

Gaza Flood Exposure and IDP Site Risk Operational Brief

Flood risk exposure, displacement-site concentration and access implications

Reporting date: 24 September 2026 | Geographic scope: Gaza Strip | Audience: Humanitarian coordination and operational planning actors
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Seasonal climate context: El Niño 2026-27

El Niño is strengthening rapidly ahead of the 2026-27 Northern Hemisphere winter. The World Meteorological Organization (3 September 2026) assessed an almost 100% likelihood that El Niño will persist through February 2027, while NOAA's Climate Prediction Center (10 September 2026) placed the probability of a very strong event above 90%. A strong El Niño can shift large-scale storm tracks, rainfall and temperature patterns, but it does not by itself determine local rainfall in Gaza.

For the eastern Mediterranean, peer-reviewed studies have reported a tendency toward enhanced winter precipitation during some El Niño periods, including in Israel, although the relationship varies across decades and is not sufficiently stable to treat El Niño as a Gaza-specific rainfall forecast. Operationally, the 2026-27 El Niño should therefore be treated as a seasonal risk amplifier rather than a prediction of flooding: episodes of heavy rain would increase the likelihood of standing water, site inundation and reduced road passability where mapped flood exposure and displacement concentrations overlap. Event-scale warnings and short-range forecasts should remain the trigger for action.

Overview

The analysis combines two complementary views that must be read separately. A neighbourhood-based model estimates that 1,882,821 people - 89.7% of the 2.1 million Gaza population baseline - are located within mapped low, moderate or high flood-risk areas. The active-site analysis describes reported populations at mapped displacement sites rather than the residential distribution assumed by the neighbourhood model.

The mapped active-site dataset contains 1,526 sites and 1,645,339 reported residents. Within it, 1,378 sites containing 1,468,650 residents are classified High, Moderate or Low: 329 high-risk, 434 moderate-risk and 615 low-risk sites. A further 148 sites containing 176,689 residents fall outside those three classified site maps. These measures overlap conceptually and must not be added together.

Table 1. Key indicators

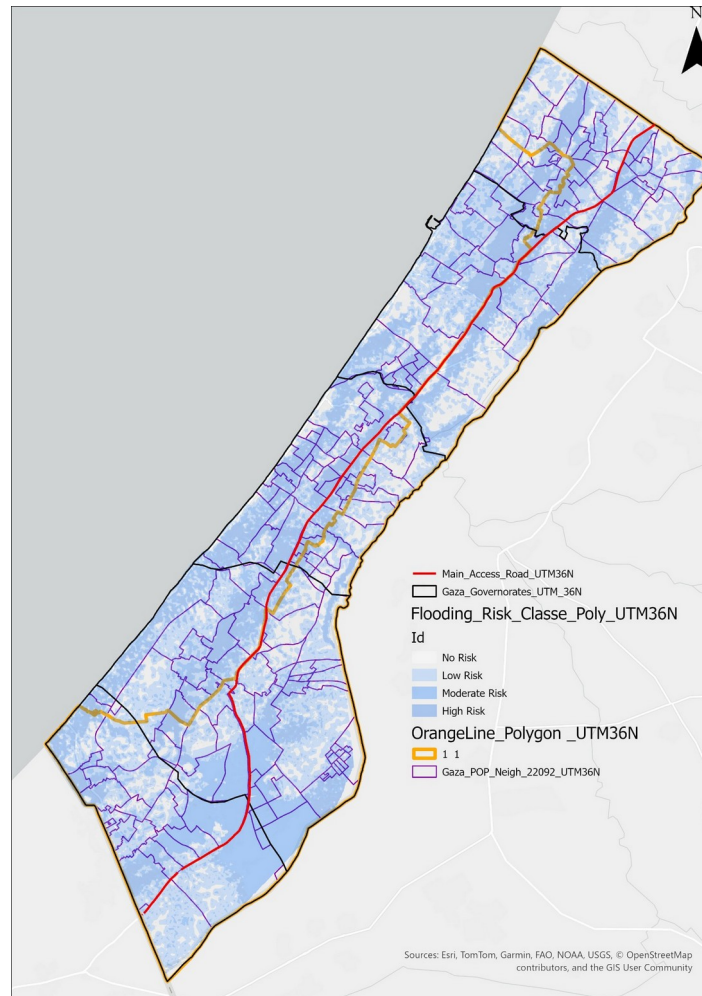
Indicator	Estimated value	Share / reference
Estimated Gaza population	2,100,000	100.0%
Neighbourhood-model population exposed to flood risk	1,882,821	89.7% of Gaza baseline
Population outside mapped neighbourhood flood-risk classes	217,179	10.3% of Gaza baseline
Population recorded in mapped active IDP sites	1,645,339	78.3% of Gaza baseline
Classified exposed IDP-site population (High + Moderate + Low)	1,468,650	89.3% of mapped site population
Site population outside the three classified risk maps	176,689	10.7% of mapped site population

Neighbourhood exposure and displacement-site population are separate analytical measures describing overlapping groups. They must not be added together.

Neighbourhood-based flood exposure

The Gaza-wide model allocates neighbourhood population across flood-risk classes according to the share of each neighbourhood falling within each class. It assumes an even population distribution within each neighbourhood and uses the 2.1 million Gaza baseline. The result is a planning estimate of spatial exposure, not a current count of people at IDP sites.

Figure 1. Neighbourhood flood-risk classes, population units and the main humanitarian access road



The map combines the flood-risk surface with the neighbourhood boundaries used for population allocation, the main humanitarian access road and the mapped buffer-zone boundary. Blue shades show the mapped risk classes; purple outlines are neighbourhood analysis units, not another risk class. The road crosses several risk classes, identifying potential monitoring points during heavy rainfall. The map does not show observed flood depth, inundation probability or confirmed road closure.

Table 2. Estimated population in mapped flood-risk areas

Flood-risk category	Estimated population	Share of total population	Share of exposed population
High risk	420,389	20.0%	22.3%
Moderate risk	542,741	25.8%	28.8%
Low risk	919,691	43.8%	48.8%
All exposed categories	1,882,821	89.7%	100.0%

Neighbourhood-based flood exposure - governorate profile

Low-risk areas contain the largest modelled exposed population, followed by moderate- and high-risk areas. High-risk areas alone contain an estimated 420,389 people, equivalent to 20.0% of the Gaza baseline.

Table 3. Modelled neighbourhood exposure by governorate

Governorate	High	Moderate	Low	Total exposed
North Gaza	124,103	88,774	145,234	358,111
Gaza	135,448	187,005	337,173	659,626
Deir al-Balah	56,864	62,135	142,706	261,705
Khan Younis	68,817	122,240	177,809	368,866
Rafah	35,157	82,587	116,769	234,513
Gaza Strip	420,389	542,741	919,691	1,882,821

These are neighbourhood-based estimates. They should not be used to rank the current flood-exposed IDP-site population.

Interpretation

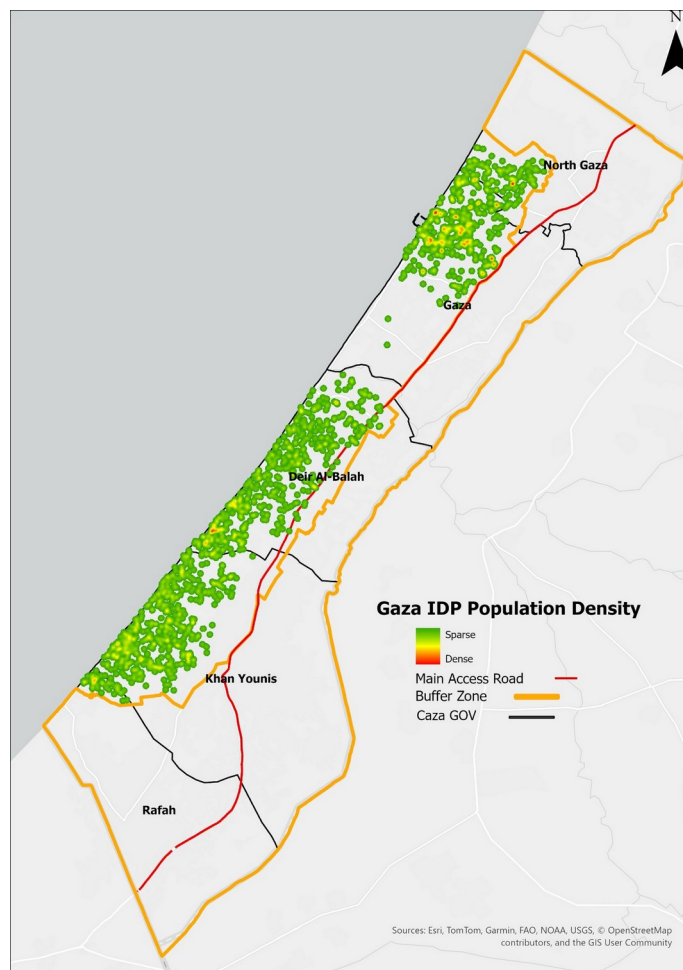
The purple neighbourhood polygons in Figure 1 are the population-analysis units used in the neighbourhood model. Scaling the Gaza-wide total changes estimated counts, not the location of people after subsequent displacement. Current displacement-site populations are analysed separately in Figures 2-6 and Tables 4-8.

Operational reading: road segments that pass close to high-density displacement areas and higher-risk flood zones warrant rainfall-triggered monitoring, drainage checks and contingency routing.

Active IDP sites and current population profile

The mapped active-site dataset contains 1,526 sites with 1,645,339 reported residents. Khan Younis contains half of the mapped site population, followed by Deir al-Balah and Gaza. These totals describe the sites included in the final dataset and are not an exhaustive census of every displacement location.

Figure 2. Relative population concentration in mapped active IDP sites



This population-weighted heat map shows where reported residents of mapped active IDP sites are relatively concentrated. The main clusters are visible in North Gaza and Gaza, Deir al-Balah and the central coastal belt, and Khan Younis. Colour intensity is a relative concentration display; it is not people per square kilometre and it does not represent flood-risk class.

Table 4. Active IDP sites by governorate

Governorate	Active sites	Reported population	Share of site population
Khan Younis	572	834,547	50.7%
Deir al-Balah	419	412,747	25.1%
Gaza	413	291,958	17.7%
North Gaza	106	91,096	5.5%
Rafah	16	14,991	0.9%
Total	1,526	1,645,339	100.0%

Operational reading: the heat map is useful for locating dense displacement clusters, but risk level must be read from the site-classification maps below.

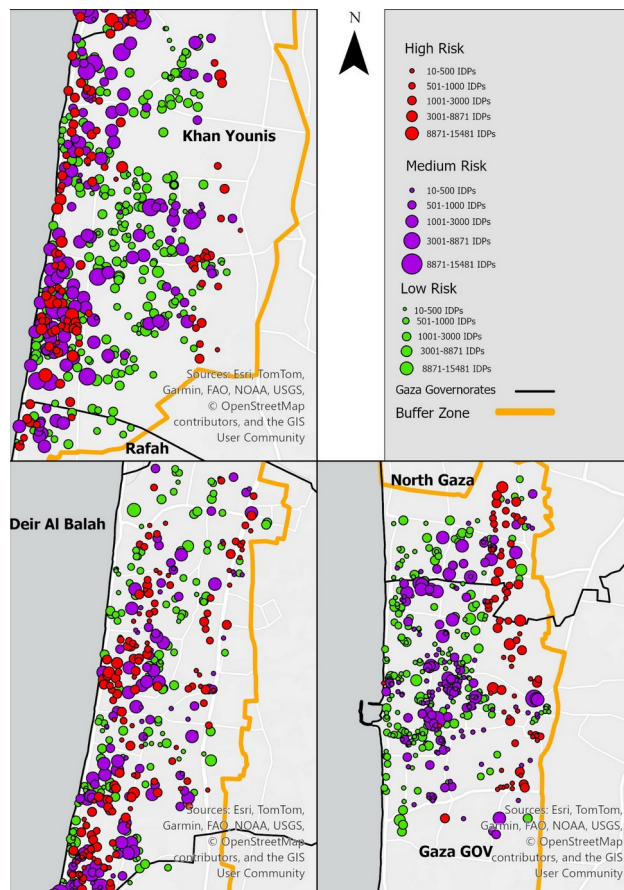
Site-level flood-risk classification

The site-level classification contains 1,378 active sites and 1,468,650 reported residents in the three mapped risk classes: 329 high-risk sites (400,004 residents), 434 moderate-risk sites (449,812) and 615 low-risk sites (618,834). The remaining 148 mapped sites and 176,689 residents are outside those three classified site maps.

How to read the circle maps

Colour represents flood-risk class (red = High, purple = Moderate, green = Low). Circle size is based on the original reported population value for each site and follows the five ranges shown in the legends. A small number of exceptionally large sites create the largest symbols, so the circle sizes are intentionally uneven. A larger circle means a larger site population, not a higher risk class.

Figure 3. Population-scaled IDP sites by flood-risk class - governorate detail



Red circles show High risk, purple circles Moderate risk and green circles Low risk. Circle size represents the original reported population at each site, grouped into the five population ranges shown in the legend. A small number of exceptionally large sites therefore produce visibly larger circles. This is intentional: circle size represents site population, while colour represents flood-risk class. Use the tables for totals rather than estimating counts from overlapping symbols.

Scope note

This brief does not include WASH service-coverage or population-gap analysis. That work is outside the scope of this report and will be presented separately.

Site-level flood-risk classification - population totals

Table 5. Classified exposed IDP-site population by governorate and risk class

Governorate	High risk	Moderate risk	Low risk	Total exposed
Khan Younis	191,473	249,753	304,376	745,602
Deir al-Balah	129,289	84,994	141,422	355,705
Gaza	42,574	93,601	134,535	270,710
North Gaza	33,736	19,241	32,508	85,485
Rafah	2,932	2,223	5,993	11,148
Total	400,004	449,812	618,834	1,468,650

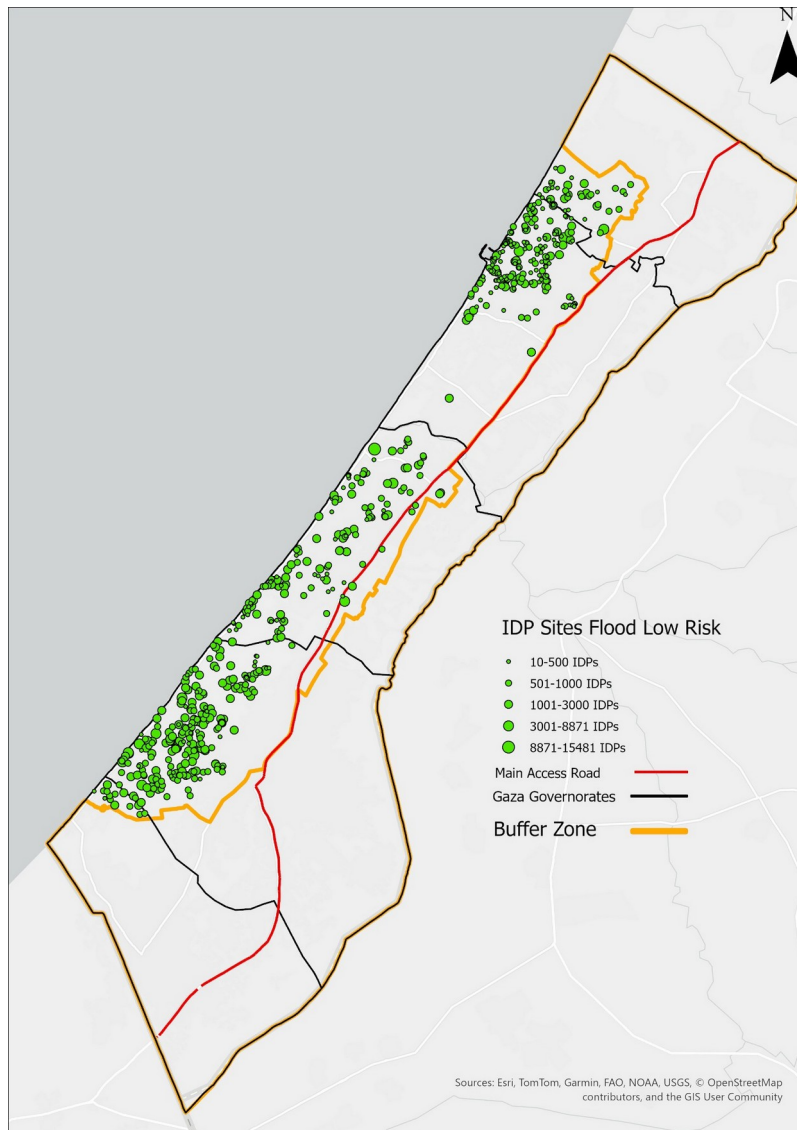
This table sums only sites classified High, Moderate or Low in the site-level risk layer; it excludes the 176,689 residents outside those three classes.

The table should be read together with Figure 3. The map identifies the geographic pattern and site-size distribution; the table provides the population totals by governorate and risk class without relying on visual symbol counts.

Low-risk IDP sites

Low-risk sites form the largest site-level category by reported population: 618,834 residents. Khan Younis accounts for 304,376 people (49.2% of the low-risk total), followed by Deir al-Balah and Gaza. Low risk is the lowest mapped class in this assessment, not an absence of flood exposure.

Figure 4. Low-risk IDP sites



Low-risk sites are widespread across the mapped displacement belt. Circle size follows the original reported site population values and the five class ranges shown in the legend; the largest circles correspond to exceptionally large sites.

Table 6. Reported population at low-risk IDP sites by governorate

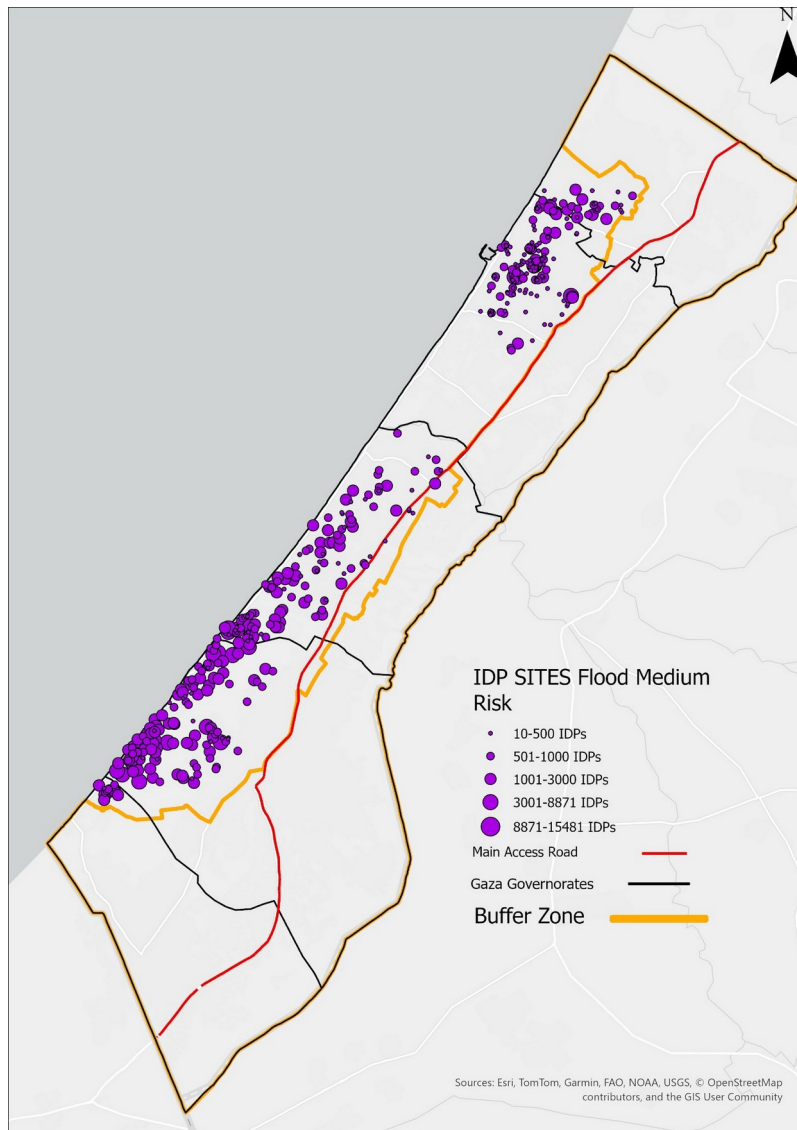
Governorate	Low-risk site population	Share of low-risk site population
Khan Younis	304,376	49.2%
Deir al-Balah	141,422	22.9%
Gaza	134,535	21.7%
North Gaza	32,508	5.3%
Rafah	5,993	1.0%
Total	618,834	100.0%

Low risk is the lowest mapped risk class in this assessment; it should not be interpreted as no flood risk.

Moderate-risk IDP sites

Moderate-risk sites contain 449,812 reported residents. Khan Younis accounts for 249,753 people (55.5% of the moderate-risk total), followed by Gaza and Deir al-Balah. The map is operationally useful because it shows where sizeable sites in this class cluster near the main movement corridor.

Figure 5. Moderate-risk IDP sites



Moderate-risk sites occur across the northern, central and southern displacement clusters. The map combines risk class with site population magnitude, making the larger purple circles the higher-population sites within the moderate-risk category.

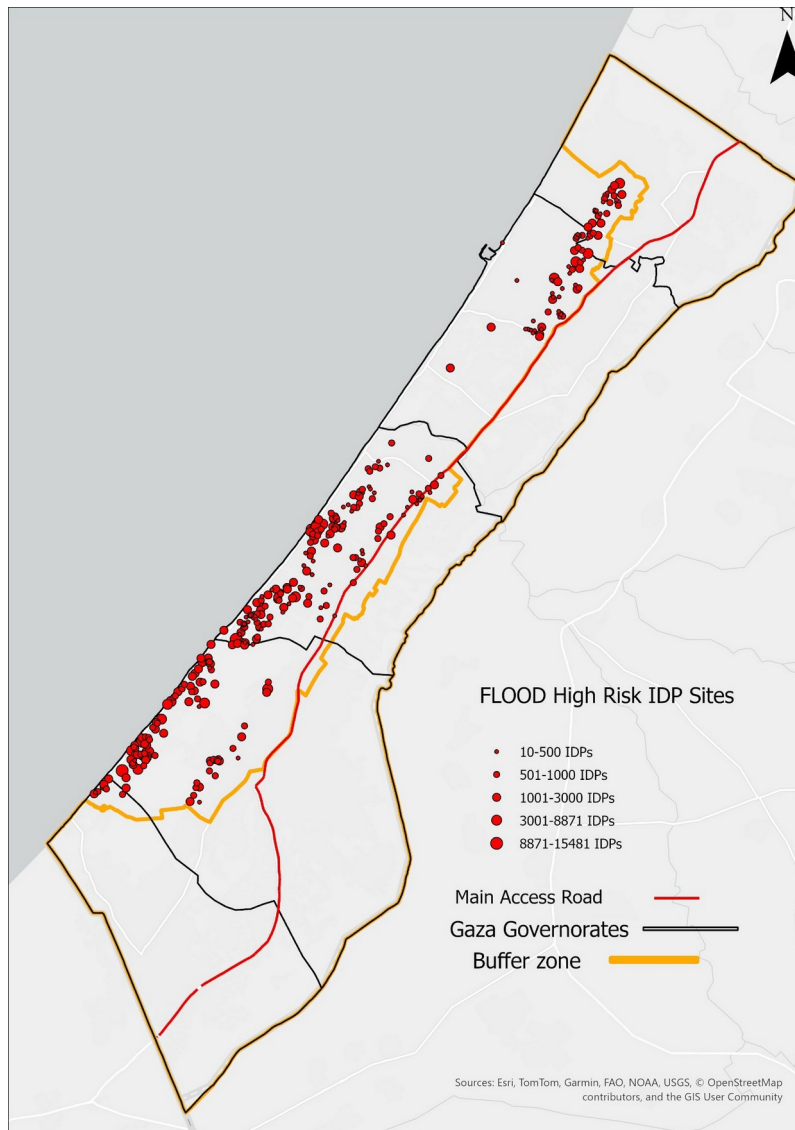
Table 7. Reported population at moderate-risk IDP sites by governorate

Governorate	Moderate-risk site population	Share of moderate-risk site population
Khan Younis	249,753	55.5%
Gaza	93,601	20.8%
Deir al-Balah	84,994	18.9%
North Gaza	19,241	4.3%
Rafah	2,223	0.5%
Total	449,812	100.0%

High-risk IDP sites

High-risk sites are the priority group for site-level preparedness and verification. The class contains 329 sites and 400,004 reported residents. Khan Younis and Deir al-Balah together account for approximately 80.2% of the reported population in high-risk sites.

Figure 6. High-risk IDP sites



High-risk sites are concentrated in several northern, central and south-western clusters. Population-scaled red circles show where larger active sites coincide with the highest mapped flood-risk class.

Table 8. Reported population at high-risk IDP sites by governorate

Governorate	High-risk site population	Share of high-risk site population
Khan Younis	191,473	47.9%
Deir al-Balah	129,289	32.3%
Gaza	42,574	10.6%
North Gaza	33,736	8.4%
Rafah	2,932	0.7%
Total	400,004	100.0%

Operational reading: prioritisation should consider both risk class and reported site population. Larger high-risk sites and dense high-risk clusters warrant early verification of drainage, shelter condition, access and evacuation options, subject to current field information.

Operational implications

- Prioritise field verification at high-risk sites, especially larger sites and dense clusters, including drainage condition, shelter condition and evacuation options.
- Protect access continuity by monitoring road segments where the main humanitarian access road passes through or alongside higher-risk areas and dense site clusters.
- Use forecast rainfall and observed-impact triggers to initiate rapid checks of road passability, standing water and site conditions. The mapped risk class is a preparedness layer, not a forecast that flooding will occur at a particular site.
- Keep site population and operating-status data current. Recalculate priorities after major population movements, access changes or updated flood-risk information.
- Use the population-scaled maps to sequence preparedness: colour identifies the mapped risk class and circle size identifies reported site-population magnitude. Use the tables for totals and the maps for spatial prioritisation.

Methods and interpretation

Neighbourhood exposure was estimated by combining neighbourhood population with the share of each neighbourhood located in each flood-risk class, using a 2.1 million Gaza baseline and an even-within-neighbourhood population assumption. Site-level analysis uses reported active-site populations and assigned flood-risk class. These are separate analytical frames and must not be combined into one population total.

Risk classes indicate potential exposure, not observed flood depth, confirmed flooding, drainage performance or the probability of a particular storm. Sites outside the High/Moderate/Low site maps are not guaranteed safe. The heat map shows relative concentration; the circle maps use original reported site populations to show site magnitude.

Sources

1. OCHA oPt. Humanitarian Situation Report, 4 September 2026 - Gaza population baseline and humanitarian context.
2. UNICEF. Gaza Service Mapping V2.0 / active IDP-site population data; final project extract dated 9 September 2026.
3. Project spatial layers used in the assessment: neighbourhood population, flood-risk classification, governorate boundaries, main humanitarian access road and mapped buffer-zone boundary. Background-map credits appear on the maps.
4. World Meteorological Organization (WMO). El Niño/La Niña Update, 3 September 2026 - El Niño persistence and expected strengthening through the 2026-27 winter.
5. NOAA Climate Prediction Center. ENSO Diagnostic Discussion, 10 September 2026 - probability and expected strength of the 2026-27 El Niño event.
6. Price, C., Stone, L., Huppert, A., Rajagopalan, B. and Alpert, P. (1998). A possible link between El Niño and precipitation in Israel. *Geophysical Research Letters*, 25(21), 3963-3966. <https://doi.org/10.1029/1998GL900098>
7. Brönnimann, S. (2007). Impact of El Niño-Southern Oscillation on European climate. *Reviews of Geophysics*, 45, RG3003. <https://doi.org/10.1029/2006RG000199>.

Key limitations

- Neighbourhood-based exposure estimates do not relocate population to current displacement sites and should not be used as current site-level population counts.
- The active-site dataset is a mapped operational subset and may not contain every displacement location or subsequent population change.
- Site-level risk categories identify overlap with the mapped risk layer; they do not measure flood depth, drainage capacity or actual event impact.
- The analysis is an independent humanitarian GIS product, not an official UN assessment. It supports prioritisation but does not replace field verification, current access information or event-specific impact assessment.