

Forensic Architecture is a multidisciplinary research group based at Goldsmiths, University of London, that uses architectural techniques and technologies to investigate cases of state violence and violations of human rights around the world.

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Report

Israel's Destruction of the Port of Gaza and
Palestinian Fishing Vessels:
October 2023 to November 2024

16 December 2024

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8. About Forensic Architecture

1. Scope of Analysis

Forensic Architecture (FA) has been commissioned by Adalah: The Legal Center for Arab Minority Rights in Israel (Adalah) and Gisha: Legal Center for Freedom of Movement to conduct an analysis of the available satellite and ground-level photographic evidence on the port of Gaza (hereafter ‘the port’) to:

1. Examine and establish a timeline and visual evidence of the targeting and destruction of the port from October 2023 to January 2024, including the approximate number of fishing vessels—and where relevant, fishing boats—affected after each visible attack.
2. Determine the present state of the port and its fishing vessels in November 2024, including the approximate number and type of vessels still docked in the port; and
3. Examine and establish a timeline and visual evidence of the state of vessel No. P-00494 (hereafter “No. 494”) belonging to Mr Jihad Hessi, and vessel No. P-00474 (hereafter “No. 474”) belonging to Mr Muhammad Hessi from October 2023 to November 2024.

2. Definitions

Fishing vessel: all watercrafts over 15-18m long, often with an engine.

Fishing boat: all watercrafts 6-10m long, often without an engine.

Fishing limit: the area where fishermen are permitted to fish.

Sea wall: a curved structure defining the external perimeter of the port, made of rocks, sand and concrete, creating a small harbour for fishing boats and other vessels.

Earth berm: a shaped mound of earth piled above the surrounding ground level, developed as part of military earthworks. These are commonly used as a protective screen against gunfire or hand-launched missiles.

3. Brief Historical Context

Located near the Rimal district of Gaza City, the port houses Palestinian fishing boats that operate along the extent of the occupied Gaza Strip's (hereafter 'Gaza') 41km coastline. The port itself is approximately 650m long, constituting only 4 percent of Gaza's overall coastline. It is defined and delimited by a curved sea wall.



Fig 1. Layout of the port showing the north, the south and the western sections. The marking in white shows the location of the sea wall.

While the fishing industry in Gaza has been significantly reduced by arbitrary restrictions imposed by the Israeli occupation, the port has remained active, and the fisheries sector continues to serve a central role in both local job creation and food security.

According to the 1995 Oslo II Accord, the fishing limit was defined as 20 nautical miles from the coastline. Since 2009, and as an extension of the siege on Gaza more broadly, Israel has imposed further restrictions on fishing in Gaza. These restrictions are arbitrarily adjusted by the Israeli occupation and would range from a maximum of 15 nautical miles in less restricted periods, to 0 nautical miles.

While the permitted fishing limit has fluctuated in the years since, the intensification of Israeli fishing restrictions and military siege nevertheless resulted in repeated and continuous attacks on Palestinian fishermen working within the Israeli-restricted fishing limit. Fishermen have regularly reported being fired on by the Israeli navy while fishing, including other attacks such as arrests, confiscation, and destruction of their fishing vessels and boats, and the destruction of their fishing equipment, among other practices.

Both before 2023, and certainly since the current war that began on 7 October 2023, the fisheries sector in Gaza was an extension of the agricultural sector in the besieged Strip, serving a central function in the food security and the livelihoods of a significant segment of the Palestinian population living in Gaza.

Prior to October 2023, Israeli authorities prevented the entry of new engines for vessels into Gaza, including the materials used by fishermen to build vessels and boats.¹ These restrictions contributed to the decimation of the fishing industry, previously one of the strongest economic sectors in Gaza, reducing the fishing community to an extremely vulnerable demographic, with rising poverty and unemployment.

According to a 2020 report by the World Bank, there were 3,951 registered ‘fishers’ in Gaza by that year, translating into ‘about 18,000 people who directly rely on fishing for their livelihood, including shore support staff, and about 110,000 people who depend on the sector, not counting their family members.’² The report further went on to explain that, already in 2020, ‘most fishers are very poor’ and that ‘90 percent of fishers live below the poverty line.’³

4. Summary of Findings

Drawing upon a range of satellite images and ground-level photographs of the port of Gaza, our study arrived at the following findings:

- € The port was subject to aerial bombardment as early as 11 October 2023, with a crater of 22m diameter preventing access by foot to the south and west curved sea wall and the vessels and boats docked there.
- € About 40 percent of all docked vessels at the port had disappeared in the first week of the Israeli military campaign, between 8 October and 15 October 2023.
- € About 56 percent of all docked vessels at the port disappeared in the first month of the Israeli military campaign, between 8 October and 6 November 2023. Over one third of those remaining were damaged and partially sunk.
- € All docked vessels at the port were either damaged, sunken, or disappear between 8 October and 21 November 2023.
- € By 10 January 2024 no vessels remain docked at the port, while 2 vessels appear navigating.
- € The port is first visibly damaged on 11 October 2023 with a crater to the south of its curved sea wall, making access from the land to the vessels and boats docked along the south and west of the curved sea wall impossible by foot. By 15 October a second crater is visible on the northern part of the port, and by 28 October, with a ground invasion underway, 2 additional craters at the extremes of the north and west sea wall appear—evidencing that the port was subject to repeated airstrikes in the first weeks of the war.
- € Israeli military encampments and earth berms on the ground are visible for the first time by 14 November 2023, indicating regular Israeli army presence around the port in this period.
- € Satellite imagery from 8 October 2023 shows the vessels No. 494 and No. 474 parked along the western tail of the port’s sea wall at the start of the current war.

¹ <https://mezan.org/public/en/post/21093/Al-Mezan-Condemns-Continued-Violation-of-Fishermen-Rights-and-Calls-for-the-International-Community-to-Intervene>

² <https://documents1.worldbank.org/curated/en/139111590727850333/pdf/Rapid-Fishery-and-Aquaculture-Sector-Diagnosis-Using-Fishery-Performance-Indicators-in-the-Gaza-Strip.pdf>

³ Ibid.

- € Satellite imagery from 14 November 2023 shows that both vessels continued to be docked in the same location. At this time, vessel No. 494 belonging to Mr Jihad Hessi is first observed as being partially submerged and rendered non-functional.
- € Satellite imagery from 21 November 2023 shows that vessel No. 474 owned by Mr Muhammad Hessi, is visibly partially submerged and rendered non-functional at this time.
- € Ground-level images taken on 26 November 2024 show that both vessels No. 474 and No. 494 are presently almost fully submerged and rendered non-functional.

5. Relevant Material Used in Analysis

5.1 Satellite images

- i. Planet Lab's archive of PlanetScope satellites: 3.7m resolution in four multispectral bands: RGB and near-infrared.
- ii. Planet Lab's archive of Skysat satellites: 50cm resolution, in five multispectral bands: RGB and near-infrared.

5.2 Ground-level photographs

- i. Images collected by Ain Media Productions on behalf of Forensic Architecture on 24 November and 26 November 2024.

5.3 Archival Photographs

- i. Images provided to Forensic Architecture from Adalah of the vessels No. 494 and No. 474.

6. Methodology

6.1 Satellite image analysis

We have been conducting satellite imagery analysis using Planet images with resolutions ranging from 50 cm to 3.7 m. The main distinction lies in their availability and level of detail.

PlanetScope (3.7 m resolution) provides daily imagery, allowing us to identify major features of change, such as the key moment of the attack on the port and the presence of craters.

Planet Labs' Skysat archive (50 cm resolution) is less frequently available but offers higher detail, allowing us to closely analyse pixels and colours for better identification of vessel and boat shapes.

We mapped the visible fishing boats (6–10m in length) and fishing vessels (15–18m in length) throughout the port in June 2023 when the first high-resolution satellite image is available prior to October 2023, and between October 2023 and January 2024, some docked and some navigating. In our analysis, we considered vessels located in the same position over time, often anchored either to the sea wall or a buoy, as being docked or

parked, and those within the body of the sea and appearing in positions where no vessels were present previously, as navigating.

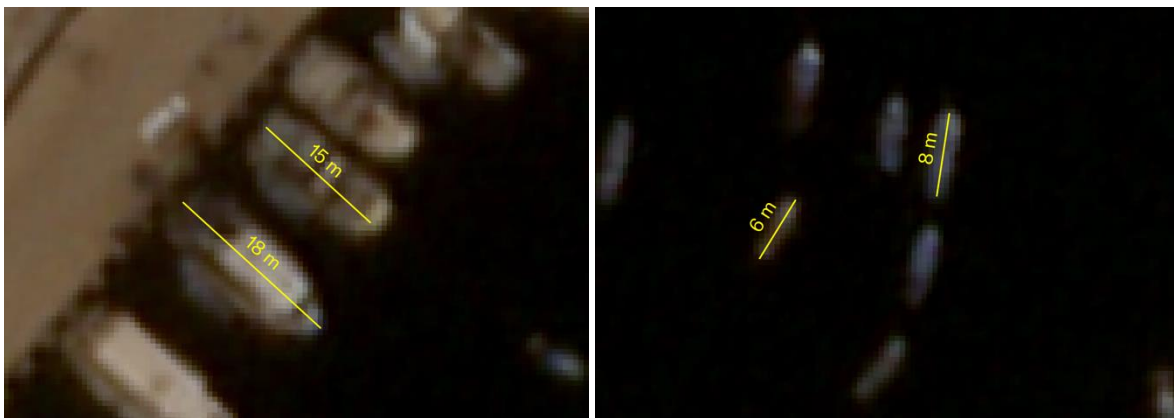


Fig 2. Samples of fishing vessels (left: 15-18m in length) and fishing boats (right: 6-10m in length) on 4 June 2023.

Working from satellite imageries and before and after analysis, we determined the status of the boats damaged, partially sunken or disappeared in the port.

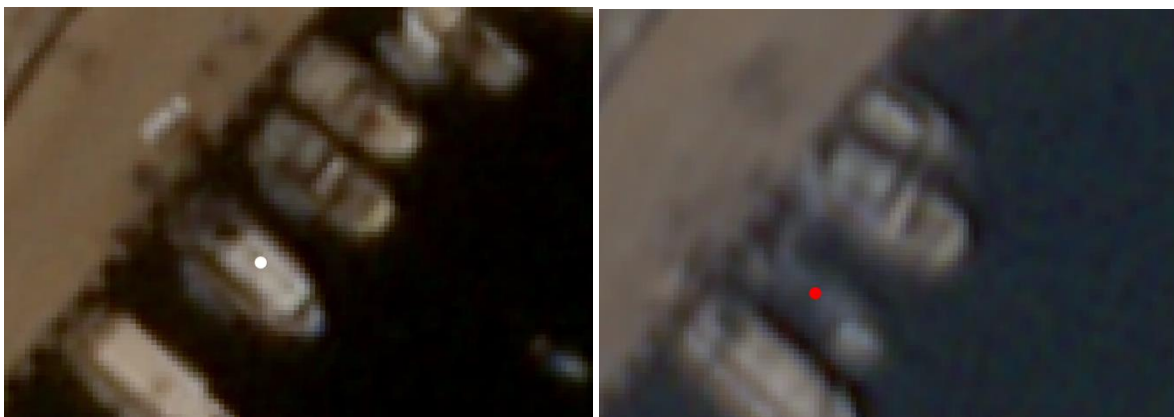


Fig 3. Comparison of satellite imagery from 4 June 2023 (left) and 14 November 2023 (right) shows that fishing vessel “No. 494” marked by a dot is damaged and partially sunken in this period.



Fig 4. By comparing satellite imagery from 4 June 2023 (left) and 21 Oct 2023 (right), we identified two damaged and partially sunken fishing vessels and two disappeared in this area of the port.

Using satellite images, we identified the period when Israeli ground troops began constructing earth berms and military encampments around the port, indicating regular army presence in the area.



Fig 5. Comparing satellite imagery from 11 Nov 2023 (left) and 30 Nov 2023 (right) we identified earth berms and military encampments, set up by the Israeli military.

6.2 Site analysis

On 24 November and 26 November 2024, journalists from Ain Media documented the state of the port, its surrounding infrastructure, and the boats docked within it. We cross-referenced these photos with satellite imagery to identify the remains of the vessels No. 494 and No. 474, and assess the destruction of the port.

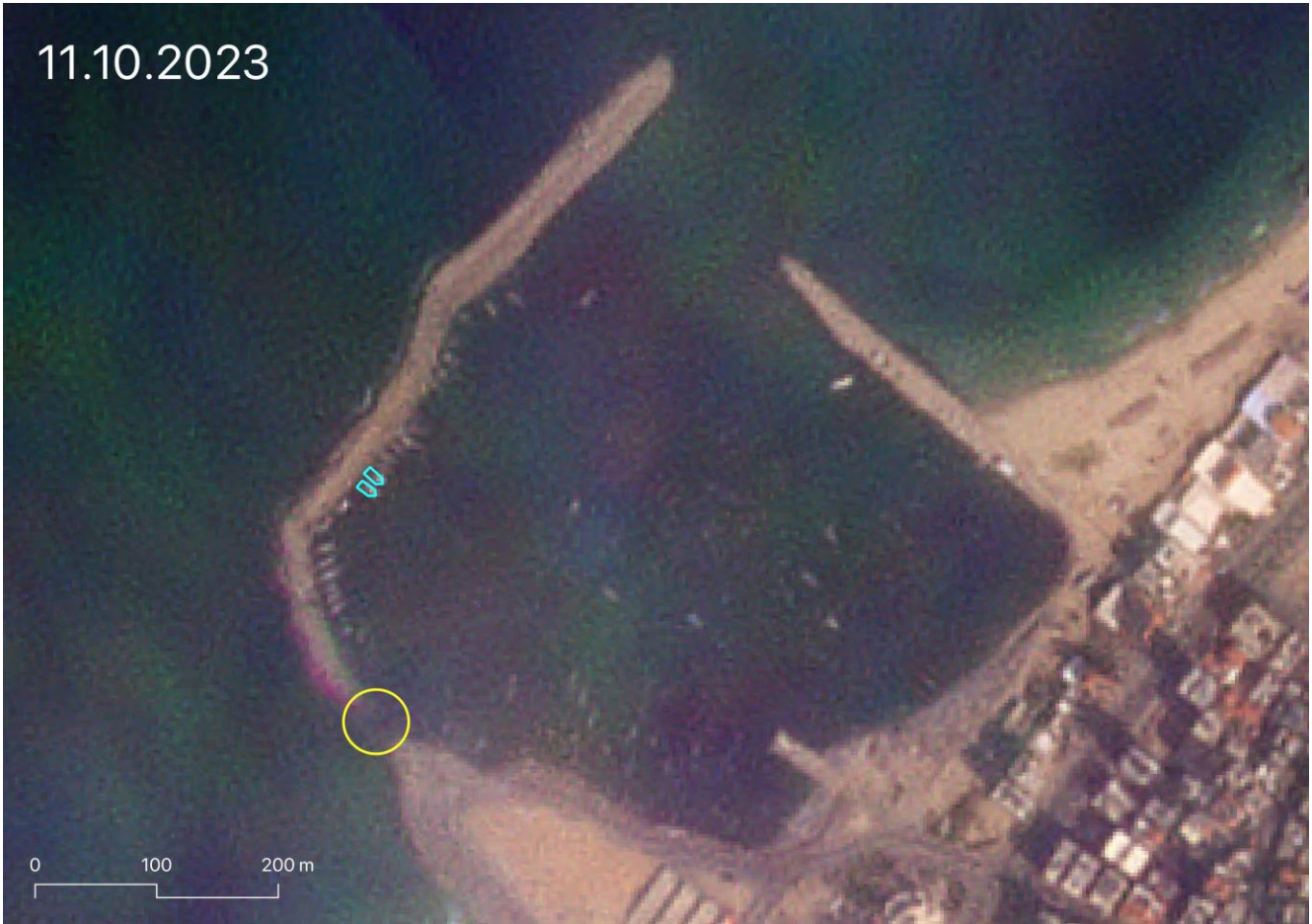
7. Outline of Findings

7.1 The targeting of the port of Gaza and fishing vessels: October 2023 to January 2024



Satellite imagery from 8 October 2023 shows:

- 64 fishing vessels, with 55 vessels docked and 9 in navigation.
- Over 200 fishing boats.



Our analysis of satellite imagery from 11 October 2023 shows the first visible damage to the port, a crater to the south of its curved sea wall.

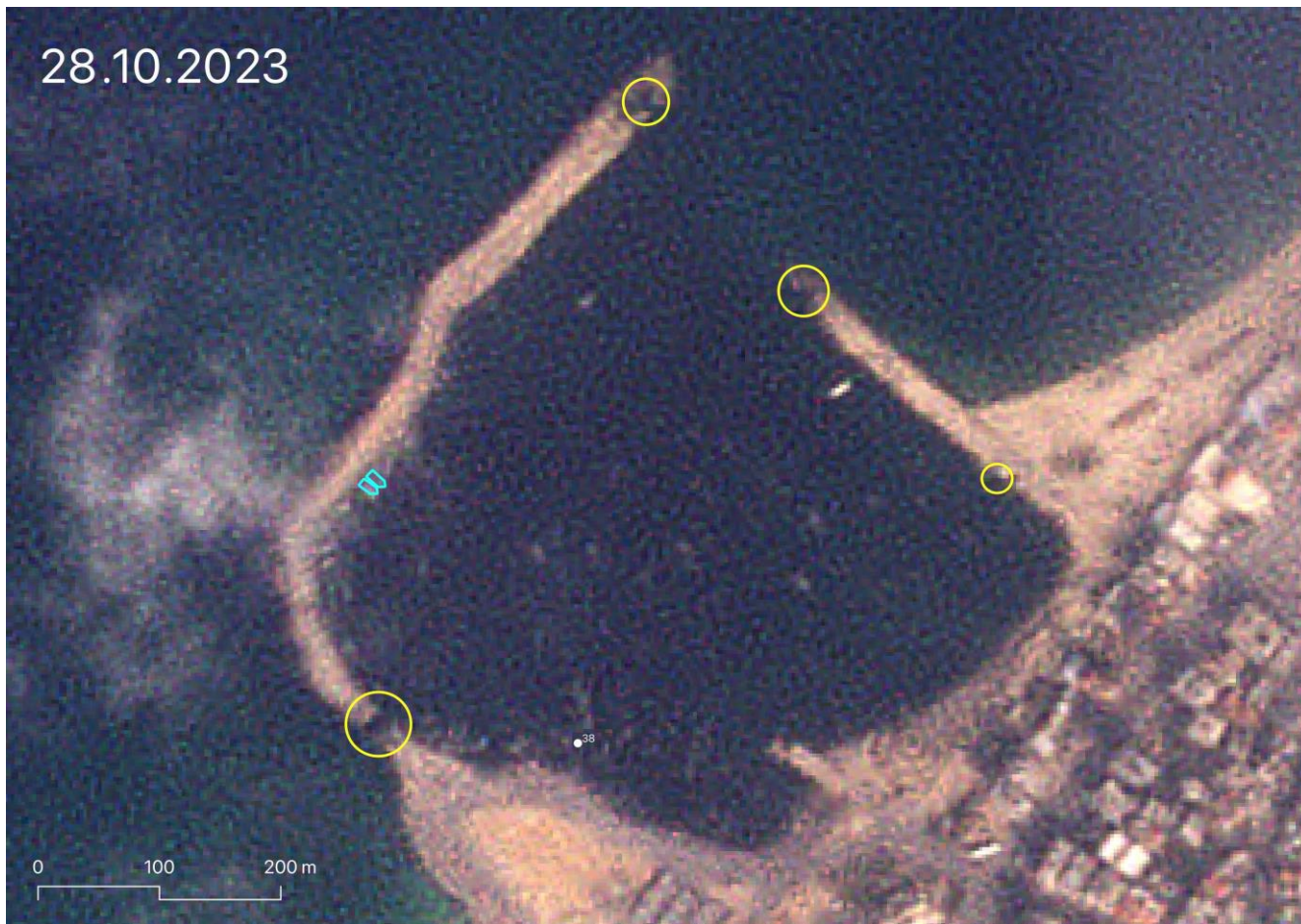
This crater has a diameter of approximately 22m, making access from the land to the vessels and boats docked along the south and west of the curved sea wall impossible by foot. Analysis of ground-level imagery confirms that this damage is the result of an Israeli airstrike.



Satellite imagery from 15 October 2023 shows:

- 38 fishing vessels (marked in white) present at the port. Compared to the satellite image from 8 October, we observe that the 25 vessels previously docked have disappeared (marked in red).
- A new crater is visible on the northern part of the port (circled in yellow) evidencing that the port was subject to additional airstrikes since 8 October.

Overall, in the first week of the Israeli military campaign in Gaza, nearly half of the fishing vessels previously present in the port are no longer present, decreasing from 64 to 37 vessels between 8 and 15 October. Some vessels and boats are no longer visible in satellite imagery, suggesting that they may have left the port. For others, visible remains in the available satellite image indicate that they may have been damaged and partially sunk.



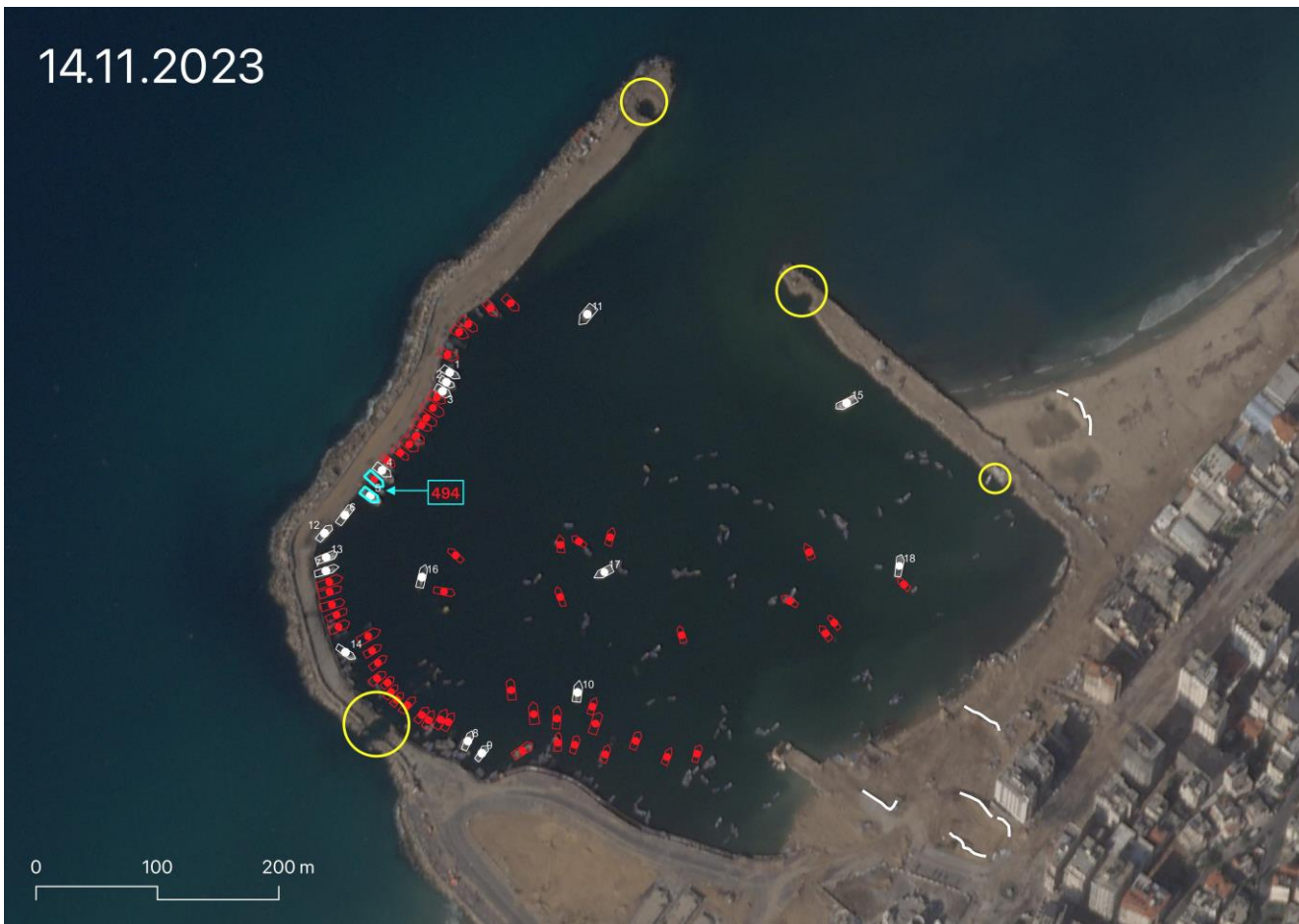
After Israel commenced its ongoing ground invasion in the north of Gaza on 27 October 2023, further damage was observed at the port.

Our analysis of satellite imagery from 28 October 2023 shows two new craters at the extremes of the north and west sea wall (marked in bolded yellow) of the port, evidencing that the port was subject to additional airstrikes since 15 October.



Our analysis of satellite imagery from 6 November 2023 shows 28 vessels present in the port (marked in white).

By this time, 10 of the vessels that were previously observed as docked on 15 October are now damaged, appearing partially sunk.



Satellite imagery from 14 November 2023 shows:

- 14 vessels present docked at the port (marked in white).
- 4 vessels navigating (marked in white).
- The first construction of Israeli military encampments and earth berms.

By 14 November, more than two weeks into the Israeli ground invasion, a total of 18 vessels are visible in the port.

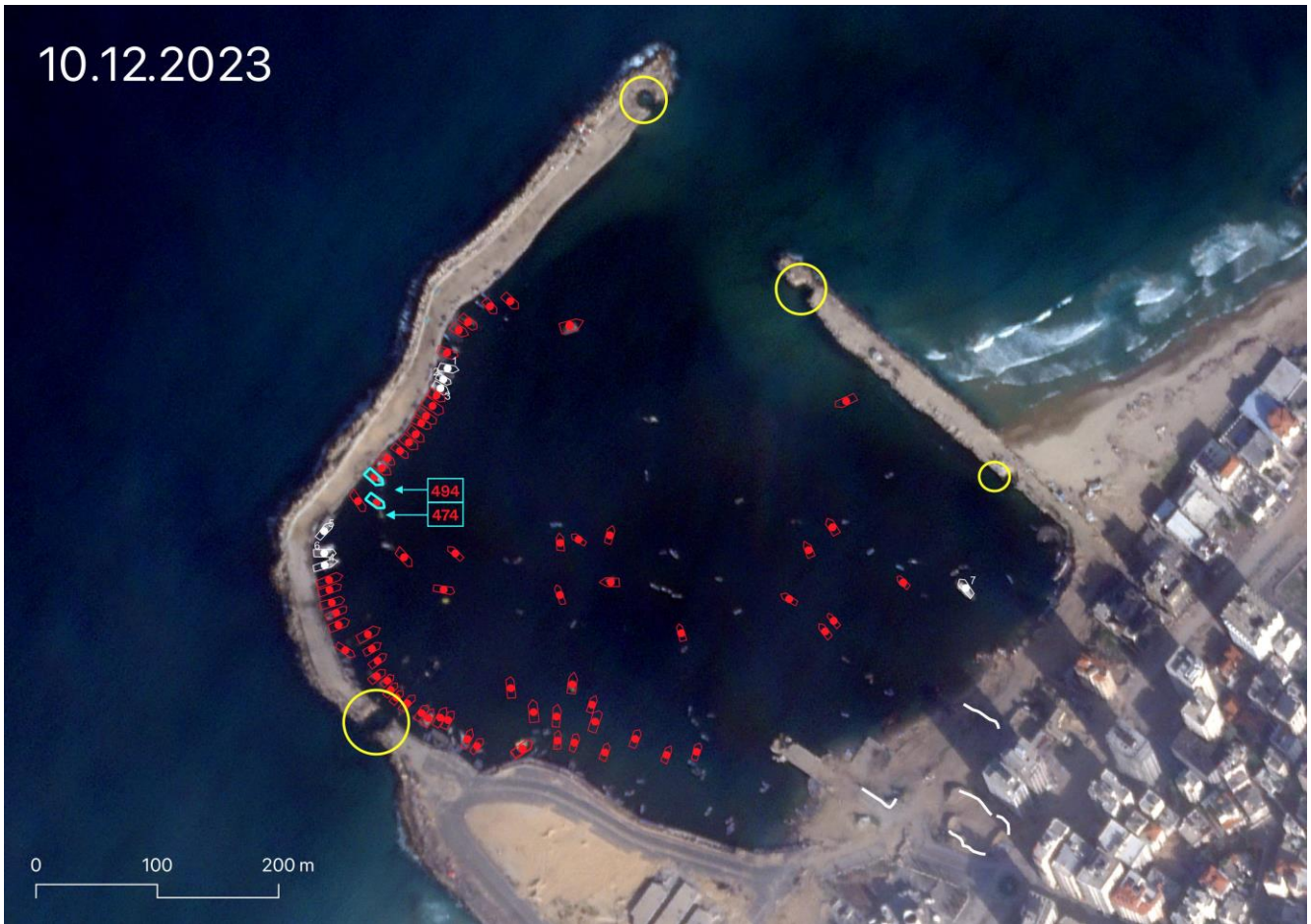
In the above image, the presence of earth berms and a potential military outpost (marked in white) on the ground indicate Israeli army presence around the port at this time.



Satellite imagery from 21 November shows:

- 10 vessels present docked at the port (marked in white).
- 3 vessels navigating (marked in white).
- Israeli military encampments and earth berms.

By 21 November, a total of 13 vessels are visible in the port.



Satellite imagery from 10 December shows:

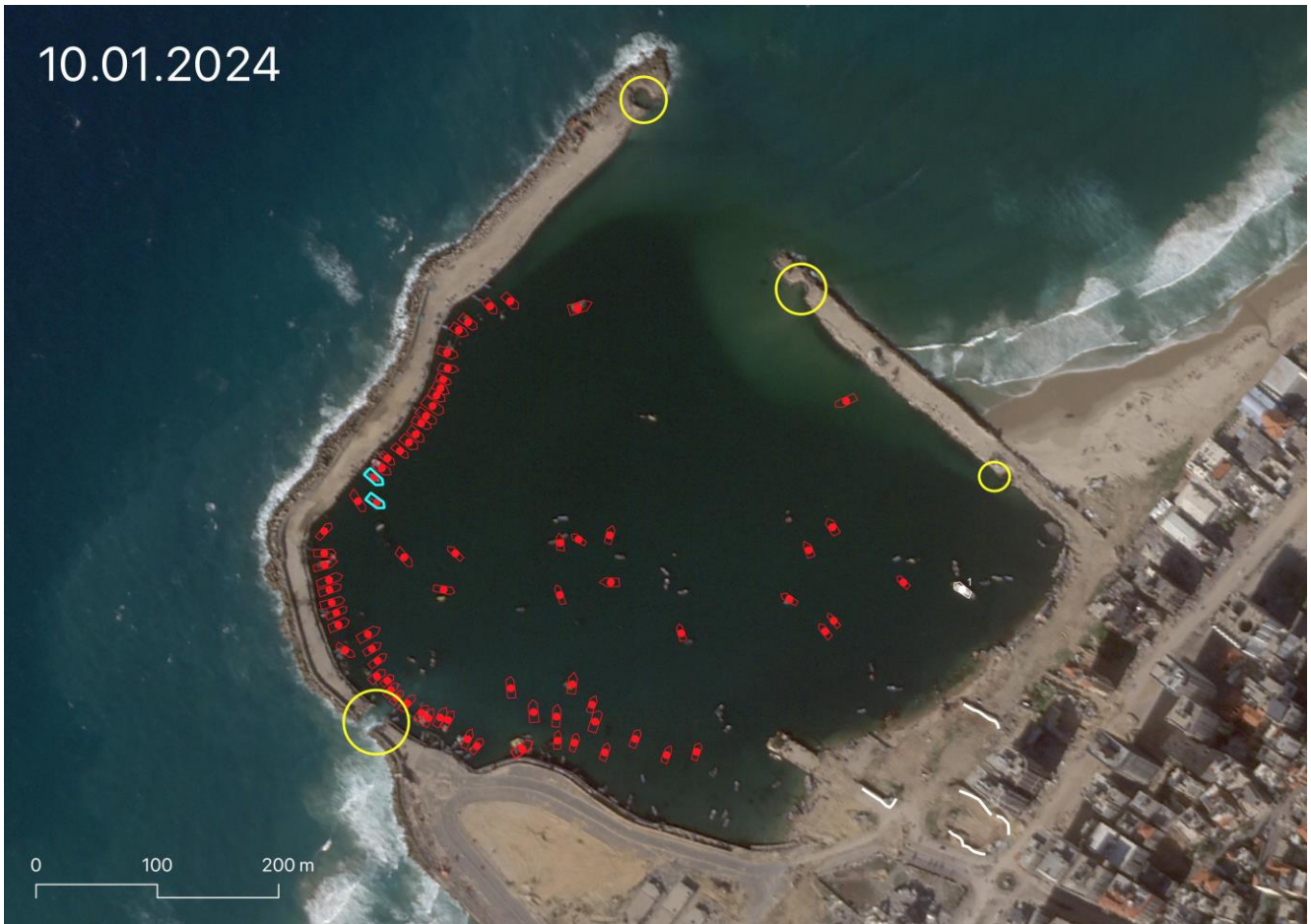
- 6 vessels present docked at the port (marked in white).
- 1 vessel navigating (marked in white).
- Israeli military encampments and earth berms.

By 10 December, only 7 vessels remain visible in the port.



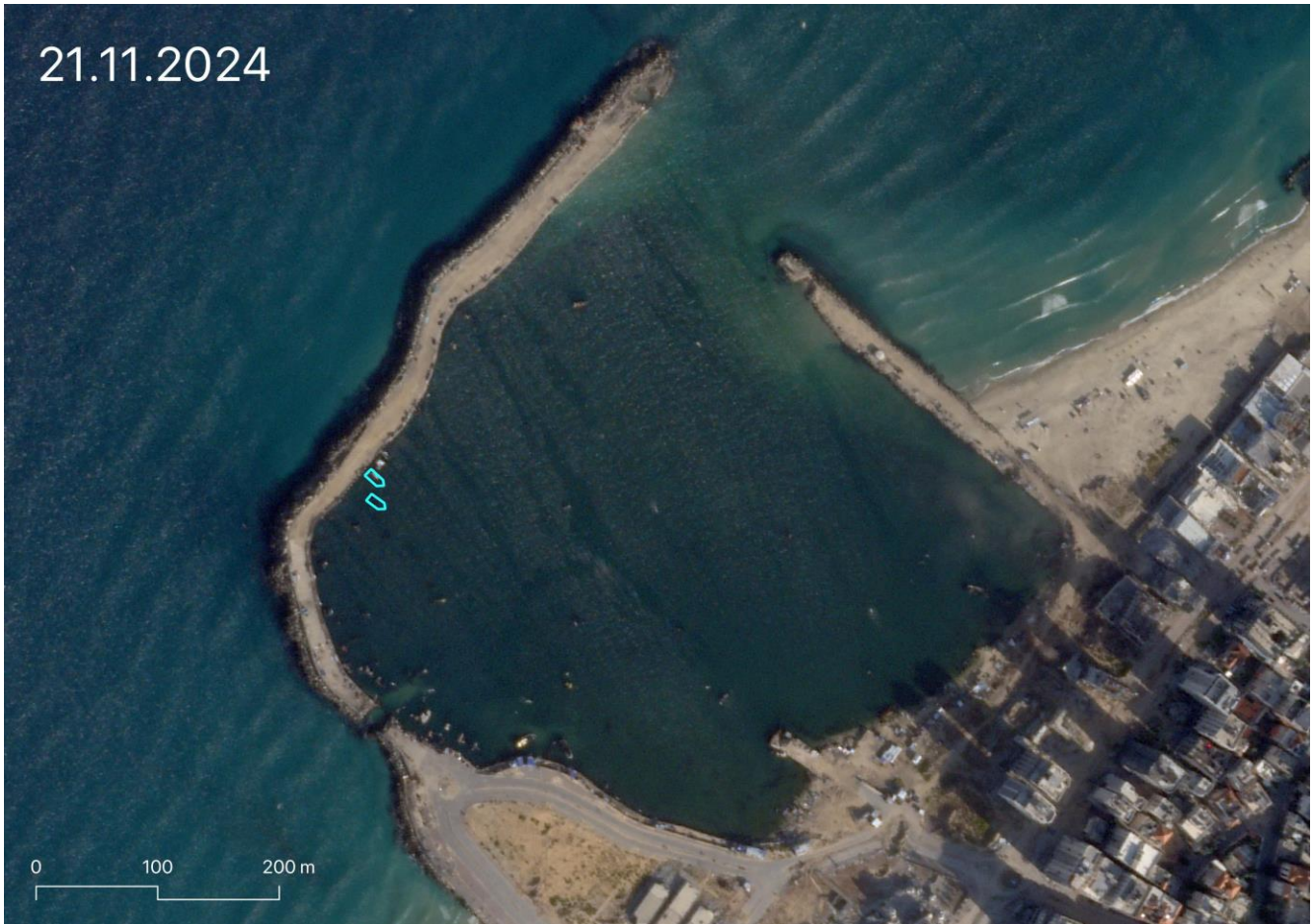
By 31 December 2023, only 1 vessel remains docked, while 1 vessel is navigating.





By 10 January 2024 no vessels remain docked, while 1 vessel is navigating.

7.2 The present state of the port of Gaza: November 2024



As of 21 November 2024, our analysis of satellite images shows that none of the vessels docked in the port in October 2023 are still operational. The vessels are either destroyed, disappeared or completely or partially sunk.

By this time, the Israeli military encampments and earth berms have also been removed, and tents have been erected along the beach by the port by Palestinians displaced from their homes. Analysis of ground-level imagery from 24 and 26 November confirms the same.

7.3 Analysis of the state of vessel No. 494 belonging to Mr Jihad Hessi and vessel No. 474 belonging to Mr Muhammad Hessi: October 2023 to December 2024

Images provided to Forensic Architecture from Adalah of the vessels No. 494 and No. 474 allowed us to measure their dimensions and identify their main features—including colour, shape, and mounted equipment such as a ladder.

We analysed satellite imagery to determine the length of the two vessels. We measured vessel No. 494 to be 18m long and vessel No. 474 to be 19m long. Both are trawler vessels. According to a 2020 World Bank report, these vessels are typically made of wood and fiberglass and carry a trawling net.⁴



Fig 6. Images of vessel No. 494 belonging to Mr Jihad Hessi in 2022 provided to Forensic Architecture



Fig 7. Images of vessel No. 474 belonging to Mr Muhammad Hessi in 2022 provided to Forensic Architecture

⁴ <https://documents1.worldbank.org/curated/en/139111590727850333/pdf/Rapid-Fishery-and-Aquaculture-Sector-Diagnosis-Using-Fishery-Performance-Indicators-in-the-Gaza-Strip.pdf>. See p.25.



Our analysis of satellite imagery from 8 October 2023 shows vessels No. 494 and No. 474 docked along the western tail of the port's sea wall.



Satellite imagery from 8 October 2024 shows the vessels No. 494 and No. 474 parked in the same location after the start of the current war. Their dimensions and the position of the docked vessels is consistent with the satellite image from 4 June 2024.

Satellite imagery from 11 October 2023 shows that the two vessels remained docked in the same location, after the first airstrike on the south of the port's curved sea wall had cut off pedestrian access to the vessels.



Satellite imagery from 14 November 2023 shows that both vessels remained parked in the same location by this time.

Our analysis shows by 14 November, vessel No. 494 belonging to Mr Jehad Hessi is first observed as being partially submerged and rendered non-functional.



Satellite imagery from 21 November 2023 shows that vessel No. 474 owned by Mr Muhammad Hessi, is partially submerged and rendered non-functional at this time.



Fig 8. Image documentations of the state of the port on 24 November 2024 by Ain Media Gaza. Annotations by Forensic Architecture mark the location of the boats (in white) and the crater (in yellow).

Ground-level images collected by Ain Media on behalf of Forensic Architecture on 24 November 2024 captured the location of the remains of vessels No. 474 and No. 494.





The position of the camera in relation to the boats is represented in the above satellite image with white triangles.



Fig 9. Image documentations of the state of the port on 24 November 2024 by Ain Media Gaza. Annotations by Forensic Architecture mark the identifying features of the boats.

We were able to identify the remains of vessels No. 474 and No. 494 by the distinctive shapes of the metal ladders attached to their respective masts.



Fig 10. Image documentations of the state of the port on 24 November 2024 by Ain Media Gaza. Annotations by Forensic Architecture mark the identifying features of the boats.

Our analysis of ground-level and satellite images show that both vessels No. 474 and No. 494 are presently almost fully submerged and rendered non-functional.

8. About Forensic Architecture

Forensic Architecture (FA) is a research agency, based at Goldsmiths, University of London. The team includes architects, scientists, academics, journalists, technology experts and other specialized professionals and experts.

Forensic Architecture undertakes advanced architectural and media research on behalf of international prosecutors, human rights organisations, as well as political and environmental justice groups.

We have provided spatial research and evidence for numerous human rights investigations and prosecutions under international law, including at the UN General Assembly in New York in October 2013 and the Human Rights Council in Geneva in 2014 (on drone warfare via the UNSRCT⁵).

We presented evidence in the Israeli High Court for the (Palestinian) village of *Battir vs. the Ministry of Defence* through Michael Sfar, who won this case on 4 January 2015.

Our report on the *Use of White Phosphorous in Urban Environments* was presented at the UN Human Rights Council Geneva in November 2012 and in March 2011 at the Israeli High Court (for Yesh Gvul via Michael Sfar).

The Forensic Oceanography team (Charles Heller and Lorenzo Pezzani) from Forensic Architecture presented the case of the *Left to Die Boat* before the French Tribunal de Grand Instance in April 2012, the Brussels Tribunal de première instance in November 2013, and in the courts of Spain and Italy on June 2013.

The *Gaza Platform* and our *Rafah: Black Friday* report about the 2014 Gaza War, developed together with Amnesty International, was submitted to the UN Independent Commission of Inquiry on March 2015 and to the ICC⁶ in March and September 2015.

For more info, please visit: www.forensic-architecture.org

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⁵ United Nations Special Rapporteur for Counter Terrorism

⁶ International Criminal Court

