

BEIRUT PORT EXPLOSIONS RESPONSE

Bourj Hammoud Municipality Rapid Building-level Damage Assessment

Municipality of Bourj Hammoud and UN-Habitat

October 2020

Working Version



PARTNERS

Academic institutions:



International and local organisations:



CREDITS

UN-Habitat Lebanon

Authors: Lady Habchy; Wael Sinno.

GIS and IM: Charbel Abou Chakra.

Data Analysis/Visualization and Report Production/Design Layout: Georges Abi Sleiman; Ruba Abou El Houda.

Editor: Suzanne Maguire; Taina Christiansen.

Municipality of Bourj Hammoud

Georges Krikorian.

Garine Balian.

Lila Kendirjian.

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INTRODUCTION

PURPOSE OF REPORT

The Port of Beirut explosions of 4th August 2020, situated within the boundaries of the Municipality of Beirut (MoB) and in close proximity to the neighbouring Municipality of Bourj Hammoud (MoBH), resulted in devastating loss of life, injury and the destruction of vast tracts of urban fabric within these municipalities and beyond.

One of the initiatives undertaken in response by the MoBH with the support of UN-Habitat was a rapid exterior visual survey at the building level. The survey covered all building types, to gain an understanding of

the extent of damage and particularly structural impacts, immediately identifying buildings at risk of collapse and in need of evacuation whilst also providing evidence for formulating early recovery measures.¹

This report describes the method and results of the survey which was conducted through a collaboration between the MoBH and UN-Habitat in its ongoing role of support to local authorities. Data was gathered from immediately after the blast until 31 August 2020.

ADMINISTRATIVE BOUNDARIES AND ASSESSMENT ZONES

The Port of Beirut is located around 2km north-west of MoBH, in the neighbouring Municipality of Beirut. The MoBH, itself a cadastre in its own right within the district of Baabda, is 2.7 square kilometres in area and is part of the central core of a larger continuously built up urban

area of Beirut which spans around 110 square kilometres in size (Figures 1 and 2).² MoBH is made up of seven sub-areas³ (Figure 3) which were then broken down into zones for the purposes of the current assessment.

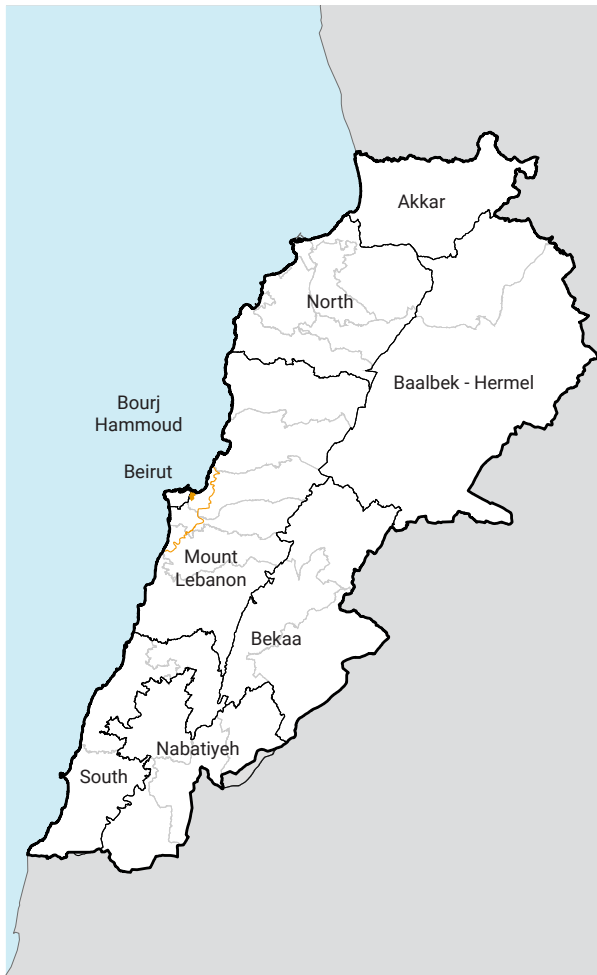


Figure 1 Mount Lebanon Governorate within Lebanon

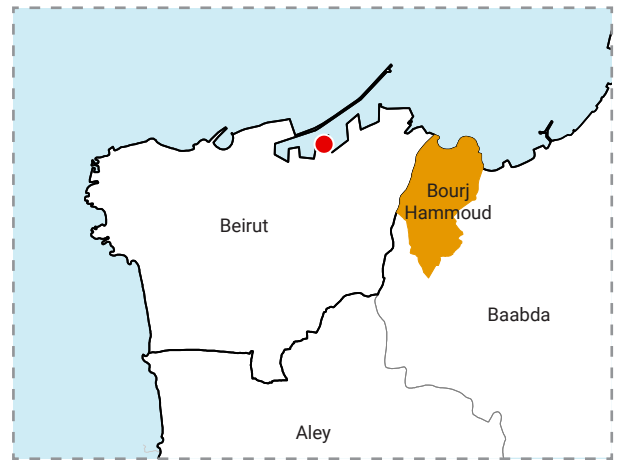


Figure 2 Explosion site relative to the Municipalities of Beirut and Bourj Hammoud

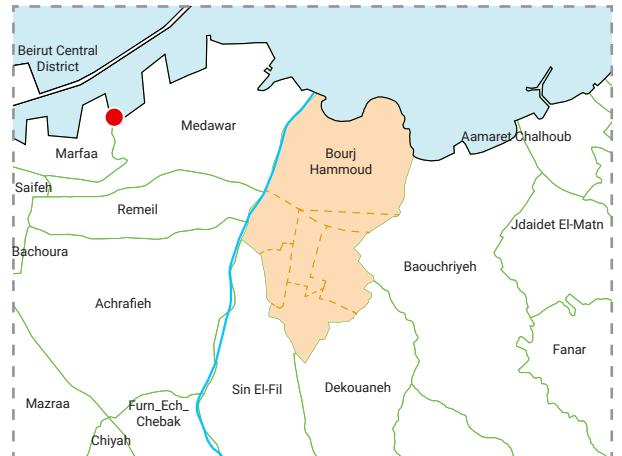
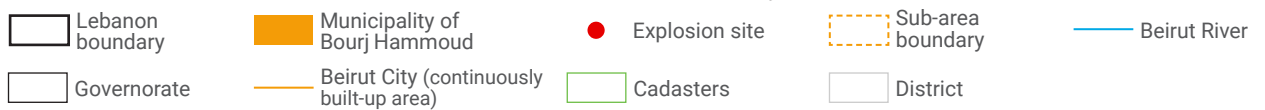


Figure 3 Assessed zones within Bourj Hammoud Municipality



¹ The approach is complementary to other assessments conducted at household level, notably the Multisectoral Needs Assessment of the Lebanese Red Cross undertaken in conjunction with the Lebanese Armed Forces, and may be triangulated with these in due course.

² UN-Habitat (forthcoming) "Beirut City Profile". Beirut, UN-Habitat.

³ Sea Side, Adana, Maraach, Aghabios, Nabaa, Trad and Siss.

The Port of Beirut explosions took place in close proximity to the city centre with its historic core, vibrant commercial districts and dense urban neighbourhoods, many of which are vulnerable. It resulted in over 200 deaths, 6,500 injured and 7 missing. The blast caused material damage to an estimated 77,000 apartments located across 10,000 buildings within a 3km radius of the blast, impacting around 300,000 people.⁴ The entry point to more than 70% of Lebanon’s imports, the port blast has also affected the availability of goods in the country.

In the aftermath of the incident, there was a spontaneous proliferation of public and private actors and associated initiatives seeking to respond to needs on the ground, which underscored the need for an efficient and rationalised response. With support from local and international entities, the municipalities remain at the centre of supporting public safety whilst working towards inclusive post-disaster planning for urban recovery.

In this context, a building-level damage assessment was undertaken to provide an evidence basis for guiding action. The MoBH worked with the support of UN-Habitat to conduct this assessment, aiming to come up with a general overview of the damages affected MoBH’s neighbourhoods and to identify the most affected zones and buildings therein.



UN-Habitat (2020)



UN-Habitat (2020)



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⁴ Shelter sector dashboard (12 September 2020).

METHODOLOGY

ZONING

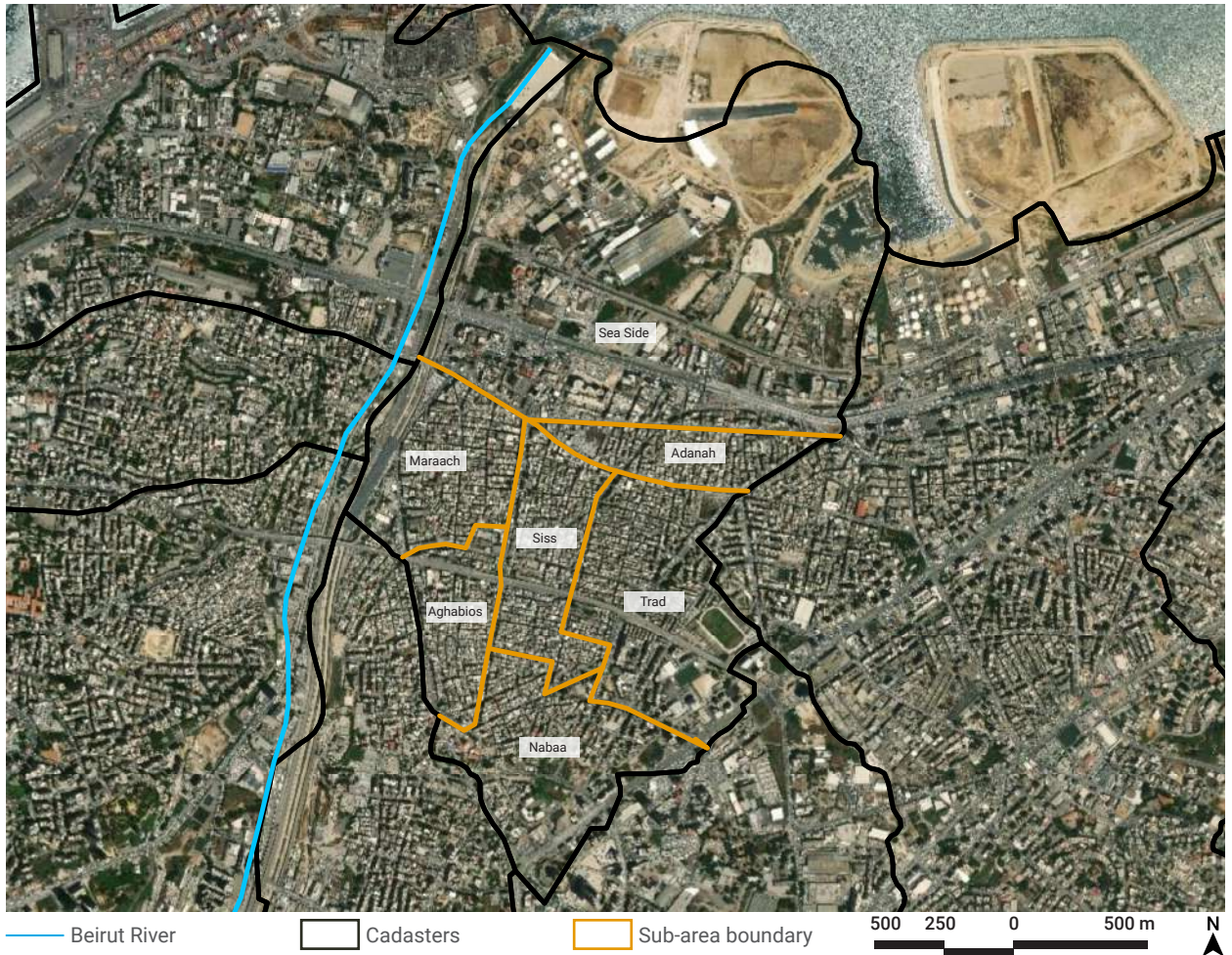


Figure 4 Sub-areas of MoBH for assessment purposes

As shown in Figure 3, the MoBH comprises seven sub-areas. These were further subdivided into 40 operational zones for the purpose of the current assessment.

Sub-areas of MoBH	Number of assessment zones
Sea Side	10
Adana	3
Maraach	6
Aghabios	4
Nabaa	5
Trad	6
Siss	6

Table 1 Dividing Bourj Hammoud sub-areas into 40 operational zones

- UN-Habitat’s team met with MoBH on 7th August to discuss the effect of the blast on local communities residing in the municipality.
- At the request of the MoBH to map the damages, a meeting was conducted with partners willing to take part in the assessment. Polish Aid for International Aid (PCPM), Naba’a NGO, and Beirut Arab University committed to take part of this assessment with support from MoBH.
- The assessment questionnaire, comprising questions related to building’s exterior conditions, was finalized.

- This assessment was then uploaded onto a mobile application to channel data transfer into a GIS platform. Noting that there are around 4,000 lots in MoBH, around 80 volunteers were selected and were divided into 40 teams; each team was composed of 2 volunteers. Each team then took on assessment of a zone.
- A training was conducted for all teams on the mobile application and on field data collection.
- Following the completion of fieldwork, a coordination meeting, led by MoBH was conducted with national and international partners to present preliminary findings and to discuss the urgency of comprehensive intervention.

The field assessments were launched on 11th of August 2020 and completed on 31 August 2020.



UN-Habitat (2020)

VISUAL INSPECTION STEPS FOR SURVEYORS

Based on the Applied Technology Council's Field Manual (ATC-20-1),⁵ the following visual inspection steps were adopted by surveyors:

1. Examine the building's exterior envelope.
2. Examine the ground and the pavement around the structure for fissures, bulged ground, or signs of slope movement.
3. Enter the building whenever the structure is not clearly visible from the outside, and in the case of suspected or confirmed problems that are non-structural (e.g. collapsed ceiling or damaged partitions). However, do not enter the building if the structure is obviously unsound.
4. Assess the structure using the visual signs of damage criteria .
5. Complete a Rapid Assessment Form (REF). Add any instances of restrictions placed on the use of the structure to the REF. Questionable buildings should be flagged for a detailed assessment.
6. Explain the significance of inhabitable or uninhabitable structures to the building occupants if present. Where buildings including buildings' common areas appear unsafe, advise residents to vacate immediately without causing panic whilst also expediting notice of unsafety to the municipality for taking action including in the form of serving evacuation notices.

Surveying was conducted using the Geopal mobile application.



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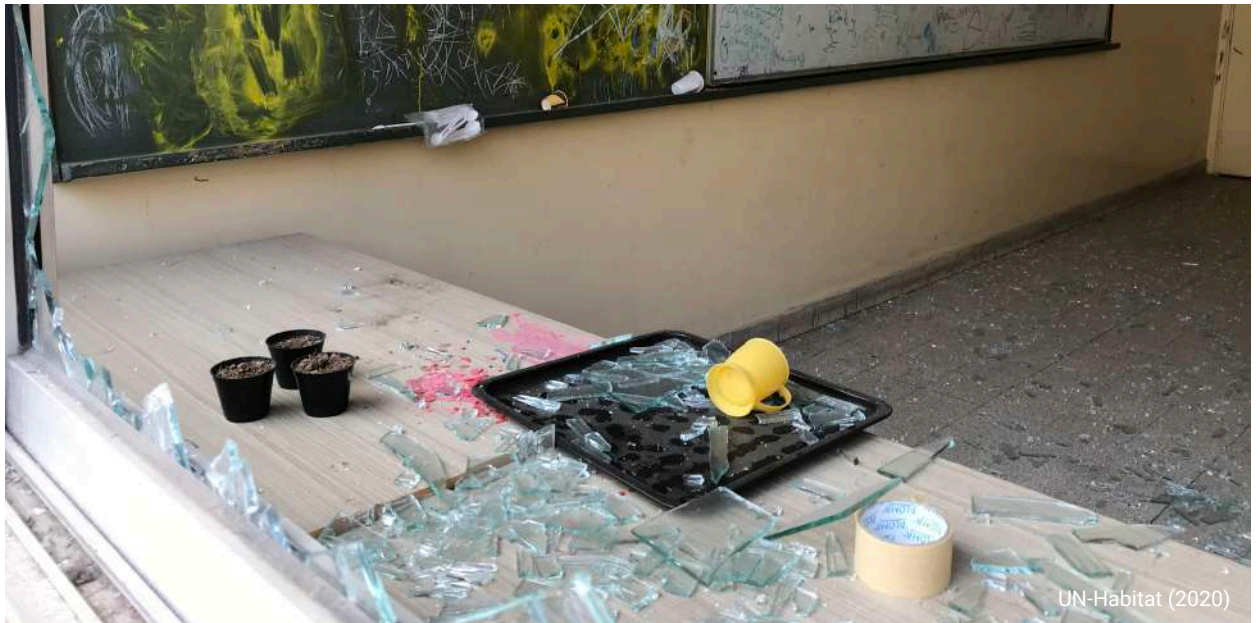


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⁵ <http://www.atcouncil.org/pdfs/ATC45Rapid.pdf>



Based on visual signs of damage, buildings were divided into those that were uninhabitable requiring evacuation and those that remain habitable.

Uninhabitable / Requires evacuation

- Total or partial collapse of the building.
- Major damage and deformation/deviation from the vertical axis of load-bearing structure.
- Severe damage to the beam-column joints.
- Neighbouring structure in danger of collapse onto building.
- The load-bearing elements show any deformation.
- Floor panels displaced away from original supports
- Load-bearing shear walls show any out-of-plane deformation.
- Significant cracks (>2mm) in load-bearing elements made of reinforced concrete.
- Significant cracks (>2mm) in load-bearing walls.
- Hairline cracks in load-bearing masonry walls, where the cracking covers more than 30 per cent of the wall area.
- Diagonal cracking or crumbling of the material in the walls between the windows or doors or similar elements of construction.
- Damage, significant distortion or collapse of the roof.
- Slight damage, partial or complete sliding of the roof.
- Large items that could fall and cause harm, including glass, detached air conditioner units, water tanks, cladding, plaster, balconies.

Habitable / Does not require evacuation

- Slight cracks in render (plaster) of the wall and/or ceiling.
- Damage limited to windows, doors and non-structural items (that are not at risk of falling onto inhabitants).
- Slight cracks in walls (load bearing and/or non-load bearing), and slight separation between load-bearing and non-load bearing elements.
- Hairline non-diagonal cracks in horizontal reinforced concrete structural beams.
- Hairline cracks in load-bearing masonry walls, where the cracking covers less than 30 per cent of the wall area.



WORK PROGRESS MILESTONES

7/08/2020 - 11/08/2020

- Meeting with Municipality of Bourj Hammoud
- Coordination meeting with partners to join efforts in the rapid damage assessment.
- Finalization of the assessment questions and incorporation into the mobile application.
- Dividing Bourj Hammoud district into 40 zones and selection of teams per zone.
- Training of the teams on the mobile application and data collection.

11/08/2020

- Start of field data collection

18/08/2020

- Press conference led by Municipality of Bourj Hammoud

31/08/2020

- End of field data collection



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Handwritten signs and posters on the right building facade, including one with Arabic text and a portrait.

FINDINGS

CODING OF BUILDINGS FOR DAMAGE AND HABITABILITY



Unsafe / evacuate

Buildings that are structurally unsound and require evacuation.



Safe / minor damage

Buildings that were subject to minor defects, such as broken glass.



Restricted use

Buildings that incurred considerable damage in their architectural components (falling architectural elements that might affect public safety).



Not affected⁵

For buildings that were not affected at all.

⁵ The category "Not affected" was added to the ATC-20-1 coding list by the Municipality of Bourj Hammoud to adapt the assessment categories to building conditions observed post-Beirut Port explosions.

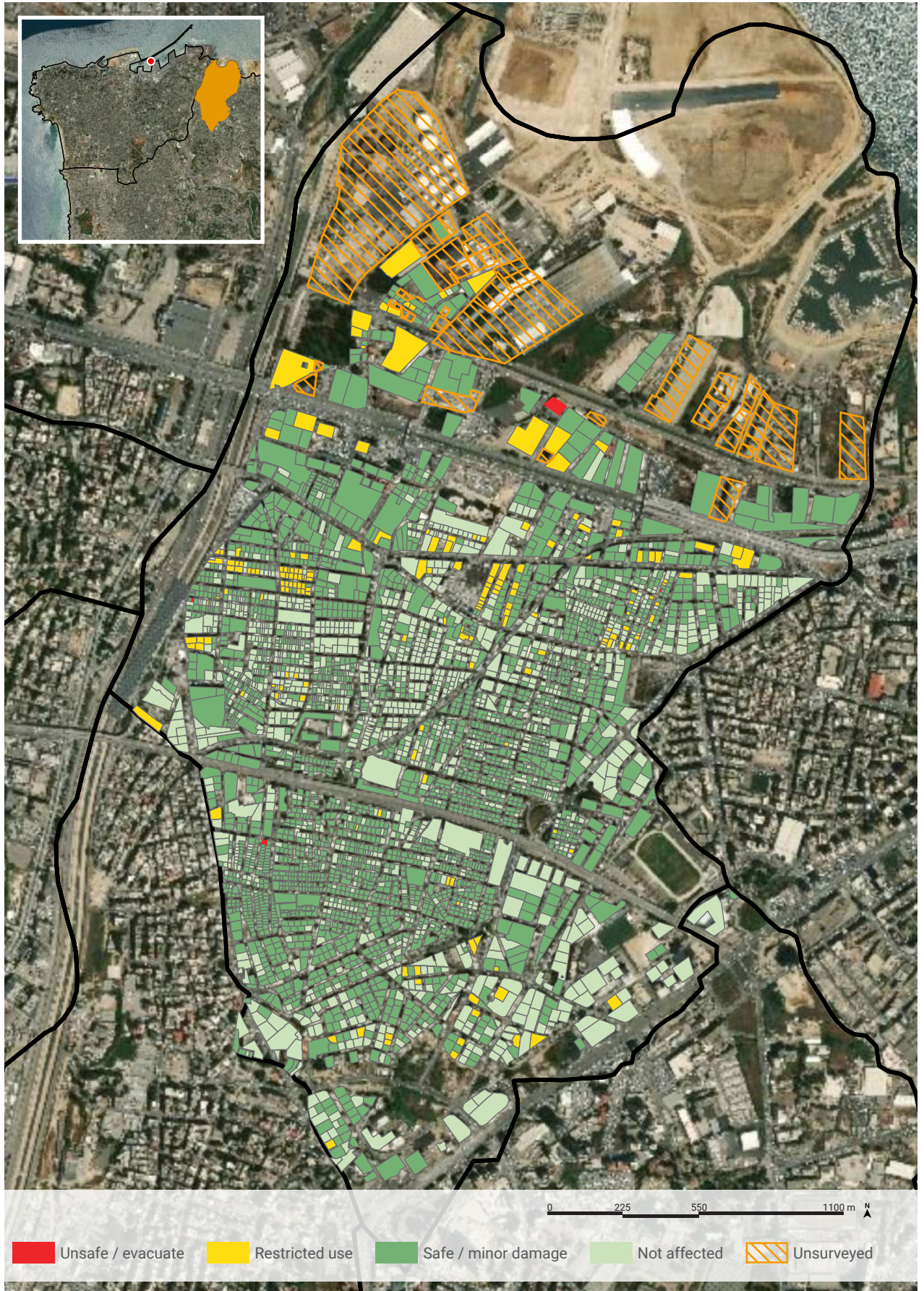


Figure 4 Detailed map showing the different damage categories for all assessed plots (including hospitals, schools and heritage buildings)

Building damage category	Assessment Count	Assessment %
Unsafe / evacuate	4	0.10
Restricted use	182	4.68
Safe / minor damage	1,957	50.27
Not affected	1,708	43.87
Unsurveyed	42	1.08
Total	3,893	100

Table 2 Number of assessed buildings by category

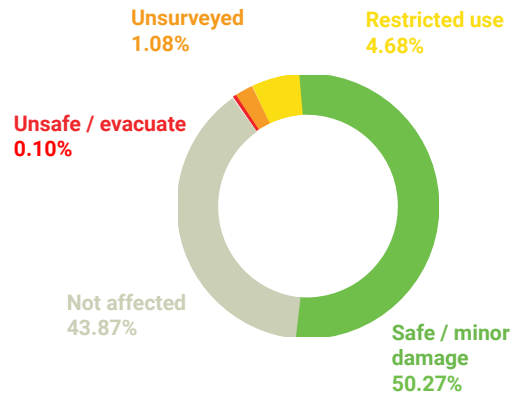


Figure 6 Percentage of assessed buildings by category

NEXT STEPS

The findings of the Bourj Hammoud Municipality Rapid Building-level Damage Assessment serves to inform the ongoing blast response, recovery and reconstruction of the impacted areas.

The data is intended to inform the prioritization of interventions, highlighting the most affected areas of Bourj Hammoud municipal boundaries, including by pinpointing structurally unsound buildings and the households whose shelters and livelihoods have been impacted as a result.



Data from the assessment can be made available through the Bourj Hammoud Municipality through contacting: coordinator.bourjhammoud@gmail.com or +961 81 304185.

The assessment can be used in complement to other assessments, and notably the household level Multisectoral Needs Assessment of the Lebanese Red Cross undertaken in conjunction with the Lebanese Armed Forces and may be triangulated with these in due course.



ANNEX

PHOTO GALLERY





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E: unhabitat-lebanon@un.org

T: +961 1 985484

www.unhabitat.org/Lebanon



MUNICIPALITY OF BOURJ HAMMOUD

E: info@bourjhammoud.gov.lb

T: +961 1 260 155

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