



Explosive weapons with wide area effects and risk to civilians

A background note to the consultations on a political declaration on explosive weapons in populated areas

Article 36 and PAX

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In conflicts all over the world – in countries such as Syria, Ukraine and Yemen – the use of explosive weapons in populated areas is a major cause of harm to civilians. Explosive weapons are a broad category of weapons, all of which project blast and fragmentation around the point of detonation.

Explosive weapons that have wide area effects are especially problematic when used in populated areas. In this paper we elaborate on the link between the technical characteristics of these weapons and the risk they pose to civilians.

The weapon technology

When explosive weapons are used in populated areas, their effects risk death and injury to civilians. Where warheads might land within a broad area, or where their blast and fragmentation will cause damage across a broad area, the risk and scale of likely harm becomes still more severe. Where these effects are likely to occur outside, or extend significantly beyond, the actual military objective being targeted, the civilian population can be expected to bear the brunt of these effects.

There are 3 characteristics that create such wide area effects, either individually or in combination:

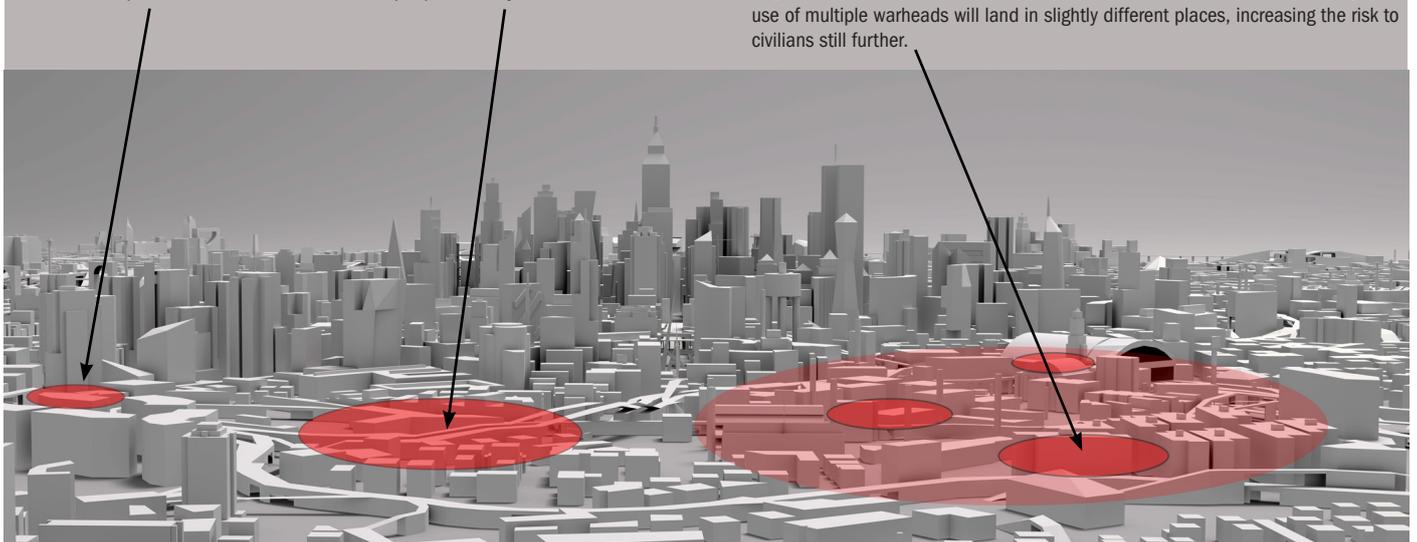
- x A substantial blast and fragmentation radius resulting from a large explosive content;
- x Inaccuracy of delivery, meaning that the weapon may land anywhere in a wide area;
- x Use of multiple warheads or multiple firings, sometimes designed to spread, affecting a wide area.

Different explosive weapons exert different levels of mechanical force and may exert force over different areas. Different explosive weapons may also be subject to different levels of uncertainty regarding where detonations will actually occur in relation to a user's intent (as a function of the accuracy and precision with which they can be projected). These scalable factors all bear upon the risk to civilians created by the use of explosive weapons: wider area effects increase the likely

1. A single explosive weapon produces an area of blast and fragmentation around the point where it detonates.

2. Where the blast and fragmentation cover a greater area, more civilian people and objects will be affected.

3. Inaccuracy of delivery means that for some weapons, the blast and fragmentation effects might occur somewhere within a much wider area still. Where within this larger area the effects will occur cannot be further controlled. Repeated firings or use of multiple warheads will land in slightly different places, increasing the risk to civilians still further.



number of surrounding civilian people and civilian objects that are exposed to those forces; high mechanical forces make it more likely that affected civilian objects will experience significant damage, possibly producing reverberating effects where that damage affects interconnected infrastructure.

Thus the technical characteristics of explosive weapons have a bearing on the nature and likelihood of harms that have been repeatedly associated with the use of these weapons in populated areas – multiple casualties, affecting people who are not the intended targets of attack, damage to buildings and infrastructure, with subsequent reverberating effects.

Wide area effects mean that the weapons will affect an area significantly greater than that of the intended target. In some contexts, certain explosive weapons are as likely, if not more likely, to cause harm to the civilian population than they are to damage a specific military target.

In some cases, the size of the affected area may be mitigated to some extent by how the weapon is being used (launch distance, fusing, etc. will impact the area effect). Yet some weapon types will almost always impact an area that extends beyond the target unless that target is of great size, such as an airfield. When such wide area effects are created in populated areas it is substantially the civilian population and civilian property that will experience death, injury or damage.

Direct and immediate harm

When these weapons are used in populated areas, the wide area effect of a weapon will form a direct and immediate risk to civilians, either by being hit by the weapon’s impact (blast, heat and weapon fragments) or by the secondary effects of the weapons, such as projected debris and collapsing buildings or fires.

The table below suggests the link between population density figures and how many people will be at risk when a 120mm mortar, known for its inaccuracy, is fired from a maximum range into different urban locations. Some 99% of firings are expected to land within an area of approximately 720,000m². Since the commander cannot control where the mortar will land exactly within this area, all people in the area risk being harmed. Inaccuracy of weapons also often leads a commander to fire multiple times, in order to increase the chance of hitting the target, but thereby also increasing the risk to civilians.

Location	Approximate population density (persons per km ²)	Persons within the wide risk area of a 120mm mortar at maximum range
Geneva, Switzerland	12,000	8,640
Manhattan, New York, USA	27,000	19,440
Mumbai, India	20,000	14,400
Cairo, Egypt	17,000	12,240
Utrecht, Netherlands	3,500	2,250

In the table below, not all of the people at risk will actually experience the weapon’s effects. However, it provides an indication of how inaccuracy of delivery (one of the key factors in producing wide area effects) puts a substantial civilian population at risk.

Indirect harm

Because an explosive weapon with wide area effect will likely damage not (only) the target but also its surrounding infrastructure, there is a high chance that critical infrastructure will be affected. Furthermore, explosive weapons can destroy pipelines, power supplies, water reservoirs and other facilities that causes long term, severe ‘reverberating effects’ – whereby damage to one component of infrastructure causes other systems to fail.

Destruction of infrastructure vital to the civilian population, including water and sanitation, housing, schools and hospitals, deprives civilians of access to basic necessities and results in a pattern of wider, long term suffering. This harm is made more likely when wide area effects are created, as users have less control over the impact they will cause.

A political declaration on explosive weapons should recognise that:

- x Explosive weapons create powerful forces that affect the area around the point at which they detonate.
- x Weapon users should understand the area and nature of effects their weapon systems are likely to create in different configurations of use.
- x In populated areas, effects that extend beyond or occur outside a military objective can be expected to cause harm to civilians and damage to civilian objects, due to civilians being concentrated in such locations.
- x Militaries should have operational policies and procedures that work to avoid use, in populated areas, of explosive weapons where they will create such wide area effects.
- x Militaries should have operational policies and procedures to evaluate the possible indirect and reverberating effects that may result from the use of different explosive weapons in populated areas, and should include these factors in legal evaluations.