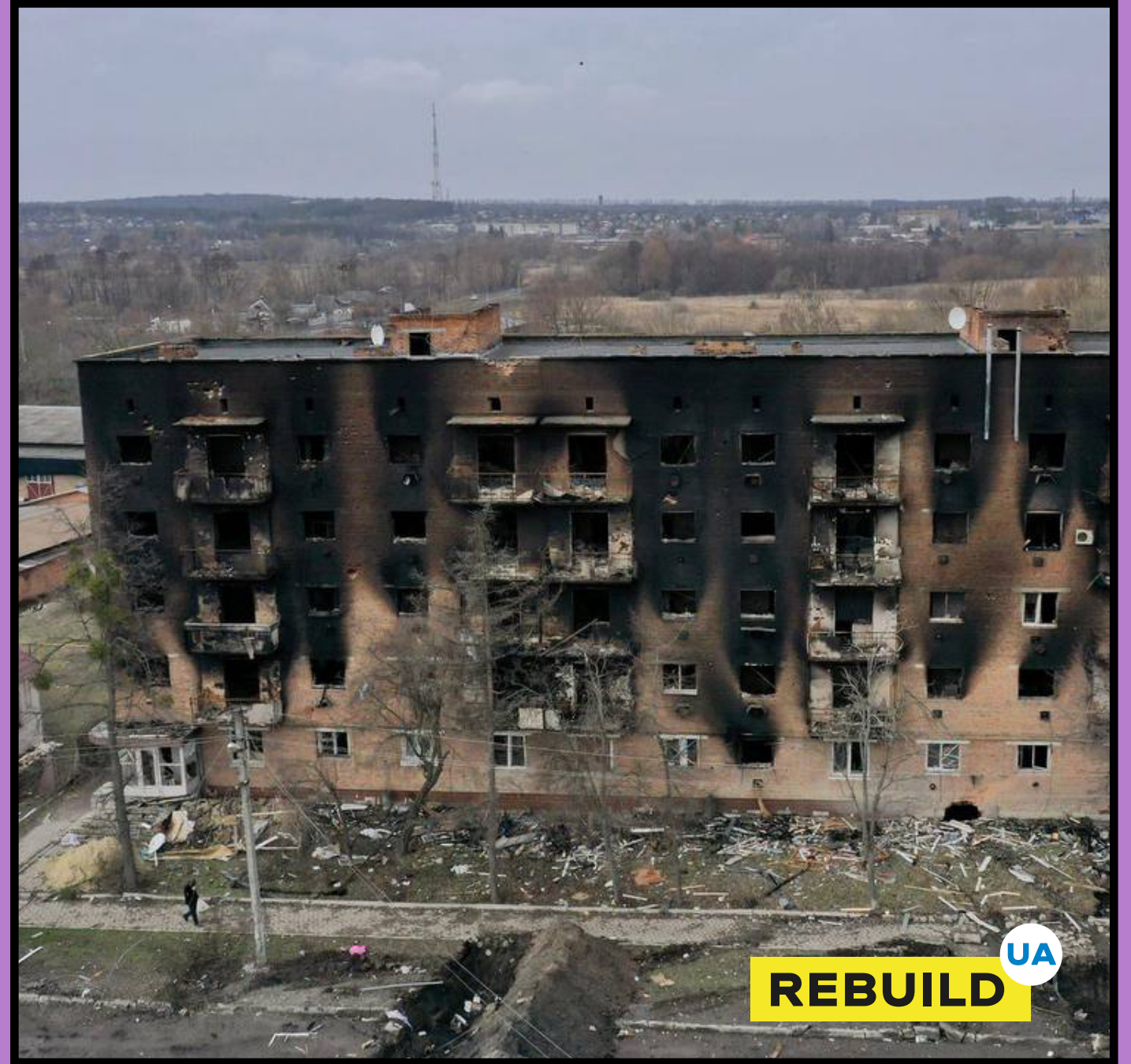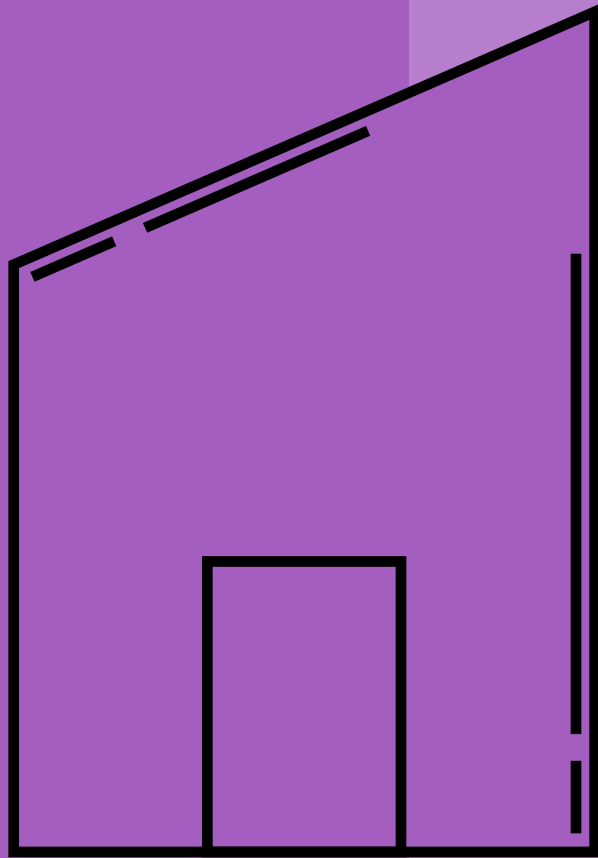
SCALE OF DESTRUCTION

Outbuildings
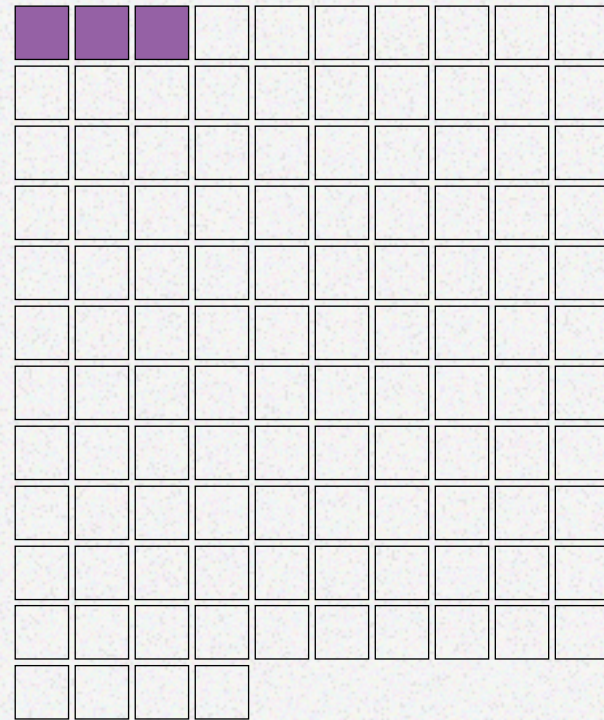
282
/ 11,421

Private houses

← 100 units
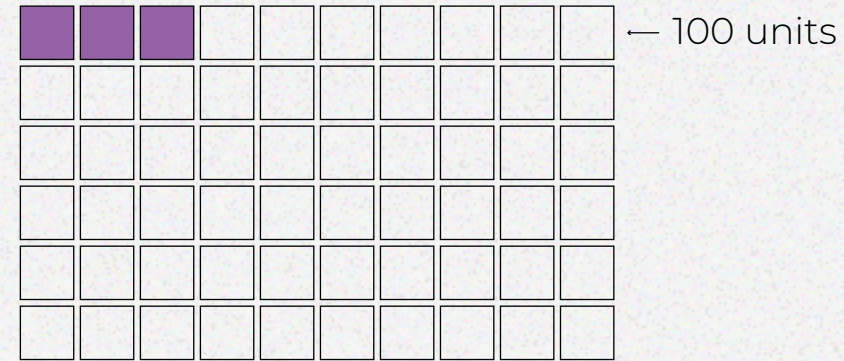
283
/ 5,976

Apartment buildings

← 1 unit
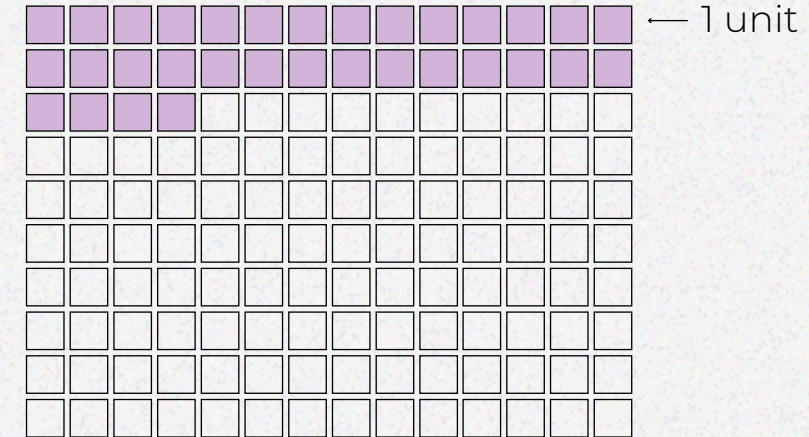
32
/ 140

Cottages
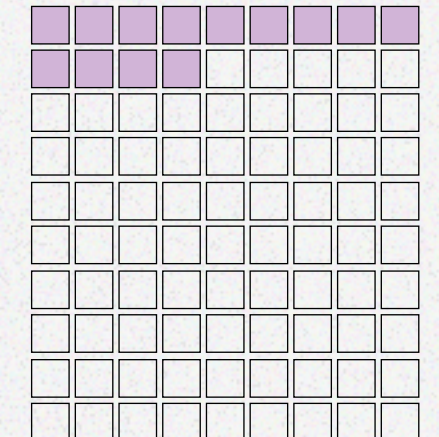
13
/ 90

Garages and parking spaces

← 20 units
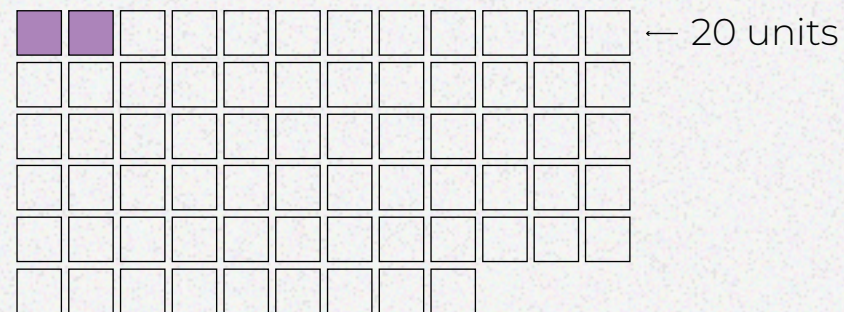
46
/ 1,374

Greenhouses
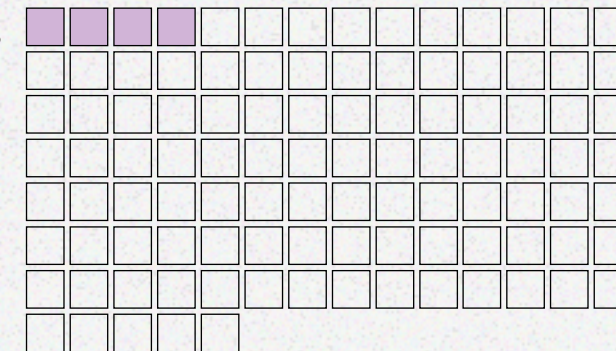
4
/ 103

SMART Farming_   VKURSI ZEMLI   TOP LEAD

SCALE OF DESTRUCTION

Level of destruction

58.2% (384)
possible

31.4% (207)
light

7.6% (50)
total

2.9% (19)
severe

Assessment of damages

Total damages
$8.6 million

$4.09 million
Apartment buildings

$3.84 million
Private houses & townhouses

$0.67 million
Outbuildings

SMART Farming_

VKURSI ZEMLI

KSE | Institute

TOP LEAD

RESIDENTIAL BUILDINGS

Level of destruction

56.7% (186)
possible

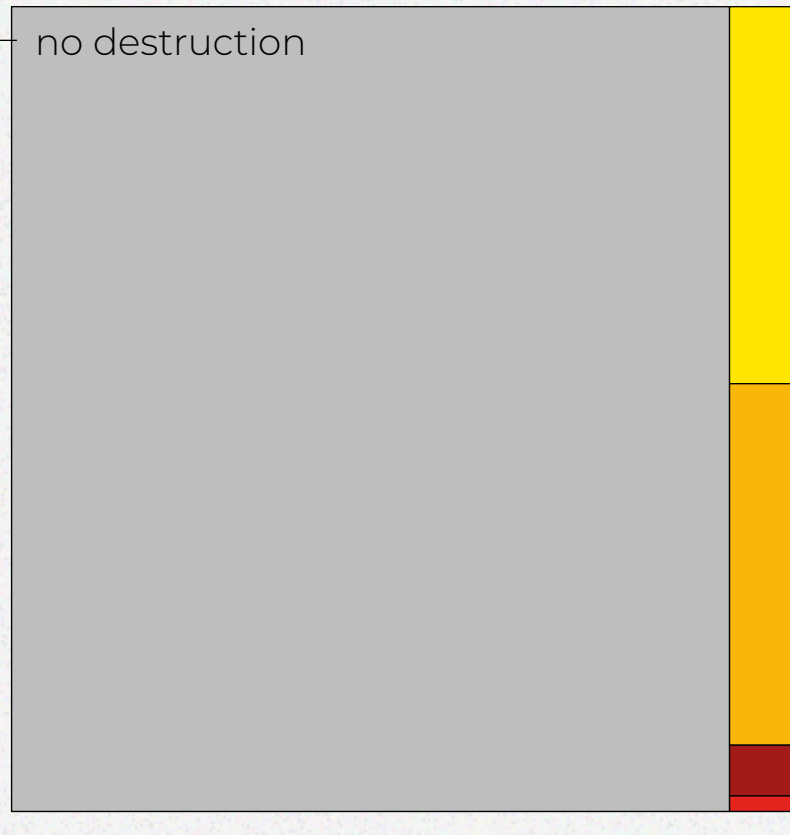**35.1%** (115)
light

7.0% (23)
total

1.2% (4)
severe
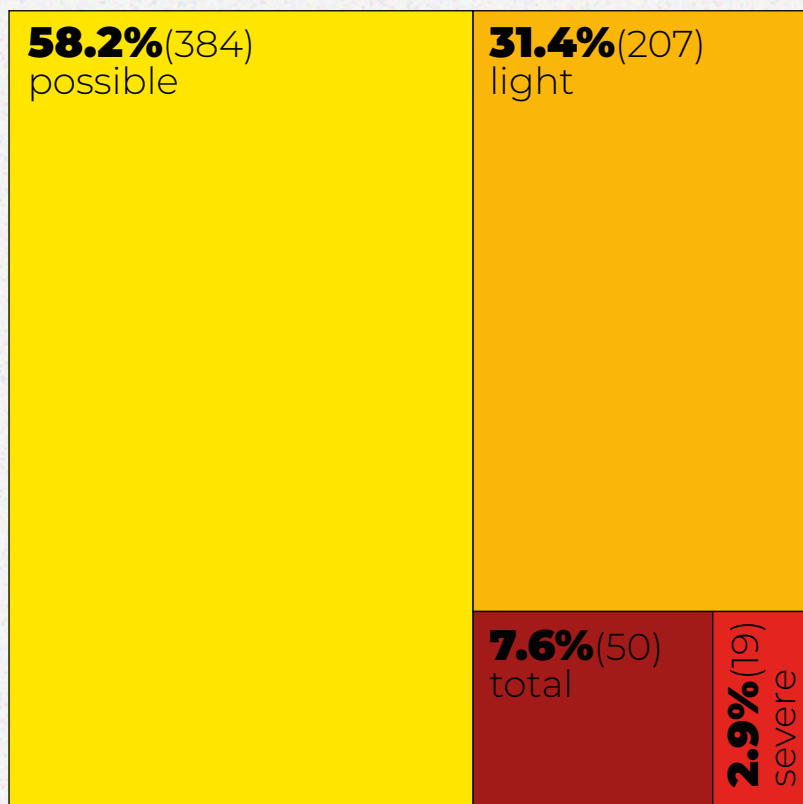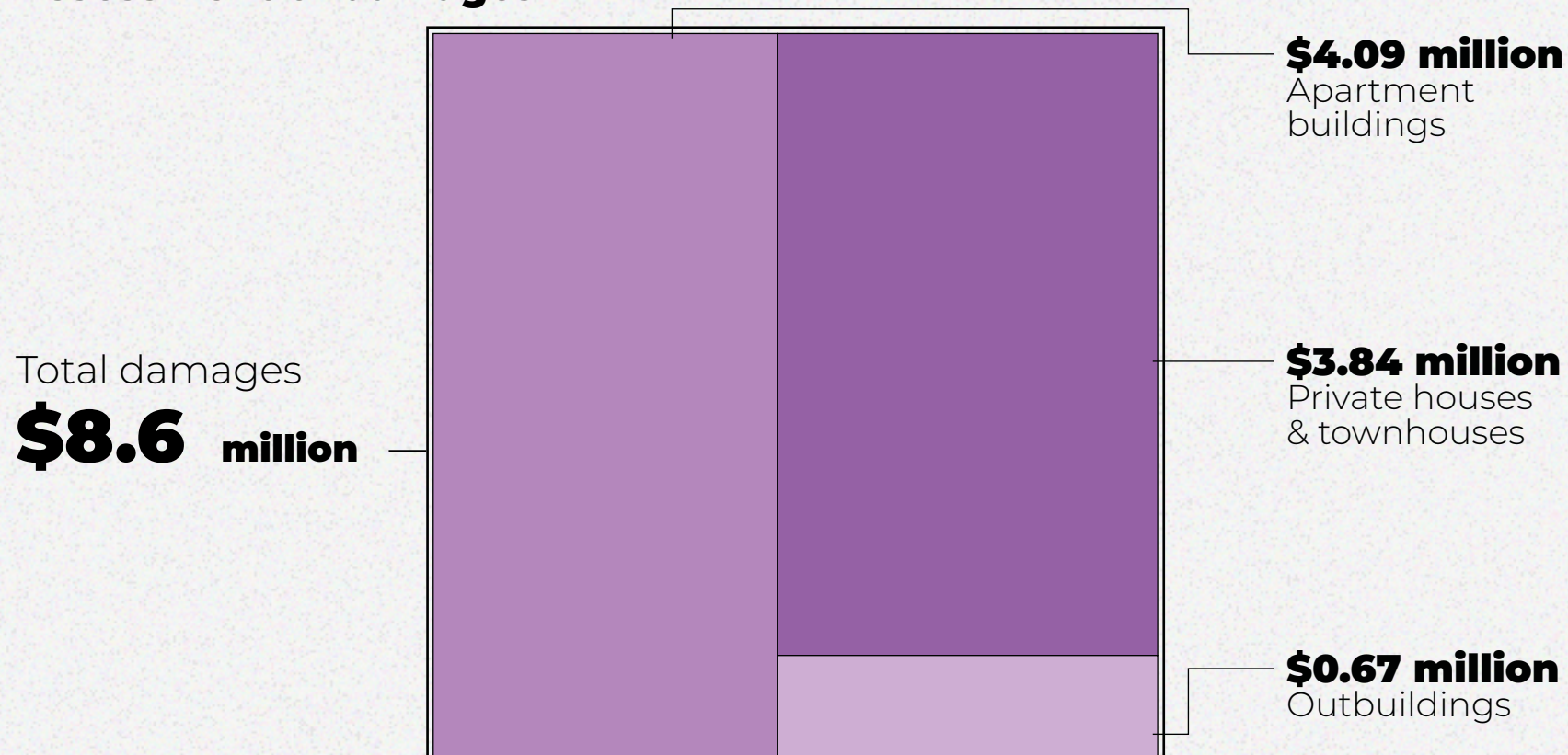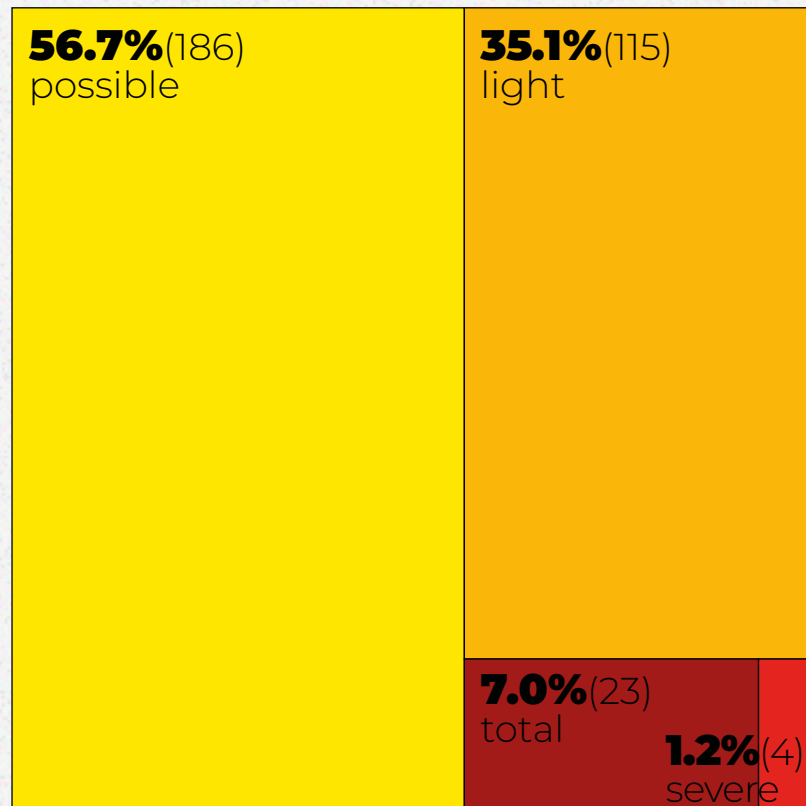
Total damages
$7.9 million

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

838.9 ths m²

17,204 people

no destruction

possible

49.2 ths m²

1,217 people

light

46.4 ths m²

1,307 people

severe

0.6 ths m²

11 people

total

2.7 ths m²

49 people

Total area of damage
98.9 ths m²

Number of residents affected
2,583

SMART Farming

VKURSI ZEMLI

KSE | Institute

Урбанина

TOP LEAD

OUTBUILDINGS

Level of destruction

59.7% (198)
possible

27.7% (92)
light

8.1% (27)
total

4.5% (15)
severe
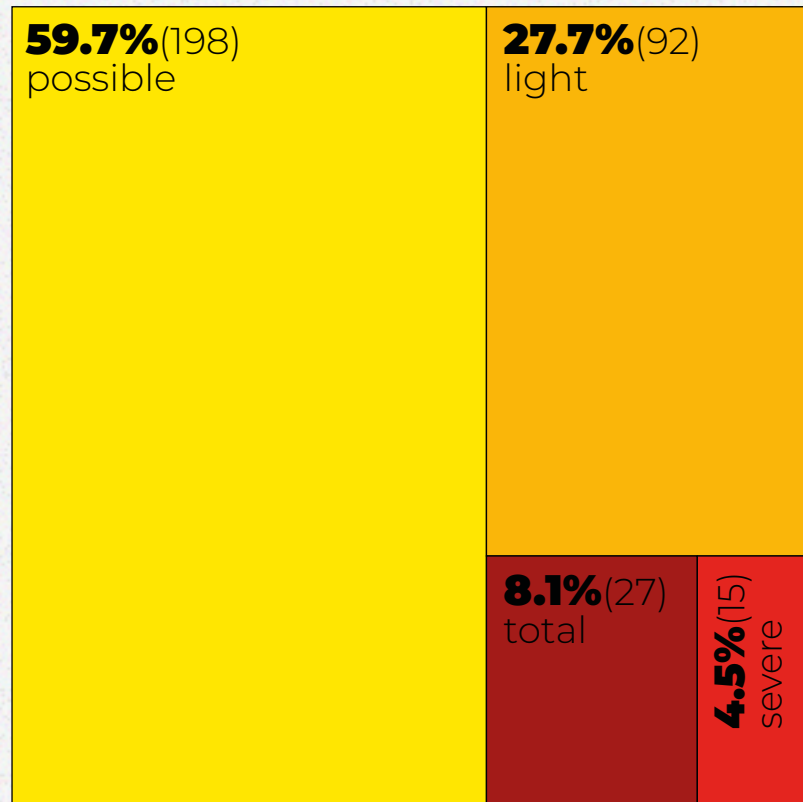
Total damages
$0.6 million

Area of destruction

564.1 ths m²   no destruction

possible
11.9 ths m²

light
7.0 ths m²

total
1.1 ths m²

severe
1.4 ths m²
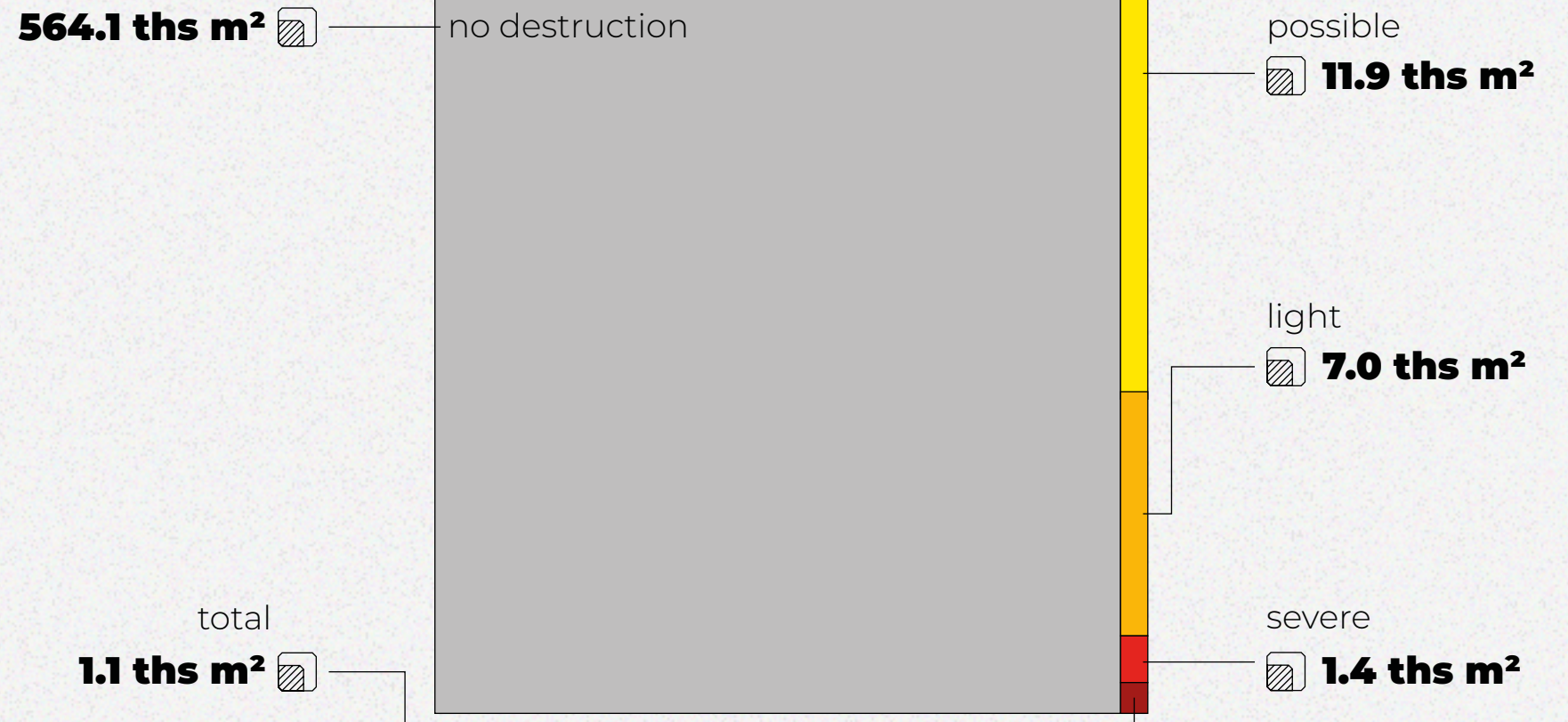
Total area of damage
21.4 ths m²

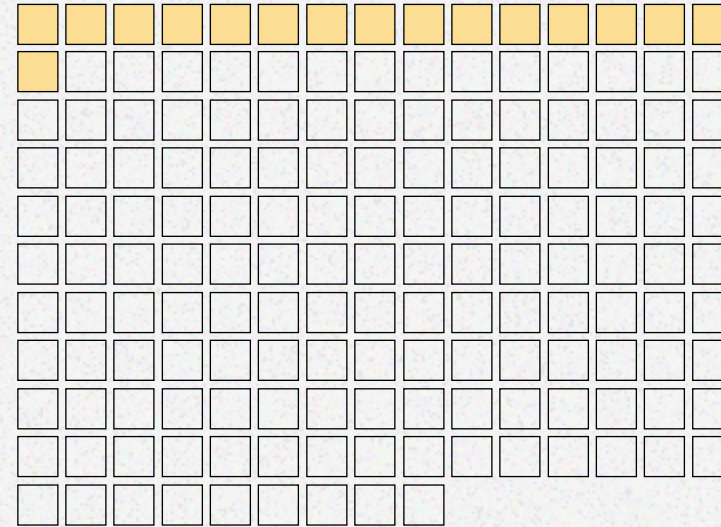SMART Farming _   VKURSI ZEMLI   KSE | Institute   Урбанина   TOP LEAD

SOCIAL INFRASTRUCTURE
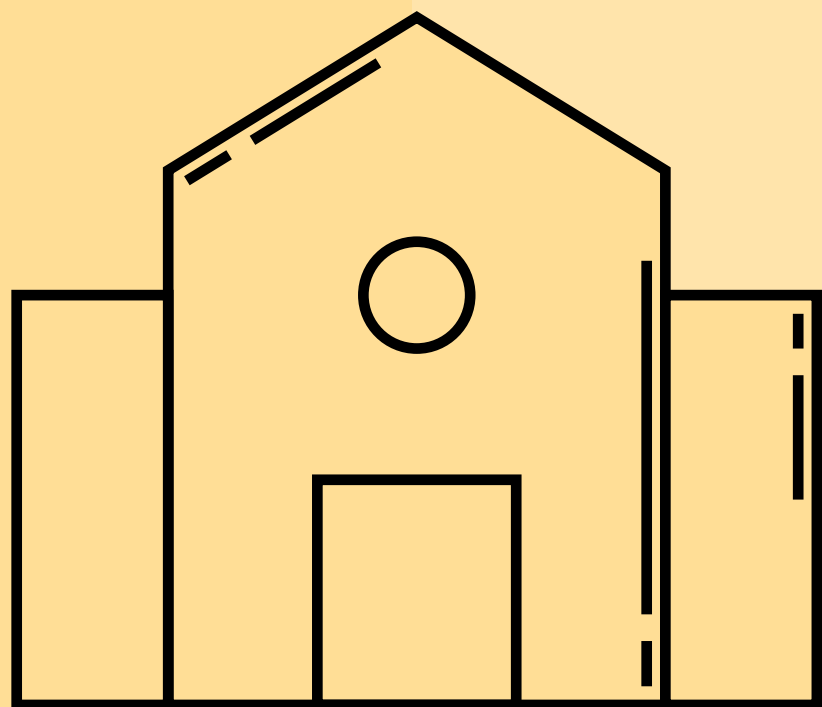
SCALE OF DESTRUCTION
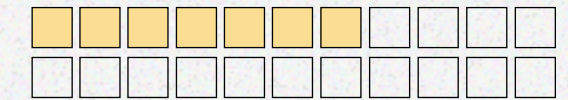
Trade & commerce
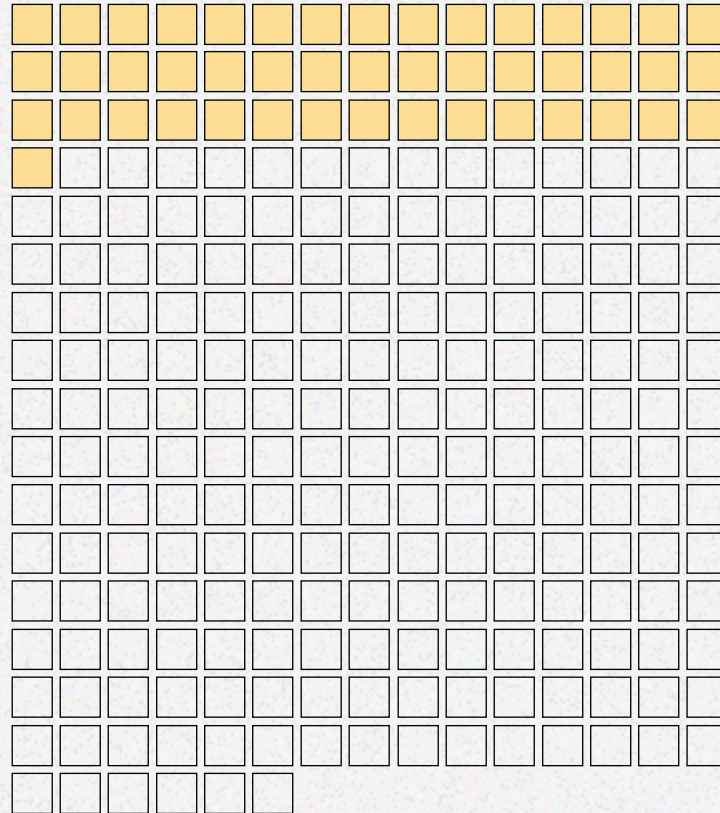
46
/ 246

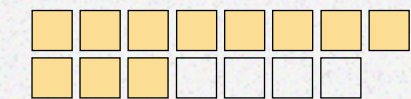Buildings of general purpose

16
/ 155

Educational institutions

9
/ 25

Culture, religion &
sports institutions

7
/ 22

Healthcare
facilities

11
/ 15

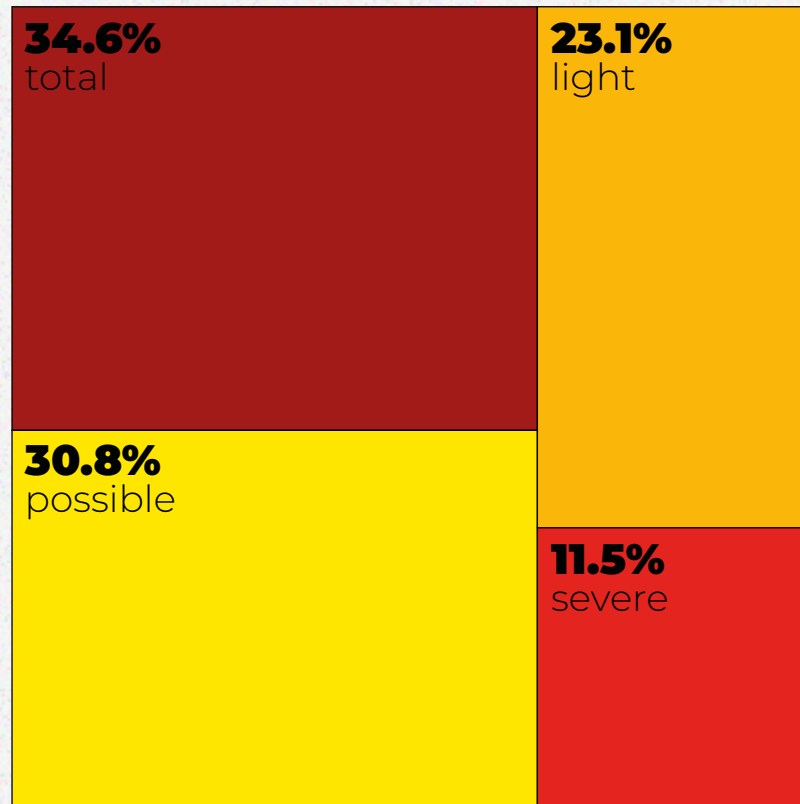Offices, hotels
& recreation

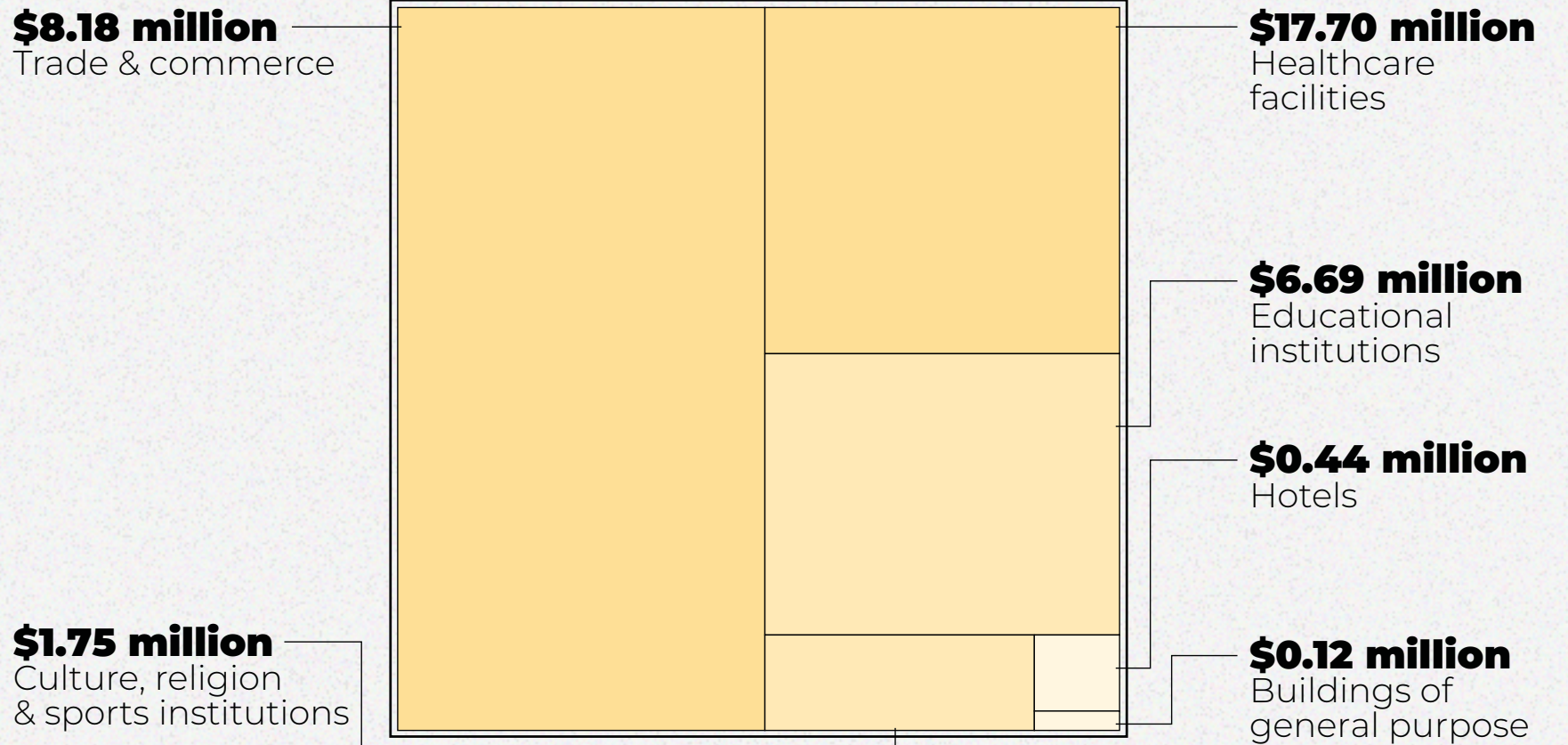**2**
/ 4

SMART Farming_   VKURSI ZEMLI   TOP LEAD

SCALE OF DESTRUCTION

Level of destruction

34.6%
total

23.1%
light

30.8%
possible

11.5%
severe

Assessment of damages

$8.18 million
Trade & commerce

$17.70 million
Healthcare facilities

$6.69 million
Educational institutions

$0.44 million
Hotels

$1.75 million
Culture, religion & sports institutions

$0.12 million
Buildings of general purpose

Total damages
$34.9 million

SMART Farming_

VKURSI ZEMLI

KSE | Institute

TOP LEAD

CULTURE, RELIGION & SPORTS

SOCIAL INFRASTRUCTURE

Level of destruction

44.5%(4) possible

33.3%(3) light

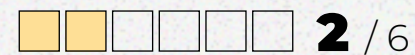**22.2%**(2) severe
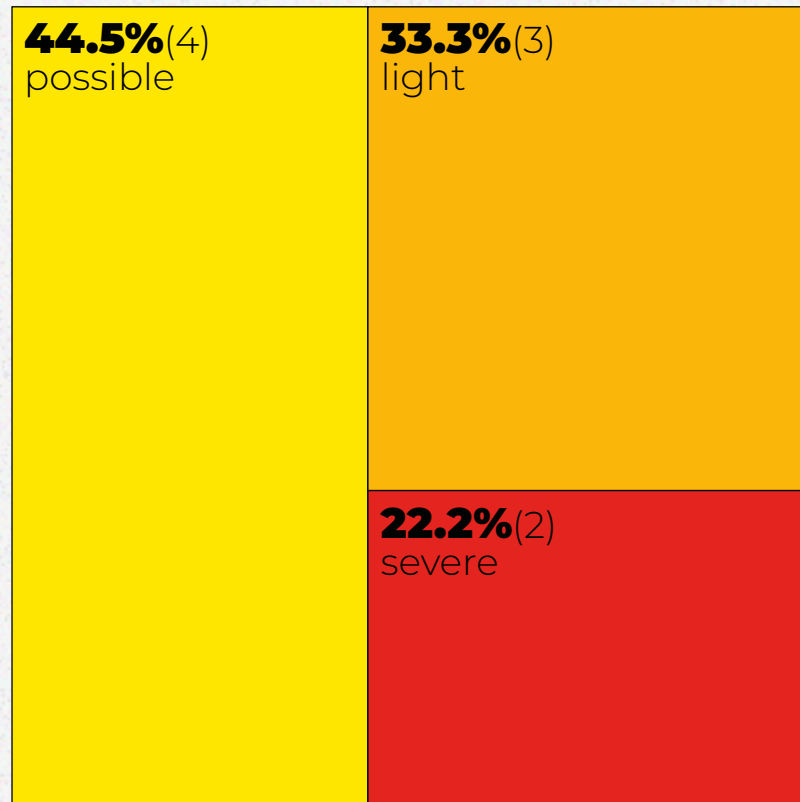
Total damages
$2.19 million

Number of destroyed buildings

Cultural institutions
3 / 6
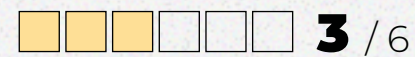
Museums & historical monuments
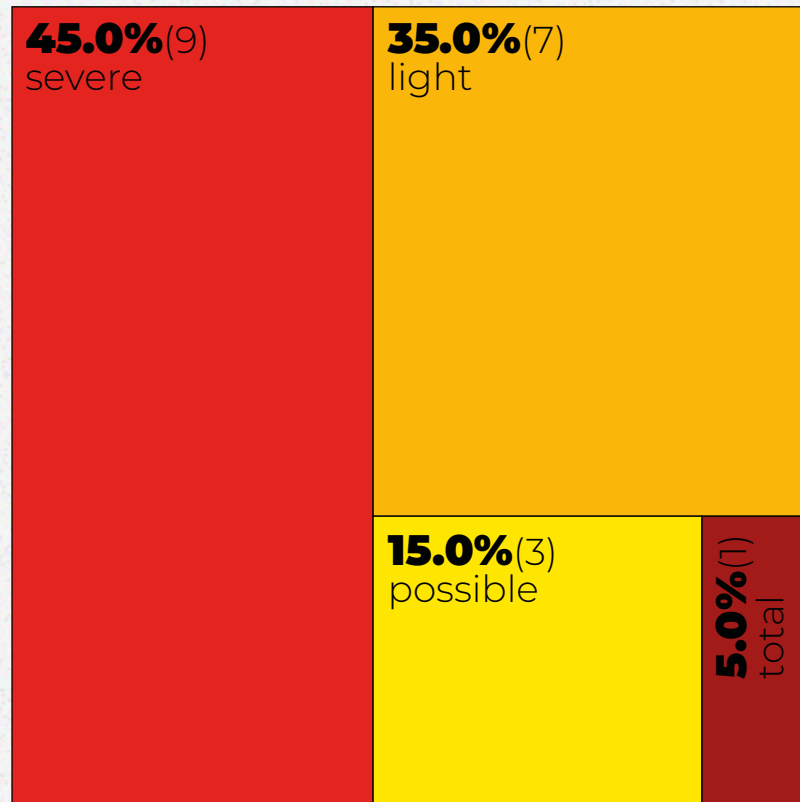**2** / 6

Hotels & recreational facilities
2 / 4

Sports facilities
2 / 3

Kenig's mansion

SMART Farming VKURSI ZEMLI KSE | Institute TOP LEAD

Level of destruction

45.0%(9)
severe

35.0%(7)
light

15.0%(3)
possible

5.0%(1)
total

Total damages
$24.4 million

Number of destroyed buildings

School (buildings)
5 / 16

Hospital (buildings)
11 / 15
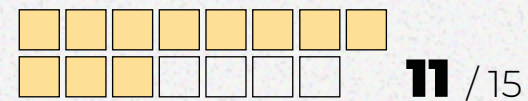
Kindergarten (buildings)
3 / 5

Scientific Research Institute (buildings)
1 / 3

Hospital

SMART Farming

VKURSI ZEMLI

KSE | Institute

TOP LEAD
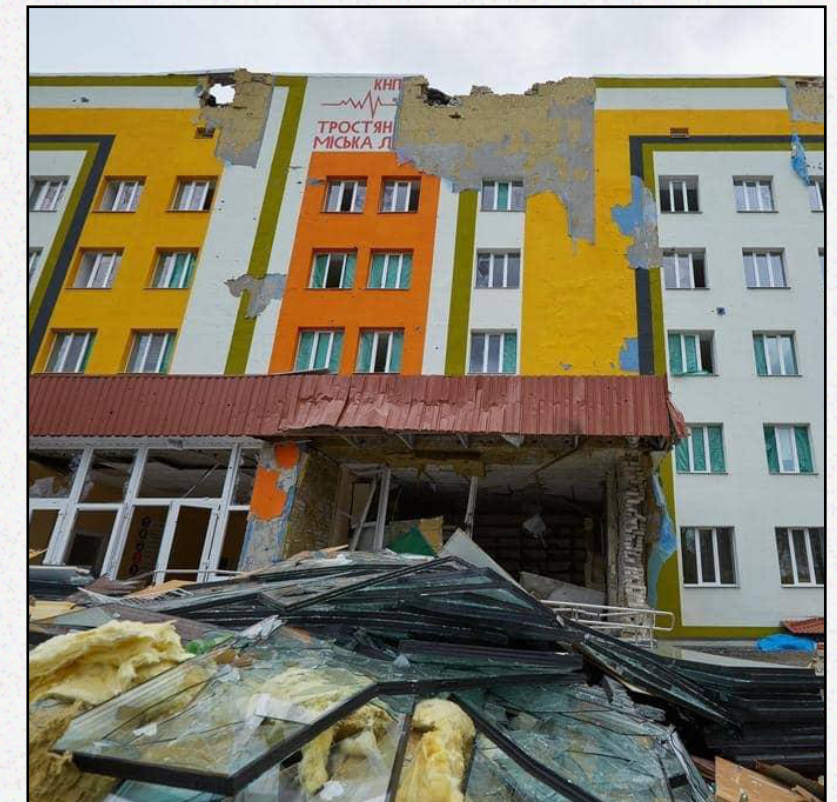
COMMERCIAL BUILDINGS

Level of destruction

41.3% (19)
total

21.7% (10)
light

21.7% (10)
possible

15.3% (7)
severe
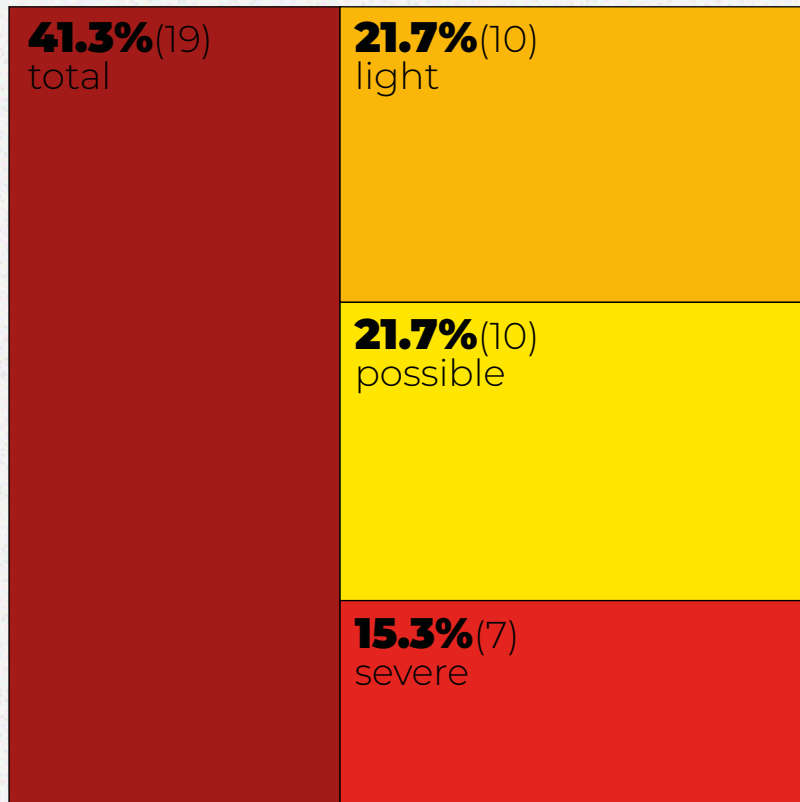
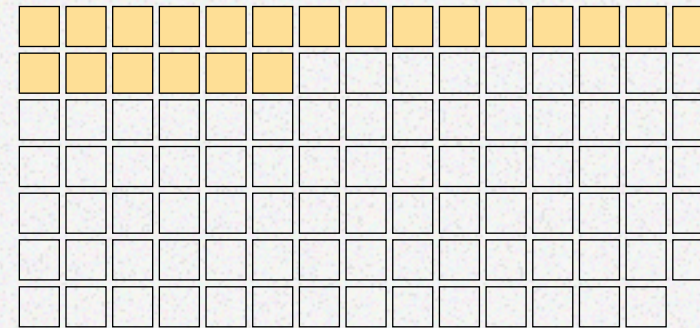Total damages
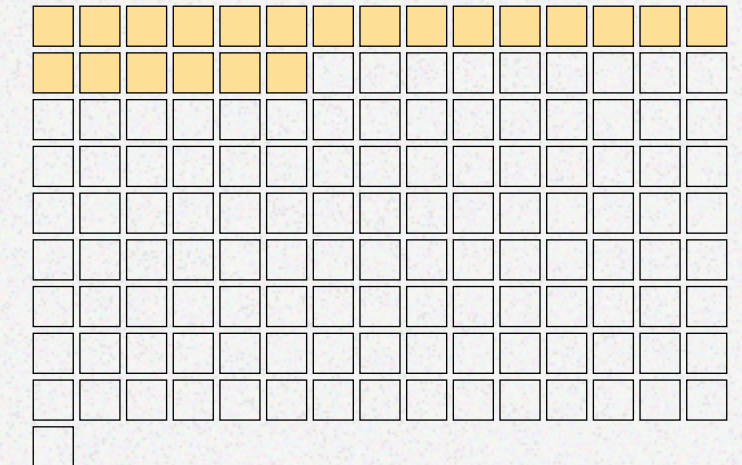## $8.18 million

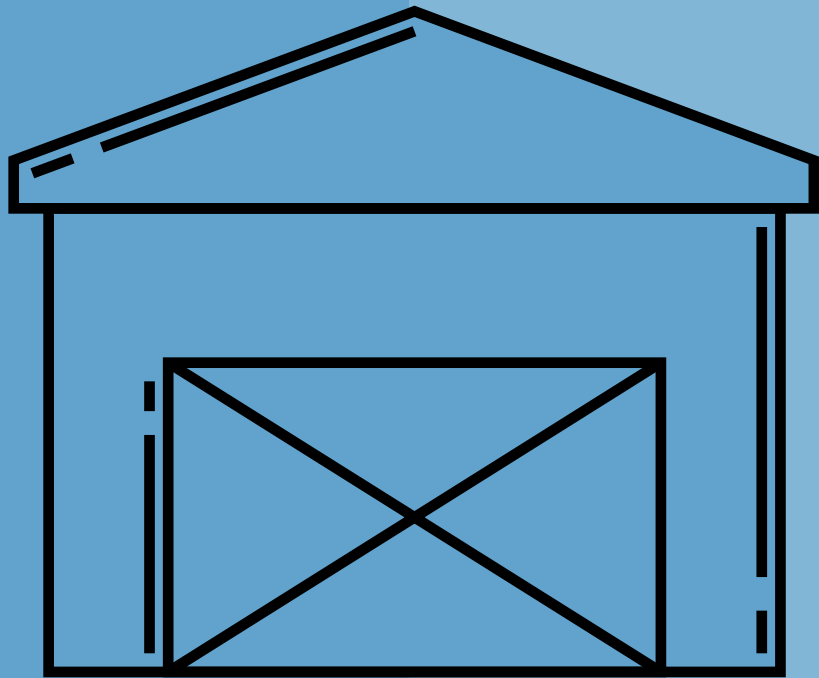## Number of destroyed buildings

Services

21 / 104

Cafes & restaurants

4 / 6

Trade

21 / 136

INDUSTRIAL INFRASTRUCTURE

SCALE OF DESTRUCTION

Number of destoyed buildings

Industrial buildings

⬛⬛⬛⬛⬛⬜⬜⬜⬜⬜ ← 10 units
⬜⬜⬜⬜⬜⬜⬜⬜⬜⬜

47 / 213

Utility buildings

⬛⬜⬜⬜⬜⬜⬜⬜⬜⬜
⬜⬜⬜⬜⬜⬜⬜⬜⬜⬜
⬜⬜⬜
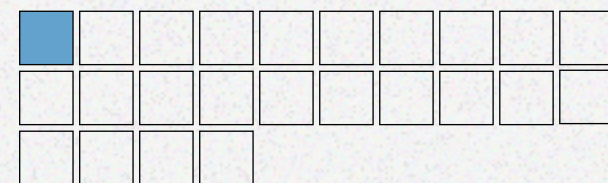
13 / 237

Construction

⬛⬛⬛⬜⬜⬜⬜⬜⬜⬜ ← 1 unit
⬜⬜⬜⬜⬜⬜⬜⬜⬜⬜

3 / 21

PrJSC Mondelez Ukraine

SMART Farming

VKURSI ZEMLI

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TOP LEAD

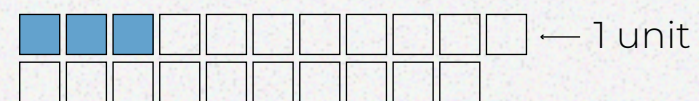# SCALE OF DESTRUCTION

Level of destruction

42.9% (27)
possible

25.4% (16)
light

23.8% (15)
total

7.9% (5)
severe
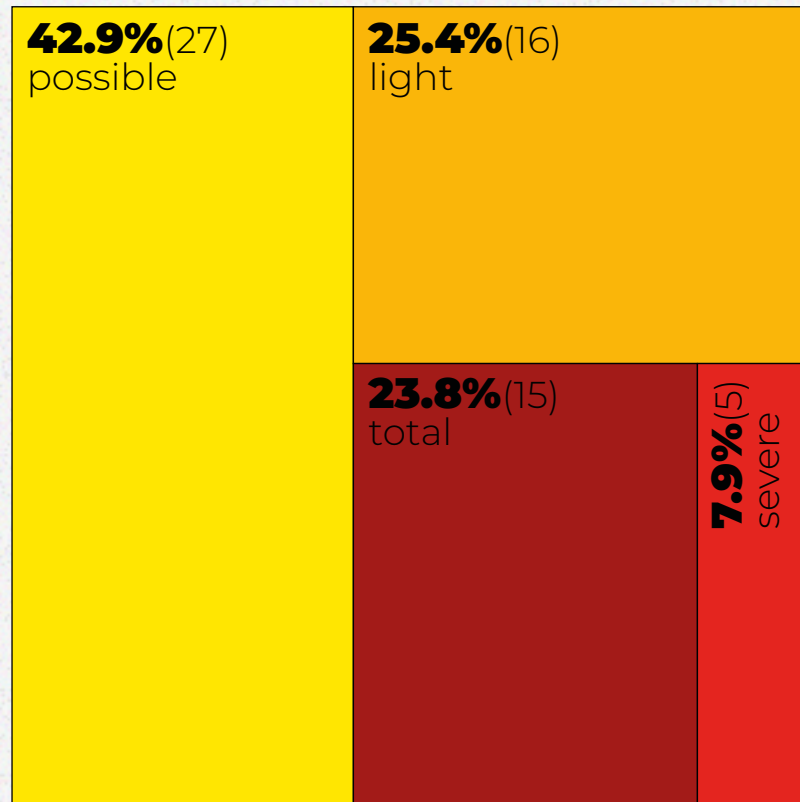
Assessment of damages

$57.1 million
Industrial
buildings
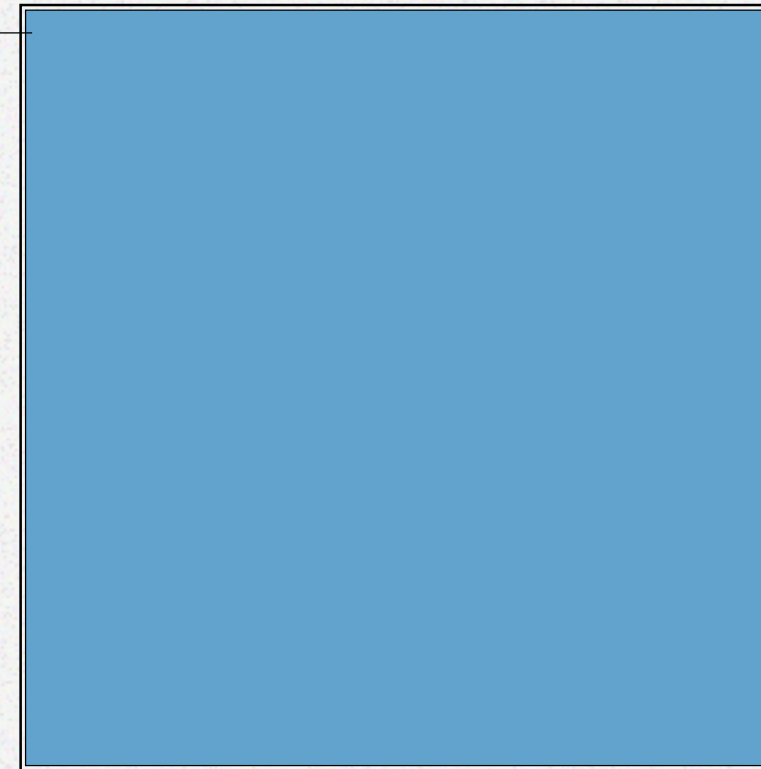
$0.14 million
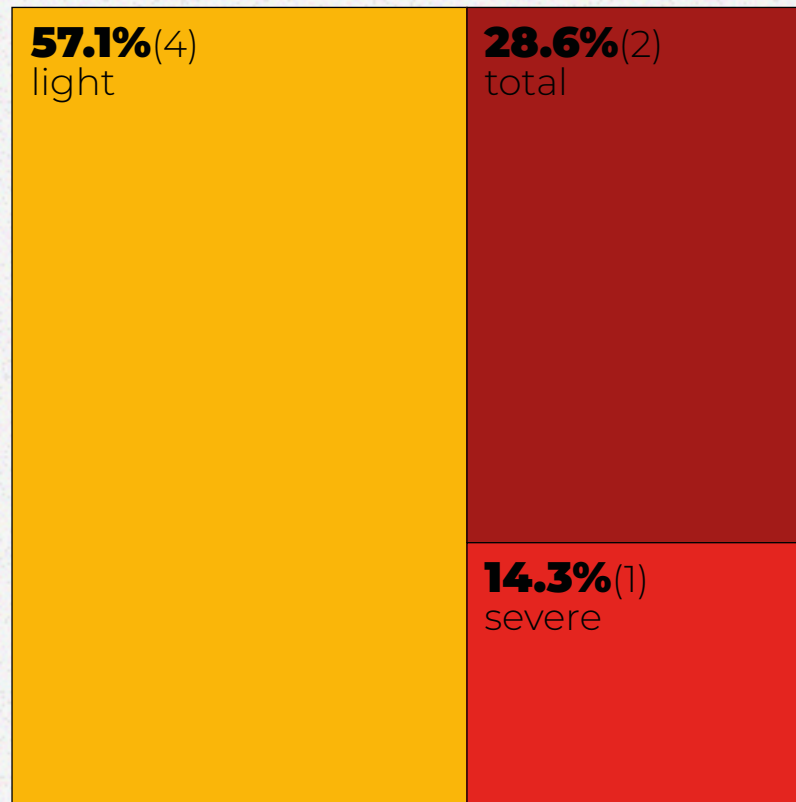Utility buildings

$0.03 million
Construction

Total damages
$57.3 million

SMART Farming

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KSE | Institute

TOP LEAD

ADMINISTRATIVE INFRASTRUCTURE

ADMINISTRATIVE INFRASTRUCTURE

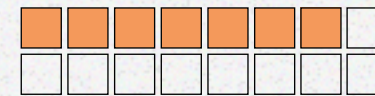## Level of destruction

57.1% (4)
light

28.6% (2)
total

14.3% (1)
severe

Total damages
$3.12 million

Number of destroyed buildings

Government &
administrative
buildings

7 / 16

Forestry

SMART Farming_

VKURSI ZEMLI

KSE | Institute

Урбанина

TOP LEAD

OTHER INFRASTRUCTURE

REBUILD UA

SCALE OF DESTRUCTION

Level of destruction

50.0% (4) possible	**37.5%** (3) light
	12.5% (1) severe
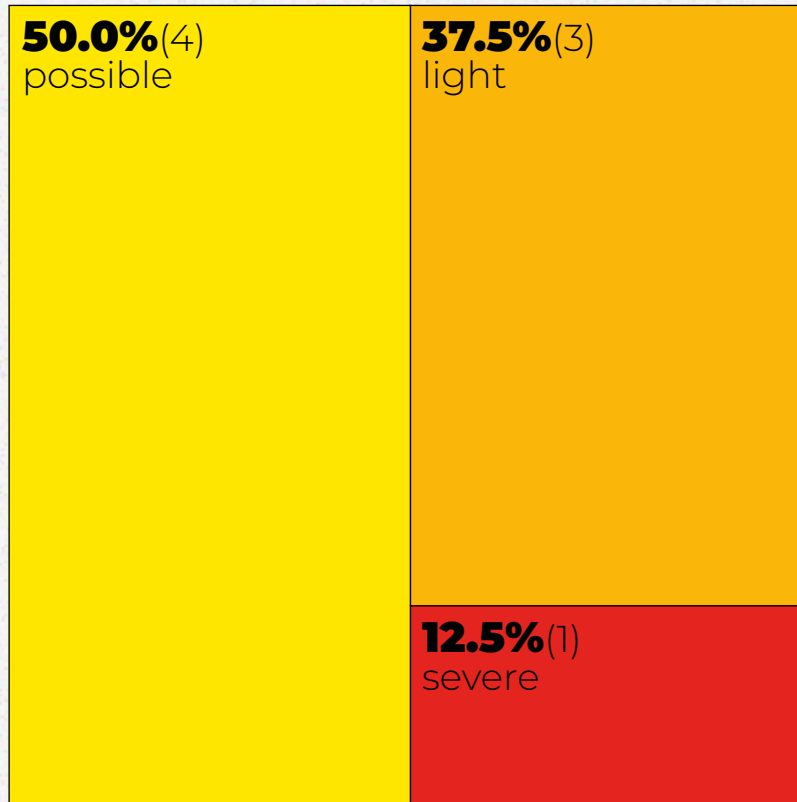
Total damages
$0.29 million

Number of destroyed buildings

Transport infrastructure

4 / 16

Boiler stations

3 / 11

Energy supply

1 / 9

Transport infrastructure

SMART Farming_   VKURSI ZEMLI   KSE | Institute   TOP LEAD
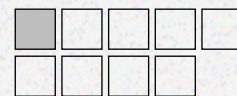
METHODOLOGIES AND ADDITIONAL INFORMATION

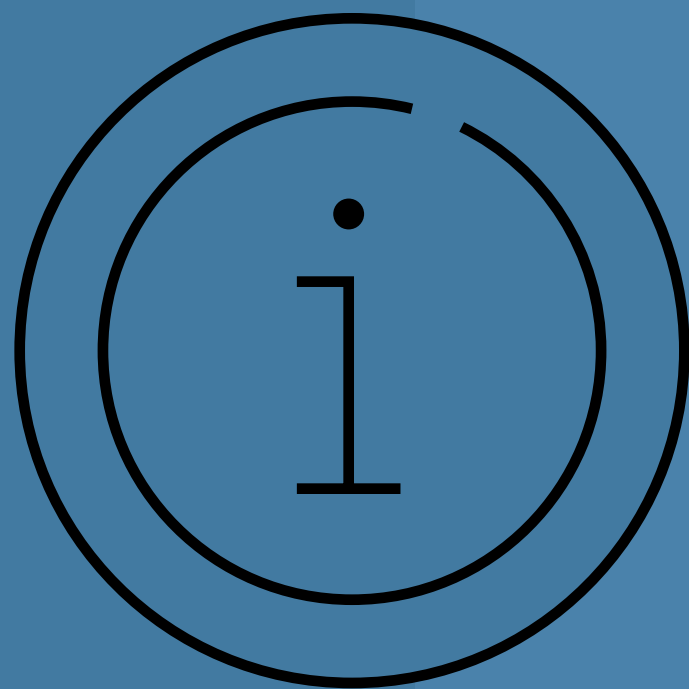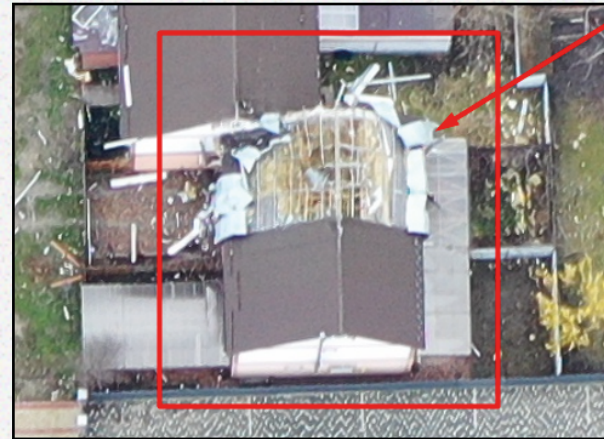# HOW WE DETERMINE LEVELS OF DESTRUCTION

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.

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METHODOLOGY OF CALCULATION

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).

* All calculations are made according to the dollar exchange rate as of January 1, 2022

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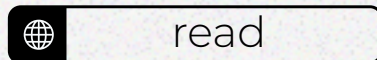# TROSTYANETS THROUGH THE EYES OF BEHOLDERS

Mayor of the destoyed Trostyanets: russia — desroyes the most successful towns of Ukraine

🌐 read
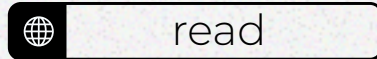
Звільнений Тростянець досі як зона бойових дій, люди гинуть на ворожих розтяжках
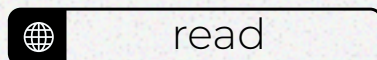
🌐 read

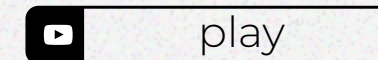«These people are angrier», – the resident of Trostyanets about russian soldiers

🌐 read

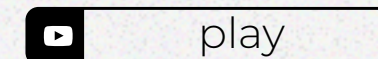Trostyanets after the occupation: what happened to the town

🌐 read

«Hell» in Trostyanets: what was left of russian military machinery in Sumy region

🌐 read

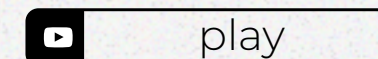"Face of the war" — the town of Trostyanets

▶ play

The situation in a de-occupied Trostyanets

▶ play

Trostyanets. 30 days in hell

▶ play

De-occupied Trostyanets: ruins of a devastated town | Apartment buildings with only one resident

▶ play

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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 Trostyanets:
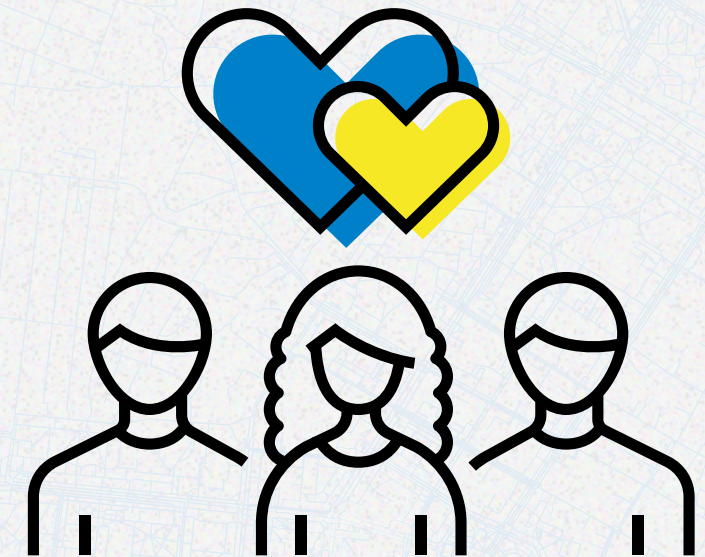
Kevin Casey

Nicolas Eckhard

Yaroslav Hnydiuk

Mariia Kinakh

Dmytro Kostian

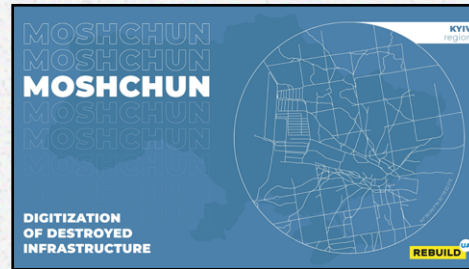Oleksandr Nabilskyi

Serhii Sheludiakov
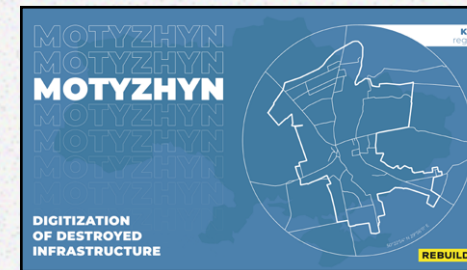
Valentyn Shkliarenko

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PREVIOUS REPORTS

Moshchun,
Buchanskyi district,
Kyiv region

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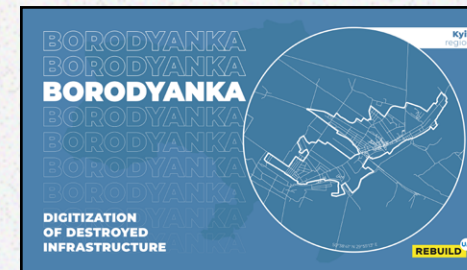**Hostomel,**
Buchanskyi district,
Kyiv region

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Horenka,
Buchanskyi district,
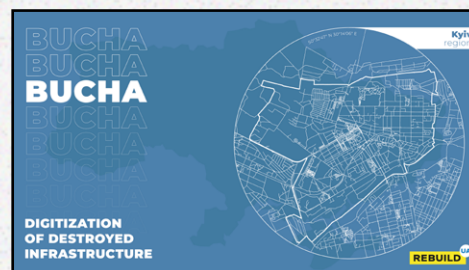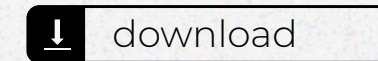Kyiv region

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Buchanskyi district,
Kyiv region

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Irpin,
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Kyiv region

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Buchanskyi district,
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Andriivka,
Buchanskyi district,
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Partners

Assessment of losses
and damages, budgeting:

KSE | Institute

Financial and
technical support

UNDP

Aerial shooting
of settlements

CULVER AVIATION

Digitization of
geospatial information:

Урбанина

Visual style
and content:

TOP LEAD

Support in cooperation
with public authorities:

Centre for Economic Recovery

Cooperation & analysis of community
economy, Vkursi Economy:

Center for Innovations Development
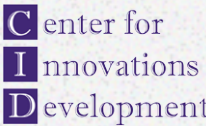
Creation of an online map
of destroyed new buildings

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ДЕПАРТАМЕНТ МІСТОБУДУВАННЯ ТА АРХІТЕКТУРИ

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