

Proportionality and precautions in attack: The reverberating effects of using explosive weapons in populated areas

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Abstract

During an armed conflict, the use of explosive weapons with wide area effects in populated areas has a devastating impact on civilians. Less visible than the direct effects of explosive weapons, but equally devastating, are the reverberating effects of the use of explosive weapons in populated areas. While there is growing consensus that parties to an armed conflict are legally obliged to take into account the reasonably foreseeable reverberating effects of an attack, particularly for the purposes of the rules on proportionality and precautions in attack, the precise scope of this obligation remains unclear. After setting out the legal arguments in support of the position that reasonably foreseeable reverberating effects must be taken into account, this article goes on to examine how such effects should be evaluated and how they must be avoided or minimized.

Keywords: International humanitarian law, conduct of hostilities, explosive weapons in populated areas, proportionality, feasible precautions, reverberating effects.

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Introduction

During armed conflict, the use of explosive weapons with wide area effects¹ in populated areas² has a devastating impact on civilians. Most visible are the direct blast and fragmentation effects of explosive weapons, which kill and injure civilians and damage civilian objects including civilian houses. Less visible, but equally devastating, are the reverberating effects of the use of explosive weapons in populated areas, meaning those effects “that are not directly and immediately caused by the attack, but are nevertheless the product thereof”.³ When civilian housing and essential infrastructure are damaged or destroyed, civilians are affected in a number of ways, especially when populated areas sustain attacks over a long period of time.⁴ Civilians may be displaced, electricity may be temporarily or permanently disabled, health services may be weakened, wastewater collection and treatment may be reduced, and the accessibility, quality and quantity of water supplies may deteriorate.⁵ In many contexts, the reverberating effects of an attack, particularly one that disables the national electricity system, may far outweigh the immediate civilian casualties caused by the attack.⁶

While international debate concerning the legal obligation to take into account the reverberating effects of an attack has evolved significantly over the last ten years – most recently in the context of cyber-warfare⁷ – and enjoys

- 1 Explosive weapons with wide area effects include: (1) weapons that employ an individual munition with a large destructive radius – i.e., with large blast and fragmentation range or effect (such as large bombs or missiles); (2) weapon systems with inaccurate delivery systems (such as unguided indirect fire weapons, including artillery and mortars); and (3) weapon systems that are designed to deliver multiple munitions over a wide area (for example, multi-barrel rocket launchers).
- 2 “Populated area” is synonymous with “concentration of civilians”, which is defined under international humanitarian law (IHL) as “a city, town, village or other area containing a similar concentration of civilians or civilian objects”. See Protocol Additional (I) to the Geneva Conventions of 12 August 1949, and Relating to the Protection of Victims of International Armed Conflicts, 1125 UNTS 3, 8 June 1977 (entered into force 7 December 1978) (AP I), Art. 51(5)(4). See also ICRC, *International Humanitarian Law and the Challenges of Contemporary Armed Conflicts*, report prepared by the ICRC for the 32nd International Conference of the Red Cross and Red Crescent, Geneva, 2015 (2015 Challenges Report), p. 49.
- 3 Michael N. Schmitt, “Wired Warfare: Computer Network Attack and *Jus in Bello*”, *International Review of the Red Cross*, Vol. 84, No. 846, 2002, p. 392.
- 4 See, for example, ICRC, *Urban Services during Protracted Armed Conflict: A Call for a Better Approach to Assisting Affected People*, Geneva, 2015 (Urban Services Report), pp. 21–32.
- 5 *Ibid.*
- 6 See, for example, Walid Doleh, Warren Piper, Abdel Qamhie and Kamel al Tallaq, *Health and Welfare in Iraq After the Gulf Crisis: An In-depth Assessment*, report by the International Study Team, Electrical Facilities Survey, October 1991; William Arkin, “Tactical Bombing of Iraqi Forces Outstripped Value of Strategic Hits, Analyst Contends”, *Aviation Week and Space Technology*, 27 January 1992, cited in James Crawford, “The Law of Noncombatant Immunity and the Targeting of National Electrical Power Systems”, *Fletcher Forum of World Affairs*, Vol. 21, No. 2, 1997, p. 110.
- 7 See, for example, Cordula Droegge, “Get Off My Cloud: Cyber Warfare, International Humanitarian Law and the Protection of Civilians”, *International Review of the Red Cross*, Vol. 94, No. 886, 2012, pp. 572 ff.

increasing acceptance by commentators⁸ and States,⁹ there is still no consensus on the scope of this obligation as it applies to the rules on proportionality and precautions in attack.¹⁰ This article seeks to shed light on this grey area in the law, particularly as it relates to the use of explosive weapons in populated areas. More precisely, the article examines the parameters of the obligation under the rules on proportionality and precautions in attack, including the extent of reverberating effects that must be taken into account, how reverberating effects should be evaluated, and how such effects must be avoided or minimized. While the use of explosive weapons in populated areas is not explicitly prohibited under international humanitarian law (IHL), this article will demonstrate that such use might violate the rule on proportionality and certain precautionary requirements, if the reasonably foreseeable reverberating effects of the attack are not taken into account.¹¹

- 8 Marco Sassòli and Lindsey Cameron, “The Protection of Civilian Objects: Current State of the Law and Issues *de Lege Ferenda*”, in Natalino Ronzitti and Gabriella Venturini (eds), *The Law of Air Warfare: Contemporary Issues*, Eleven International Publishing, Utrecht, 2006, p. 65; Michael N. Schmitt and Eric W. Widmar, “‘On Target’: Precision and Balance in the Contemporary Law of Targeting”, *Journal of National Security Law and Policy*, Vol. 7, No. 3, 2014; Peter Rowe, “Kosovo 1999: The Air Campaign – Have the Provisions of Additional Protocol I Withstood the Test?”, *International Review of the Red Cross*, Vol. 82, No. 837, 2000, p. 152; Michael N. Schmitt (ed.), *Tallinn Manual on the International Law Applicable to Cyber Warfare*, Cambridge University Press, Cambridge, March 2013 (Tallinn Manual), p. 160 (prepared by the International Group of Experts at the Invitation of the NATO Cooperative Cyber Defence Centre of Excellence). It should be noted that the *Commentary on the Harvard Humanitarian Policy and Conflict Research Manual on International Law Applicable to Air and Missile Warfare*, Harvard University, 2010 (Commentary on the AMW Manual), indicates that “the issue is not entirely settled” (M. N. Schmitt and E. W. Widmar, “‘On Target’”, above, p. 405). See also *Harvard Humanitarian Policy and Conflict Research Manual on International Law Applicable to Air and Missile Warfare*, Harvard University, 2009 (AMW Manual). However, according to Schmitt – who was part of the process for both the Tallinn Manual and the AMW Manual – the Tallinn Manual is the better view. See Michael N. Schmitt, “Rewired Warfare: Rethinking the Law of Cyber Attack”, *International Review of the Red Cross*, Vol. 96, No. 893, 2014, pp. 202–205.
- 9 ICRC, *Explosive Weapons in Populated Areas: Humanitarian, Legal, Technical and Military Aspects*, Geneva, 2015 (Expert Meeting Report), p. 23 (this report is a product of the Expert Meeting held in Chavannes-de-Bogis, Switzerland, on 24–25 February 2015); US Department of Defence, *Law of War Manual*, 2015 (US Law of War Manual), p. 342, note 158, citing the US Air Force Pamphlet, 1976; US Department of the Army, *Counterinsurgency*, FM 3-24/ MCWP 3-33.5, 2006 (US Counterinsurgency Manual), § 7–36; UK Ministry of Defence, *The Joint Service Manual of the Law of Armed Conflict*, JSP 383, 2004, amended in 2013 (UK Joint Service Manual), para. 5.33.4; “Response to the IHL Questionnaire from Switzerland”, CCW/GGE/XI/WG.1/WP.13, 3 August 2005, § 15; “Response to the IHL Questionnaire from Norway”, CCW/GGE/XI/WG.1/WP.5, 29 July 2005, § 19; “Response to the IHL Questionnaire from Austria”, CCW/GGE/XI/WG.1/WP.14, 4 August 2005, § 11; “Response to the IHL questionnaire from Czech Republic”, CCW/GGE/XIII/WG.1/WP.2, 10 February 2006; “Response from Sweden to Document CCW/GGE/X/WG.1/WP.2”, CCW/GGE/XI/WG.1/WP.8, 29 July 2005; Statement by Ireland on the McCormack Report, CCW Thirteenth Meeting of the Group of Government Experts on ERW, March 2006, available at: [www.unog.ch/80256ee600585943.nsf/\(httpPages\)/eae6f87b33e754b8c12573cf0074929e?OpenDocument&ExpandSection=1](http://www.unog.ch/80256ee600585943.nsf/(httpPages)/eae6f87b33e754b8c12573cf0074929e?OpenDocument&ExpandSection=1) (all internet references were accessed in October 2016).
- 10 Yoram Dinstein, *The Conduct of Hostilities under the Law of International Armed Conflict*, 3rd ed., Cambridge University Press, Cambridge, 2016, p. 159; Michael N. Schmitt, “The Law of Targeting”, in Elizabeth Wilmshurst and Susan Breau (eds), *Perspectives on the ICRC Study on Customary International Humanitarian Law*, Cambridge University Press, Cambridge, 2007, pp. 131, 159.
- 11 While the foreseeable reverberating effects of an attack using explosive weapons in populated areas are also relevant to the prohibition against indiscriminate attack, this article will focus solely on the relevance of reverberating effects in the interpretation and application of the rules on proportionality and precautions

The article is structured in four parts. The first part presents the IHL rules on the conduct of hostilities, while the second part explores the legal arguments in support of the position that foreseeable reverberating effects must be taken into account for the purposes of the rule on proportionality and some of the rules relating to precautions in attack. The third part examines the scope of the obligation to take into consideration foreseeable reverberating effects, including the notion of “foreseeability” and the standard of care imposed by the obligation. The article concludes by analyzing the practical measures that must be taken to assess and minimize the foreseeable reverberating effects of an attack, as required by the obligation to take all feasible precautions in attack.

IHL rules on the conduct of hostilities

Like other means of warfare, the use of explosive weapons in populated areas is regulated by IHL rules on the conduct of hostilities, namely, the rules on distinction, proportionality and precautions in attack. These rules, as set out in treaty and customary IHL, are applicable in both international and non-international armed conflicts.¹²

The rule of distinction prescribes that parties to an armed conflict must at all times distinguish between civilians and civilian objects on the one hand, and military objectives on the other;¹³ civilians and civilian objects are protected and must not be the object of attack.¹⁴ The prohibition on indiscriminate attacks which flows from the rule of distinction prohibits attacks not directed at a specific military objective, attacks which employ means or methods of combat that cannot be directed at a specific military objective, and attacks which employ means or methods of combat the effects of which cannot be limited as required by IHL and consequently, in each such case, are of a nature to strike military objectives and civilians or civilian objects without distinction.¹⁵ The prohibition of indiscriminate attacks also entails the prohibition of disproportionate attacks.¹⁶ According to this prohibition, the expected incidental loss of civilian life, injury to civilians and damage to civilian objects, or combination thereof (hereafter referred to as “incidental damage”), of an attack must not be excessive in relation to the concrete and direct military advantage anticipated.¹⁷ While it is argued

in attack. The relevance of the foreseeable reverberating effects of a cyber-attack in relation to the prohibition against indiscriminate attacks, among other rules, is referred to in the 2015 Challenges Report, above note 2, pp. 42–43.

12 AP I, Arts 48(1), 51(1), 51(2), 51(5)(b), 57; Jean-Marie Henckaerts and Louise Doswald-Beck (eds), *Customary International Humanitarian Law*, Vol. 1: *Rules*, Cambridge University Press, Cambridge, 2005 (ICRC Customary Law Study), Rules 1, 7, 14, 15–21.

13 AP I, Art. 48(1); ICRC Customary Law Study, above note 12, Rules 1, 7.

14 AP I, Arts 51(2), 52(1); ICRC Customary Law Study, above note 12, Rules 1, 7.

15 AP I, Art. 51(4); ICRC Customary Law Study, above note 12, Rules 11, 12.

16 Under AP I, Article 51(5), area bombardment and disproportionate attacks are treated as particular forms of indiscriminate attacks.

17 AP I, Art. 51(5)(b); ICRC Customary Law Study, above note 12, Rule 14. The rule on proportionality in attack is also found in Article 3(8)(c) of the Protocol on Prohibitions on the Use of Mines, Booby-Traps

that an object which serves both civilian and military functions (“dual-use object”) is to be regarded as a military objective in its entirety,¹⁸ there is considerable support from States¹⁹ and commentators²⁰ for the idea that

the destruction of the civilian part of this object, or more generally, the fact that the attack puts an end to its use by civilians, as well as the reverberating effects of such damage forms part of the incidental damage that must be taken into account under the proportionality principle.²¹

In order to ensure compliance with the rules of distinction and proportionality, and to ensure that constant care is taken in the conduct of military operations to spare civilians and civilian objects, IHL requires parties to an armed conflict to take precautions in attack. Precautionary requirements entail doing everything feasible

and Other Devices as amended on 3 May 1996 (Amended Mines Protocol) annexed to the Convention on Prohibitions or Restrictions on the Use of Certain Conventional Weapons which may be deemed to be Excessively Injurious or to have Indiscriminate Effects, Geneva, 3 May 1996 (CCW), and Rule 102(b) of the *San Remo Manual on International Law Applicable to Armed Conflicts at Sea*, 12 June 1994, regarding naval blockades. See Louise Doswald-Beck (ed.), *San Remo Manual on International Law Applicable to Armed Conflicts at Sea*, Cambridge University Press, Cambridge, 1995, p. 179. It should be noted that violation of the rule on proportionality in attack constitutes a war crime in both international and non-international armed conflicts. See AP I, Art. 85(3)(b); Rome Statute of the International Criminal Court, UN Doc. A/CONF. 183/9, 17 July 1998 (entered into force 1 July 2002), Art. 8(2)(b)(iv); ICRC Customary Law Study, above note 12, Rule 156.

- 18 Agnieszka Jachec-Neale, *The Concept of Military Objectives in International Law and Targeting Practice*, Routledge, New York, 2016, p. 69; William H. Boothby, *The Law of Targeting*, Oxford University Press, Oxford, 2012, pp. 104–105.
- 19 See Royal Army of the Netherlands, *The Humanitarian Law of War: A Manual*, VS 27-41, unofficial English translation available at the ICRC library, September 2005, para. 0546: “When attacking mixed objects ..., it must be carefully considered whether the military advantage expected from eliminating the military element of the mixed objective outweighs the damage done to the civilian population, by damaging or destroying the civilian element of the mixed object or ending its civilian function”; Carrielyn D. Guymon (ed.), *US Digest of United States Practice in International Law 2014*, US Department of State, Office of the Legal Adviser, 2014, p. 737, where it is stated: “When undertaking a proportionality evaluation, parties to an armed conflict should consider the risk of unintended or cascading effects on civilians and civilian objects in launching a particular cyber attack, as well as the harm to civilian uses of dual-use infrastructure that may be the target of an attack”; US Joint Chiefs of Staff, *Joint Targeting*, Joint Publication 3–60, 31 January 2013 (US Joint Targeting Manual), p. A-5, mentions that: “If the attack is directed against dual-use objects that might be legitimate military targets but also serve a legitimate civilian need (e.g., electrical power or telecommunications), then this factor must be carefully balanced against the military benefits when making a proportionality determination.” See also Department of Homeland Security and US Coast Guard, Department of the Navy, Office of the Chief of Naval Operations and Headquarters, *The Commander’s Handbook on the Law of Naval Operations*, NWP 1-14M, July 2007 (US Naval Handbook), para. 8.3, and the discussion of coalition practice in the Gulf War in Christopher Greenwood, “Customary International Law and the First Geneva Protocol of 1977 in the Gulf Conflict”, in Peter Rowe (ed.), *The Gulf War 1990–91 in International and English Law*, Routledge, London, 1993, pp. 63 ff., 73, 79.
- 20 Tallinn Manual, above note 8, p. 135; W. H. Boothby, above note 18, pp. 104–105; Henry Shue and David Wippman, “Limiting Attacks on Dual-Use Facilities Performing Indispensable Civilian Functions”, *Cornell International Law Journal*, Vol. 35, No. 3, 2002, p. 565; Noam Lubell, “Current Challenges with Regard to the Notion of Military Objective – Legal and Operational Perspectives”, in *Conduct of Hostilities: The Practice, the Law and the Future*, International Institute of Humanitarian Law, September 2014, p. 84; M. N. Schmitt and E. W. Widmar, above note 8, p. 393; M. Sassòli and L. Cameron, above note 8, para. 57 ff.
- 21 Laurent Gisel, “Relevant Incidental Harm for the Proportionality Principle”, *Urban Warfare*, Proceedings of the 16th Bruges Colloquium, 15–16 October 2015, p. 123.

to verify that the target is a military objective;²² taking all feasible precautions in the choice of means and methods of attack, with a view to avoiding, and in any event minimizing, the expected incidental damage;²³ refraining from launching an attack that may be expected to violate the rule on proportionality;²⁴ and cancelling or suspending an attack if it becomes apparent that the target is not a military objective or is subject to special protection, alternatively, that the attack may be expected to violate the rule on proportionality.²⁵ The application of these rules, which are the most relevant ones in relation to the use of explosive weapons in populated areas, will necessarily be based on *ex ante* information²⁶ – that is, the information that is reasonably available to the attacking party at the time of the attack – and not on hindsight.²⁷

As is clear from the elaboration of these basic conduct of hostilities rules, both the rule of proportionality and several of the precautionary rules require an assessment of the expected incidental damage arising from an attack.²⁸ While many military manuals include the notion of incidental damage, the term has been defined in different ways.²⁹ At its core, it refers to damage to civilians and civilian objects that is incidental, collateral or secondary to an attack against a lawful target. In the view of the International Committee of the Red Cross (ICRC) and others, incidental damage also includes the foreseeable reverberating effects of an attack,³⁰ otherwise known as “knock-on” or “indirect”

22 AP I, Art. 57(2)(a)(i); ICRC Customary Law Study, above note 12, Rule 16.

23 AP I, Art. 57(2)(a)(ii); ICRC Customary Law Study, above note 12, Rule 15.

24 AP I, Art. 57(2)(a)(iii); ICRC Customary Law Study, above note 12, Rules 17 and 18.

25 AP I, Art. 57(2)(b); ICRC Customary Law Study, above note 12, Rule 19. Note that Rule 19 does not refer to objects “that are subject to special protection”. Additional precautionary requirements are set out in AP I, Articles 57(2)(c), 57(3) and 57(4), and ICRC Customary Law Study, above note 12, Rules 20 and 21.

26 Commentary to ICRC Customary Law Study, above note 12, Rule 15.

27 Knut Dörmann, “Obligations of International Humanitarian Law”, *Military and Strategic Affairs*, Vol. 4, No. 2, 2012, p. 12.

28 There are four such rules: (1) the rule on proportionality; (2) the obligation to take feasible precautionary measures in the choice of means and methods of attack in order to avoid and in any event minimize “expected” incidental damage; (3) the obligation to refrain from launching an attack that may be expected to violate the rule on proportionality, including to do everything feasible to assess whether the attack may be expected to violate this rule; and (4) the obligation to cancel or suspend an attack if it becomes apparent that the attack may be expected to violate the rule on proportionality.

29 See ICRC Customary Law Study, above note 12, Rule 14. See also Y. Dinstein, above note 10, p. 150.

30 2015 Challenges Report, above note 2, pp. 42, 52; Expert Meeting Report, above note 9, p. 21; ICRC, *International Humanitarian Law and the Challenges of Contemporary Armed Conflicts*, report prepared by the ICRC for the 28th International Conference of the Red Cross and Red Crescent, Geneva, 2003, p. 12; ICRC, *Existing Principles and Rules of International Humanitarian Law Applicable to Munitions that May Become Explosive Remnants of War*, Working Paper submitted to the CCW Group of Government Experts, CCW/GGE/XI/WG.1/WP.7, Geneva, 28 July 2005. See also K. Dörmann, above note 27, p. 17; Maya Brehm, “International Humanitarian Law and the Protection of Civilians from the Effects of Explosive Weapons”, in Caroline Harvey, James Summers and Nigel D. White (eds), *Contemporary Challenges to the Laws of War: Essays in Honour of Professor Peter Rowe*, Cambridge University Press, Cambridge, 2014, p. 254; Rebecca J. Barber, “The Proportionality Equation: Balancing Military Objectives with Civilian Lives in the Armed Conflict in Afghanistan”, *Journal of Conflict & Security Law*, Vol. 15, 2010, p. 480; Cordula Droegge and Marie-Louise Tougas, “The Protection of the Natural Environment in Armed Conflict – Existing Rules and Need for Further Legal Protection”, *Nordic Journal of International Law*, Vol. 82, No. 1, 2013, p. 30; Marco Roscini, *Cyber Operations and the Use of Force in International Law*, Oxford University Press, Oxford, 2014, p. 221.

effects.³¹ According to this position, commanders are not only obliged to take into account the direct incidental damage that may be expected from an attack, but must also consider the foreseeable reverberating effects of the attack. These effects form part of the incidental damage that must be weighed up against the anticipated military advantage under the rules of proportionality and precautions in attack, and which must be taken into consideration when taking all feasible precautions in the choice of means and methods of an attack in order to avoid, and in any event minimize, the expected incidental damage.

Legal obligations regarding the reverberating effects of an attack

The legal obligation to take into account the reverberating effects of an attack derives from rules in Additional Protocol I (AP I) on proportionality and precautions, interpreted in line with the rules on treaty interpretation. In addition, there is a growing body of State practice which demonstrates increasing acceptance of this obligation.

Treaty interpretation

As with all treaty rules, the AP I rules on proportionality and precautions in attack must be interpreted in good faith in accordance with the ordinary meaning to be given to the terms of the treaty in their context, and in light of the object and purpose of the treaty.³² In this regard, there are a number of arguments to support the view that the “expected” incidental damage to civilians should be interpreted so as to include the reverberating effects of an attack.

Textual interpretation

First, the phrase “may be expected” in Articles 51(5)(b) and 57(2)(a)(iii) and (b) of AP I is not explicitly limited in either time or space. Indeed, the 1974–77 Diplomatic Conference expressly rejected attempts to confine incidental damage to those in the immediate vicinity of the military objective.³³ There is accordingly no reason, based on the text of the provisions, to limit the assessment under the rules on proportionality and precautions in attack to the immediate or direct effects of an attack. This argument is articulated by Droege, who states that “considering the wording of Article 51(5)(b) of Additional Protocol I (‘may be expected’), it is reasonable to argue that foreseeable damages, even if they are long-term,

31 See L. Gisel, above note 21, p. 125.

32 Vienna Convention on the Law of Treaties, 23 May 1969, United Nations, Treaty Series, Vol. 1155, Art. 31 (1).

33 Michael Bothe, Karl Josef Partsch and Waldemar A. Solf, *New Rules for Victims of Armed Conflicts: Commentary on the Two 1977 Protocols Additional to the Geneva Conventions of 1949*, Martinus Nijhoff, Leiden, 2013, para. 2.6.2.

second- and third-tier damages, must be taken into account”.³⁴ Similarly, Sassòli and Cameron take the view that

the *expected* collateral damage from an attack on a dual-use object ... must include the damage *expected* due to the destruction of the object itself, in addition to whatever other collateral damage that may be *expected* in the surrounding area or that is foreseeable, including through reverberating effects.³⁵

This approach is consistent with the ordinary meaning of “expected”, which is defined in the Oxford English Dictionary as “regard[ed] that something is likely to happen”.³⁶

Purposive interpretation

Second, the rules on proportionality and precautions in attack must be interpreted in light of their context, including the headings and the respective chapeau provisions of Articles 51 and 57 of AP I. Indeed, AP I Article 51(5)(b) on proportionality should be read in light of the heading of Article 51 (“Protection of the Civilian Population”) as well as Article 51(1), which provides that the civilian population and individual civilians “shall enjoy general protection against dangers arising from military operations”.³⁷ Likewise, the specific rules on precautions in attack operate under the umbrella of AP I Article 57(1), which provides that “in the conduct of military operations, constant care shall be taken to spare the civilian population, civilians and civilian objects”.³⁸ It is true that the humanitarian objective of the rule on proportionality is explicitly tempered by military considerations (for instance, by only prohibiting “excessive” incidental damage compared to the concrete and direct military advantage) and that the rules on precautions in attack are contingent upon what is reasonably feasible. However, “incidental damage” as such – separate from the subsequent proportionality assessment or considerations of feasibility – should arguably be interpreted in light of the humanitarian purpose spelled out in the chapeau provisions, so as to provide the broadest protection to civilians, including by requiring that commanders take into account the foreseeable reverberating effects of an attack.

Moreover, the relevance of reverberating effects is affirmed in other articles of AP I, including Articles 54(2) and 56(1), which prohibit attacks on specially protected objects (objects indispensable to the survival of the civilian population

34 C. Droege, above note 7, p. 572.

35 M. Sassòli and L. Cameron, above note 8, p. 65 (emphasis added).

36 Oxford Dictionary of English, 3rd ed., Oxford University Press, Oxford, 2010, available at: www.oxforddictionaries.com/definition/english/expect.

37 AP I, Art. 51(1).

38 AP I, Art. 57(1); ICRC Customary Law Study, above note 12, Rule 15. According to Kalshoven: “This should be taken literally: total avoidance of damage to the civilian population is the ideal standard that combatants should seek to attain in all cases.” Frits Kalshoven, *Constraints on the Waging of War: An Introduction to International Humanitarian Law*, 4th ed., Cambridge University Press, Cambridge, 2011, p. 113.

and works or installations containing dangerous forces), arguably because of the foreseeable humanitarian impact if such objects are damaged or destroyed.³⁹

State practice

The rules on treaty interpretation support the view that the notion of “expected” incidental damage as set out in AP I entails an obligation to take into account the reverberating effects of an attack. Increasingly, such an approach also enjoys support in State practice. In particular, there is significant State practice arising from the Third Review Conference on the Convention on Prohibitions or Restrictions on the Use of Certain Conventional Weapons Which May Be Deemed to Be Excessively Injurious or to Have Indiscriminate Effects (CCW) in 2006. In the debate concerning Protocol V of the CCW on explosive remnants of war (ERW), several States underlined that the long-term humanitarian impact of ERW for civilians had to be considered as part of the proportionality analysis. For example, Switzerland expressed the view that

the military commander’s proportionality assessment with regard to the choice and use of a particular means or method of warfare must also take into account the foreseeable incidental long term effects of an attack such as the humanitarian costs caused by duds becoming ERW.⁴⁰

As a result, the Final Declaration of the Third Review Conference of the CCW in 2006 – adopted by consensus – notes that “the foreseeable effects of explosive remnants of war are a relevant factor to be considered in applying the international humanitarian law rules on proportionality and precautions in attack”.⁴¹ This

39 See M. Roscini, above note 30, p. 221, note 376.

40 See “Response from Switzerland to Document CCW/GGE/XI/WG.1/WP.2,” CCW/GGE/XI/WG.1/WP.13, 3 August 2005, § 15. See also “Response from Norway to the Document CCW/GGE/XI/WG.1/WP.2,” CCW/GGE/XI/WG.1/WP.5, 29 July 2005, § 18 (“a military commander, in his assessment of the proportionality between the military necessity of launching the attack and the humanitarian consequences caused by the attack, must take into consideration both the humanitarian concerns related to the direct impact of the munitions (due to the wide dispersal and in some cases large number of submunitions contained in the bomb), as well as the humanitarian effects caused by unexploded ordnance remaining on the ground after the attack”); “Response from Sweden to Document CCW/GGE/XI/WG.1/WP.2,” CCW/GGE/XI/WG.1/WP.8, 29 July 2005 § 4 (“It may be argued that a cluster bomb with submunitions that have a high dud rate and is used in populated areas is likely to create a disproportionate suffering for the civilian population compared with the military advantage from the use of such a weapon. Furthermore, it could be argued that a cluster bomb with a large ‘foot print’ can be considered to be indiscriminate if used in a populated area.”); Intervention by Ireland, CCW Review Conference, Main Committee II – Explosive Remnants of War, 9 November 2006 (“Ireland has been concerned to ensure that parties to armed conflict pay due regard to the foreseeable long term effects on civilians of the use of particular weapon systems when considering means and methods of attack.”). See also Tim McCormack and Paramdeep Mtharu, *Expected Civilian Damage and The Proportionality Equation: International Humanitarian Law and Explosive Remnants of War*, Asia Pacific Centre for Military Law, University of Melbourne Law School, 2006, pp. 12–13, available at: <http://apcml.org/uploads/c0a7d9021926fd6fa4aa87d4737e9ae9cabd06f2.pdf>.

41 See Third Review Conference of the High Contracting Parties to the Convention on Prohibitions or Restrictions on the Use of Certain Conventional Weapons which May be Deemed to be Excessively Injurious or to Have Indiscriminate Effects, Final Declaration, CCW/CONF.III/11, Part II, 17 November 2006, p. 4 (Final Declaration of the 3rd Review Conference). The Final Declaration was

position is also reflected in the text of Article 3(10)(a) of Amended Protocol II to the CCW, which provides that circumstances to be taken into account when considering all feasible precautions to protect civilians from the effects of weapons include “the short- and long-term effects of mines upon the local civilian population for the duration of the minefield”. In 2015, at an ICRC Expert Meeting of States on the use of explosive weapons in populated areas, several States also expressed support for the view that commanders must take into account the foreseeable reverberating effects of an attack.⁴²

Moreover, in providing guidance on how to apply the rules on proportionality and precautions in attack, several States refer to the “second-order” or “foreseeable” effects of an attack in their military manuals.⁴³ For example, the US Army manual *Counterinsurgency* (US Counterinsurgency Manual) of 2006 indicates that

leaders must consider not only the first-order desired effects of a munition or action, but also possible second and third-order effects – including undesired ones. For example, bombs delivered by fixed-wing close air support may effectively destroy the source of small arms fire from a building in an urban area; however, direct-fire weapons may be more appropriate due to the risk of collateral damage to nearby buildings and non-combatants.⁴⁴

In sum, the interpretation of the AP I rules on proportionality and precautions in attack indicates that the notion of incidental damage is not limited to the direct effects of an attack but encompasses certain reverberating effects, which must be taken into account when assessing the lawfulness of an attack. Although this section has not examined whether the same obligation is inherent in the equivalent customary IHL rules on proportionality and precautions in attack, the growing body of state practice points in that direction – i.e., that they are understood in the same way.

reached on the basis of consensus between seventy-six States Parties. Available at: [www.unog.ch/80256EE600585943/\(httpPages\)/1DB747088014E6D7C12571C0003A0818?OpenDocument](http://www.unog.ch/80256EE600585943/(httpPages)/1DB747088014E6D7C12571C0003A0818?OpenDocument).

42 Expert Meeting Report, above note 9, p. 23.

43 For example, see UK Joint Service Manual, above note 9, para. 5.33.4 (in deciding whether an attack would be proportionate, commanders must bear in mind the “foreseeable effects of the attack”; the Manual gives the example of an attack on a military fuel storage depot where there is a foreseeable risk of the burning fuel flowing into a civilian residential area and causing injury to the civilian population); US Law of War Manual, above note 9, p. 342, note 158, citing the US Air Force Pamphlet, 1976 (“International law does not require that a weapon’s effects be strictly confined to the military objectives against which it is directed, but it does restrict weapons whose foreseeable effects result in unlawful disproportionate injury to civilians or damage to civilian objects.”); Ministry of Defence of Spain, *Orientaciones: El derecho de los conflictos armados*, OR7-004, 18 March 1996, Vol. 1, para. 2.5 (“An attack is prohibited if, during the planning phase, the available information makes it foreseeable that the damage to the civilian population and/or to civilian objects which the attack will cause is excessive in relation to the military advantage anticipated from the attack as a whole.”).

44 US Counterinsurgency Manual, above note 9, § 7–36.

What is the scope of the obligation to take into account the reverberating effects of an attack?

Having shown that the rules on proportionality and precautions in attack encompass an obligation to take into account the reverberating effects of an attack, this section examines the scope of this obligation. What is the necessary degree of causation between the attack and the reverberating effects of the attack, such that those effects must be considered for the purposes of the rules on proportionality and precautions in attack? When can reverberating effects be considered too remote in time or space? Are there certain reverberating effects that are in general objectively foreseeable? With a view to identifying more precisely the parameters of the obligation to take into account the reverberating effects of an attack, it is first necessary to examine the legal standard for causation, including the notion of “foreseeability”. Moreover, this section will explore the temporal, geographical and material scope of the obligation to take into account the foreseeable reverberating effects of an attack.

Defining the causal link

As previously noted, the position of the ICRC and others is that commanders must take into account the *foreseeable* reverberating effects of an attack.⁴⁵ Practically speaking, it is impossible to foresee all possible reverberating effects of an attack. Thus, a reasonable legal standard must reflect this reality and acknowledge that some reverberating effects are too remote and thereby outside the scope of what must be considered at the time of the attack.⁴⁶ Limiting the causal link through the standard of foreseeability is in line with the approach adopted by States in defining the scope of incidental damage. For example, the Final Declaration of the Third Review Conference of the CCW notes that “the foreseeable effects of explosive remnants of war are a relevant factor to be considered in applying the international humanitarian law rules on proportionality and precautions in attack”.⁴⁷ In addition, several States have explicitly adopted the standard of foreseeability in their military manuals.⁴⁸ Moreover, the Inter-American Commission on Human Rights stated in its report on Colombia in 1999 that the

45 2015 Challenges Report, above note 2, pp. 42, 52; Final Declaration of the 3rd Review Conference, above note 41. See also K. Dörmann, above note 27, p. 17; M. Brehm, above note 30, p. 254; R. J. Barber, above note 30, p. 480; C. Droege and M.-L. Tougas, above note 30, p. 30; M. Roscini, above note 30, p. 221.

46 As noted above, the rules of proportionality and precautions in attack, as well as other conduct of hostilities rules, impose an obligation at the time of the attack and not in hindsight. See, for example, F. Kalshoven, above note 38, pp. 101, 105, 185.

47 See Final Declaration of the 3rd Review Conference, above note 41, p. 4.

48 See, for example, Ministry of Defence of Spain, above note 43, Vol. 1, para. 2.5 (“An attack is prohibited if, during the planning phase, the available information makes it foreseeable that the damage to the civilian population and/or to civilian objects which the attack will cause is excessive in relation to the military advantage anticipated from the attack as a whole.”); UK Joint Service Manual, above note 9, para. 5.33.4 (commanders must bear in mind the “foreseeable effects of attack”); US Law of War Manual, above note 9, p. 342, note 158, citing the 1976 Air Force Pamphlet (“International law does not require that a weapon’s effects be strictly confined to the military objectives against which it is directed, but it

principle of proportionality required that *foreseeable* injury to civilians and damage to civilian objects should not be disproportionate or excessive to the anticipated concrete and direct military advantage.⁴⁹

Different tests have been proposed to define the requisite causal link for the purpose of the obligation to take into consideration reverberating effects under the rules of proportionality and precautions in attack. For example, in the context of computer network attacks, Schmitt, Harrison Dinnis and Wingfield have suggested a “but for” legal test requiring that the attack must be the “proximate cause” of the effects – i.e., reverberating effects are only relevant to the proportionality assessment and the obligation to take feasible precautions in attack, if such effects would not have occurred “but for” the attack.⁵⁰ In effect, a “but for” test reverses the assessment, such that it is necessary to start by examining the reverberating effect in question and tracing a line of causation back to the attack. Although this approach may be more effective in excluding those effects that are too remote, it would appear more useful for an *ex post facto* assessment as opposed to a standard that can be easily complied with by commanders in the field.

Another test focuses on the degree of likelihood of the reverberating effects. In this regard, Greenwood argues that in its normal meaning, “a consequence is said to be expected if it is thought more likely than not that the consequence will result. A lesser degree of risk is not sufficient.”⁵¹ Similarly, the Commentary on the *Harvard Humanitarian Policy and Conflict Research Manual on International Law Applicable to Air and Missile Warfare* (AMW Manual) takes the view that “expected” (and “anticipated”) “means that the outcome is *probable*, i.e. more likely than not”.⁵² This approach, however, is based on an overly restrictive interpretation of “expected”. As noted above, the ordinary meaning of “expected” is that something is “*likely* to occur” rather than “more likely than not”. Even if the risk of incidental damage is only 40% likely (i.e., less likely than not), it is still foreseeable and should be taken into account when applying the rules on proportionality and precautions in attack. Thus, at a 2005 expert meeting convened by the Geneva Academy of

does restrict weapons whose *foreseeable effects* result in unlawful disproportionate injury to civilians or damage to civilian objects.” (emphasis added).

- 49 Inter-American Commission on Human Rights, *Third Report on the Human Rights Situation in Colombia*, OEA/Ser.L/V/II.102, Doc. 9, Rev. 1, 26 February 1999, para. 79.
- 50 Michael N. Schmit, Heather A. Harrison Dinnis and Thomas C. Wingfield, *Computers and War: The Legal Battlespace*, Background Paper prepared for the Informal High-Level Expert Meeting on Current Challenges to International Humanitarian Law, Cambridge, 25–27 June 2004, p. 9, available at: www.hpcrresearch.org/sites/default/files/publications/schmittetal.pdf, cited in M. Roscini, above note 30, p. 221.
- 51 See Christopher Greenwood, Observations dated 13 November 2003 circulated by the United Kingdom Delegation to the CCW Group of Governmental Experts, 17–24 November 2003, cited in William H. Boothby, *Cluster Bombs: Is There a Case for New Law?*, Occasional Paper Series, Program on Humanitarian Policy and Conflict Research, Harvard University, 2005, p. 28.
- 52 Commentary on the AMW Manual, above note 8, p. 91 (emphasis added). See also M. Roscini, above note 30, p. 221. It should be noted, however, that in relation to reverberating effects, the AMW Manual specifically endorses an approach based on reasonable foreseeability, stating that “indirect effects cannot be taken into account if they are too remote or cannot be reasonably foreseen”.

International Humanitarian Law and Human Rights, it was argued that the scope of the obligation should be based on the notion of “reasonable causality”, meaning that attackers must take into account “civilians dying of thirst, if there [is] a *reasonable expectation of causality* or if thirst and certain diseases [are] a *likely or foreseeable* consequence of the attack”.⁵³

Accepting that foreseeability is the most appropriate standard for limiting the scope of the reverberating effects that must be taken into account, it is necessary to examine this standard in greater detail.

Is “foreseeable” a subjective or objective standard?

At one end of the spectrum, it is sometimes argued that the rules on proportionality and precautions in attack inevitably involve a subjective assessment by the military commander responsible for launching the attack. In particular, this view holds that the process of assessing both the concrete and direct military advantage, as well as the expected incidental damage, is based on the subjective view of the military commander in light of his or her specific skills, experience and knowledge, in the circumstances ruling at the time.⁵⁴ In addition, it has been argued that determining whether the expected incidental harm is excessive in relation to the concrete and direct military advantage is also a subjective matter. For example, according to the US *Law of War Manual*, “the question of whether the expected incidental harm is excessive may be a highly open-ended legal inquiry, and the answer may be subjective and imprecise”.⁵⁵

In contrast to the view that the expected incidental damage and anticipated military advantage should be assessed on an entirely subjective basis, it is argued that the rules on both proportionality and precautions in attack incorporate a degree of objectivity. This is supported by the terms “may be” and “expected” in the relevant provisions, which in conjunction clarify that the relevant standard is not what the commander in fact, subjectively, expected, but what can objectively be predicted. This interpretation finds support in the ICRC Commentary to Article 57 of AP I, which, while recognizing that the rule on precautions in attack includes an element of subjectivity, notes that “the interpretation must above all be a question of common sense and good faith for military commanders”.⁵⁶ In other words, compliance with the rule must also be measured against the objective standards of “common sense” and “good faith for military commanders”.⁵⁷

53 *Ibid.*

54 In M. Bothe, K. J. Partsch and W. A. Solf, above note 33, pp. 351–352, the authors note that the decision on “whether those effects are excessive” will “involve a balancing of different values which are difficult to compare” and thus “the judgment must be subjective”. Yet, “[d]espite the impossibility of quantifying the factors of the equation, a plain and manifest breach of the rule will be recognizable”.

55 US Law of War Manual, above note 9, § 5.12.4. See also § 2.4.1.2 (“Under the law of war, judgments of proportionality often involve difficult and subjective comparisons.”).

56 ICRC Commentary to AP I, § 2208. See also ICRC Commentary to AP I, § 1978.

57 See Marco Sassòli, “Autonomous Weapons and International Humanitarian Law: Advantages, Open Technical Questions and Legal Issues to be Clarified”, *International Law Studies*, Vol. 90, 2014, p. 335.

More recently, the objective element of these rules has been framed as a requirement of reasonableness. For example, Dinstein takes the view that the attacker “must act reasonably and in good faith”.⁵⁸ A similar approach is taken in the 2001 Canadian *Manual on the Law of Armed Conflict* in relation to the rule on precautions in attack: “The test for determining whether the required standard of care has been met is an objective one: Did the commander, planner or staff officer do what a reasonable person would have done in the circumstances?”⁵⁹ This approach is also adopted by Kalshoven, who indicates that the relevant standard is “that of a normally alert attacker who is reasonably well-informed and who, moreover, makes reasonable use of the available information”.⁶⁰

An objective standard is also reflected in the case law on disproportionate attacks, namely in the *Galić* case before the International Criminal Tribunal for the former Yugoslavia (ICTY). Here, the Tribunal held that

in determining whether an attack was proportionate it is necessary to examine whether a reasonably well-informed person in the circumstances of the actual perpetrator, making reasonable use of the information available to him or her, could have expected excessive civilian casualties to result from the attack.⁶¹

While it must be emphasized that IHL and international criminal law (ICL) are distinct bodies of law, the latter is an important source of interpretation of IHL rules.⁶² As argued by Sassòli and Cameron, “any behaviour which leads to

58 Y. Dinstein, above note 10, p. 159. See also Michael. N. Schmitt and Jeffrey S. Thurnher, “‘Out of the Loop’: Autonomous Weapon Systems and the Law of Armed Conflict”, *Harvard National Security Journal*, Vol. 4, 2013, p. 256 (“the ‘quantification’ of the military value of a target in terms of collateral damage does not require surgical precision. Rather, the test is one of reasonableness.”); A. P. V. Rogers, *Law on the Battlefield*, 3rd ed., Manchester University Press, Manchester and New York, 2012, p. 151 (“the test must be one of reasonableness”). See also 2015 Challenges Report, above note 2, p. 52.

59 Canada, Office of the Judge Advocate General, *Law of Armed Conflict at the Operational and Tactical Levels*, Joint Doctrine Manual, 13 August 2001, § 418. See also Brian J. Bill (ed.), *Law of War Deskbook*, US Army, International and Operational Law Department, 2010, pp. 140–141: “In judging a commander’s actions one must look at the situation as the commander saw it in light of all circumstances. The question of reasonableness, however, ensures an objective standard that must be met as well. In this regard, two questions seem relevant. Did the commander gather a reasonable amount of information to determine whether the target was a military objective and that the incidental damage would not be disproportionate? Second, did the commander act reasonably based on the gathered information? Of course, factors such as time, available staff, and combat conditions affecting the commander must also factor into the analysis.”

60 F. Kalshoven, above note 38, p. 115 (the proportionality assessment is “not entirely left to the subjective judgment of the attacker”).

61 ICTY, *Prosecutor v. Stanislav Galić*, Case No. IT-98-29, Judgment (Trial Chamber), 30 November 2003, § 58. This test has been endorsed by a number of commentators: see Marco Roscini, above note 30, p. 228; Paolo Benvenuti, “The ICTY Prosecutor and the Review of the NATO Bombing Campaign against the Federal Republic of Yugoslavia”, *European Journal of International Law*, Vol. 12, No. 3, 2001, p. 517; Ian Henderson, *The Contemporary Law of Targeting: Military Objectives, Proportionality and Precautions in Attack under Additional Protocol I*, Martinus Nijhoff, Leiden, 2009, p. 222. A similar test was also set out in ICTY, *Final Report to the Prosecutor by the Committee Established to Review the NATO Bombing Campaign against the Federal Republic of Yugoslavia*, 11 December 2002, § 50. This approach in the report is supported by W. H. Boothby, above note 18, p. 96.

62 Several authors refer to the ICTY case law and the Rome Statute: for example, Y. Dinstein, above note 10, p. 159; W. H. Boothby, above note 18, pp. 98–97.

individual criminal responsibility must first be contrary to the standard of care required by IHL from belligerent parties”.⁶³

A similar but slightly distinct approach is to focus not only on a standard of “reasonable person”, but on the slightly higher standard of “reasonable commander”. According to Cannizzaro, the standard of reasonable commander “on the one hand tends to locate the assessment of proportionality with the subjective situation of the agent, but on the other hand seems to require an objective degree of diligence”.⁶⁴ For example, Sassòli and Cameron argue that

while the average “reasonable person” on the street might not be expected to foresee that destroying electricity facilities would cut off the civilian fresh water supply, the reasonable military commander, who is aware of the interconnectedness of infrastructure, would be expected to foresee this consequence.⁶⁵

The standard of the reasonable commander has been embraced by some States. For example, Israel takes the view that:

the principle of proportionality requires consideration of a commander’s assessment of the expected collateral damage from an attack. The test is based on the expected collateral damage that a “reasonable commander” would have assessed at the time of attack – and not the damage that actually occurred as a result of the attack.⁶⁶

In relation to reverberating effects, the standard of the reasonable commander would require that the attacker takes into account the reasonably foreseeable reverberating effects of the attack, meaning *those effects that are foreseeable for a reasonable commander*, making use of the information that is reasonably available to him or her, and in light of the circumstances ruling at the time, including whether the attack is pre-planned or an attack of opportunity. This is the preferred standard of care as it excludes negligent behaviour that does not meet an objective degree of diligence, whilst clearly taking into account that the rules apply based on the circumstances ruling at the time.

Are some reverberating effects objectively foreseeable?

Acknowledging that “reasonable foreseeability” entails an objective standard enables the identification of certain elements that a reasonable commander

63 M. Sassòli and L. Cameron, above note 8, p. 64.

64 Enzo Cannizzaro, “Proportionality in the Law of Armed Conflict”, in Paola Gaeta and Andrew Clapham (eds), *The Oxford Handbook of International Humanitarian Law*, Oxford University Press, Oxford, 2014, p. 340.

65 M. Sassòli and L. Cameron, above note 8, p. 65. Likewise, Shue and Wippman contend that “the effects of large-scale infrastructure attacks are clear and foreseeable”, and that “the proportionality principle obliges states to make at least a good faith effort to factor indirect effects into their targeting decisions”. See H. Shue and D. Wippman, above note 20, pp. 570–571.

66 State of Israel, *The 2014 Gaza Conflict (7 July–26 August 2014): Factual and Legal Aspects*, May 2015, pp. 49, 317.

should take into account – i.e., which would be unreasonable to ignore – when assessing the expected reverberating effects of an attack. Reverberating effects may be considered reasonably and objectively foreseeable based on past practice and empirical research, lessons learned and publicly available information.

Past practices and empirical data

While recognizing that no two cases are identical, past experiences and empirical data can contribute to making certain reverberating effects foreseeable. For instance, in light of the nuclear attacks on Hiroshima and Nagasaki and the extensive subsequent research exposing the long-term effects of these attacks, it can no longer be argued that reverberating effects of using nuclear weapons – such as long-term health effects – are too remote or speculative.⁶⁷ In the context of the CCW negotiations on Protocol V on ERW, past practice and extensive documentation regarding the failure rates of submunitions provided an important indication of the foreseeable reverberating effects of an attack using such weapons. For example, the ICRC stated that

in light of the experience gained from the use of cluster munitions in past conflicts and the work of governments and organizations to address them, the ICRC is of the view that the application of the proportionality rule must now include the extended impact of submunitions (and other ordnance) that become ERW. When these weapons are used in or near populated areas the long-term consequences of unexploded submunitions upon civilians are readily foreseeable. If civilians are already present in a target area, they will predictably need to gather food and water, travel, seek medical care and conduct other daily activities which put them at risk from unexploded submunitions. If they have left the area during the hostilities, it is predictable that they will return at the earliest opportunity and be at risk from unexploded submunitions.⁶⁸

In effect, “past experience has put users on notice about the long-term dangers that cluster munitions cause to civilians”.⁶⁹ As noted above, past practice was accepted in

67 Louis Maresca and Eleanor Mitchell, “The Human Costs and Legal Consequences of Nuclear Weapons Under International Humanitarian Law”, *International Review of the Red Cross*, Vol. 97, No. 899, 2015, pp. 623–626.

68 Working Paper submitted by the ICRC, CCW/GGE/XI/WG.1/WP.7, Geneva, 28 July 2005, § 21. According to Tim McCormack, who presented at the CCW meetings on ERW, “[w]henver the use of weapons likely to cause ERW is contemplated in residential areas or in areas otherwise known to be frequented by the civilian population, assessments of expected civilian damage ought to take account of the consistent conclusion of numerous reports and studies carried out by international and non-governmental organisations, many of which include data on percentages of munitions which fail to explode and the effect of such unexploded ordnance on civilian populations”. See T. McCormack and P. Mtharu, above note 40, § 27. Further, McCormack states: “If such weapons are to be deployed in residential areas or on arable farmland then the expected failure rate and consequent expected ERW problem ought to be factored into the proportionality equation.” Report of presentation by Professor Tim McCormack, CCW/GGE/XI/WG.1/WP.19, 25 August 2005, § 11.

69 Louis Maresca, “Cluster Munitions: Moving Toward Specific Regulation”, *UNIDIR Disarmament Forum*, United Nations Institute for Disarmament Research, 2006, p. 29.

the context of the CCW as an important source of understanding the objectively foreseeable reverberating effects of certain weapons.⁷⁰

At least Ireland and Norway have made explicit reference to the foreseeable effects of an attack or a particular weapon being informed by past practice. For example, Ireland has noted that military commanders “will be informed in their assessments of likely, post-conflict harm to civilian life and property by – amongst other things – the considerable research into this question that has been done in recent years”.⁷¹ Similarly, at an ICRC Expert Meeting on the humanitarian, technical, legal and military challenges posed by cluster munitions, a representative from the Norwegian Ministry of Defence expressed the view that

it is difficult to claim that the long-term effects of cluster munitions are too remote or uncertain to be considered by a military commander. Experiences in Vietnam, Laos, and other places have demonstrated both the magnitude of the problem and the length of time required to resolve it.⁷²

Past experiences and empirical data have also informed the foreseeable reverberating effects of damage to or destruction of electricity networks. For example, it is estimated (conservatively) that the coalition attacks on Iraq’s electrical power system in 1991 resulted in 70,000 civilian deaths.⁷³ In effect, the attacks reduced Iraq’s power capacity to 15% of its pre-conflict levels, with a significant impact on health services (reduced hospital capacity, inability to refrigerate adequate quantities of vaccines) and sanitation (inability to treat and dispose of raw sewerage).⁷⁴ More recently, statistical analysis has demonstrated that disruption of electricity and safe drinking water can have a dramatic impact on civilian lives and health. For instance, the increase in hepatitis, dysentery and typhoid in certain parts of Syria has been attributed to the reduced access to safe drinking water, sanitation and hygiene in those areas.⁷⁵

In some cases, past experiences, such as the attacks in Iraq, have led to a change in policy. For example, during Operation Allied Force in Kosovo, NATO forces sometimes used carbon graphite filaments designed to temporarily disrupt power. This was in part based on a policy decision to minimize long-term incidental harm to civilians.⁷⁶ In addition, greater awareness in the public domain

70 See Final Declaration of the 3rd Review Conference, above note 41.

71 Statement by Ireland, CCW 3rd Review Conference, Main Committee II, 9 November 2006. According to the New Zealand delegation at a CCW meeting in June 2003, “through the improved collection of information on weapons used, clearance operations and civilian casualties from mines and ERW including submunitions, we are beginning to know more about when the greatest numbers of civilian casualties actually occur and would expect that this information is also available to militaries for informing the conduct of their military operations”.

72 ICRC, *Expert Meeting: Humanitarian, Military, Technical and Legal Challenges of Cluster Munitions*, report, Montreux, Switzerland, 18–20 April 2007, p. 60.

73 W. Arkin, above note 6, p. 110.

74 J. Crawford, above note 6, p. 110.

75 UNICEF, “News Note: Millions of Children in Syria at High Risk of Disease amid Water Scarcity and Summer Heat”, 10 July 2015, cited in Urban Services Report, above note 4, p. 31.

76 Randy W. Stone, “Protecting Civilians during Operation Allied Force: The Enduring Importance of Proportional Force and NATO’s Use of Armed Force in Kosovo”, *Catholic University Law Review*,

regarding the interconnectedness of essential services has put commanders on notice regarding the objectively foreseeable reverberating effects of damage to or destruction of essential infrastructure.⁷⁷ For instance, the report of the ICRC Expert Meeting on Explosive Weapons in Populated Areas provides the example that “if the energy supply is cut, the ability to ensure the continuity of the water supply service and the evacuation and treatment of wastewater out of a populated area diminishes”.⁷⁸

Finally, it should be noted that the logic of objectively foreseeable effects is already incorporated into decision-making tools, which are adapted so as to take into account past practices and ensure that lessons learned are incorporated into future targeting assessments. For example, collateral damage estimation methodologies (CDMs) – used by some militaries to estimate the expected collateral damage arising from an attack – rely on testing and data, as well as analysis of past practice and lessons learned through battle damage assessments.⁷⁹ Indeed, the CDM used by the United States joint services notes that “[a]s a science, the CDM uses a mix of empirical data, probability, historical observations, and complex modeling for [collateral damage estimation] analysis”.⁸⁰ States are also required to take into account the foreseeable effects of a particular weapon when carrying out legal reviews of new weapons under Article 36 of AP I.⁸¹ Given the remoteness from the actual combat situation in which the weapon might be used in the future when carrying out the weapons review, this assessment must be premised on an assessment of the objectively foreseeable effects of the weapon in question.

The context of the attack

The circumstances ruling at the time of the attack will impact what kind of reverberating effects may be objectively foreseeable. With respect to repeated or cumulative attacks, to the extent that the effects of past attacks on a populated area are – or should – reasonably be known, this must also be taken into account for the purpose of respecting the rules on proportionality and precautions in

Vol. 50, No. 2, 2001, cited in H. Shue and D. Wippman, above note 20, p. 565. Carbon fibre bombs were also used to attack power distribution facilities in Iraq on the basis that they were designed to temporarily incapacitate rather than destroy. See Human Rights Watch, *Off Target: The Conduct of the War and Civilian Casualties in Iraq*, New York, 2003, p. 43.

77 Urban Services Report, above note 4, pp. 28–32; 2015 Challenges Report, above note 2, p. 52. See also Expert Meeting Report, above note 9, p. 23.

78 *Ibid.*, p. 15.

79 Some multinational forces also monitor civilian casualties through civilian casualty tracking mechanisms. See *ibid.*, p. 6.

80 US Chairman of the Joint Chiefs of Staff, *No-Strike and the Collateral Damage Estimation Methodology*, Instruction, CJCSI 3160.01A, 2012, p. D-1. In addition, the Instruction states: “The CDM is not an exact science. The supporting technical data and processes of the methodology are derived from physics-based computer models which generate statistical results, weapons test data, and operational combat observations.” *Ibid.*, p. D-2.

81 ICRC, *A Guide to the Legal Reviews of New Weapons, Means and Methods of Warfare: Measures to Implement Article 36 of Additional Protocol I of 1977*, Geneva, 2006, p. 15.

attack.⁸² If a commander is aware that civilian infrastructure has been partially damaged, it is foreseeable that any further incidental damage caused by an attack will increase the reverberating effects on civilians. For example, if an attacker knows that a water treatment plant is only operating at 50% of its capacity due to previous damage, the reverberating effects on civilians caused by further incidental damage to the plant will be more significant than if the treatment plant was fully functioning. This is particularly true if the cumulative attacks take place in a short period of time, as it is then likely that the attacker is aware of the extent of past incidental loss of life, injury and damage.

Moreover, known contextual factors such as economic sanctions, blockades, the protracted nature of a conflict or the inability of engineers to repair essential infrastructure due to denial of access may also be relevant to an assessment of the foreseeable reverberating effects of an attack. For instance, if there are long-term sanctions in place, and it is known that construction material is not accessible or is severely restricted, it is objectively foreseeable that the reverberating effects of an attack are more likely to last longer and be more severe. Similarly, if essential infrastructure cannot be repaired because access to the targeted area is systematically denied (including for engineers), it is reasonably foreseeable that the reverberating effects of an attack which damages essential infrastructure can be expected to have a more significant impact on civilians in the area. Likewise, in protracted conflicts such as those in Syria, eastern Ukraine, Libya or Yemen, it is reasonably foreseeable that the quality of essential services will have declined due to years of neglect or inability (financial or otherwise) to ensure proper maintenance of infrastructure and that the reverberating effects of damage to or destruction of essential civilian infrastructure – meaning the infrastructure which if damaged or destroyed will have a significant impact on essential services – will therefore have a more significant impact on the lives and health of the affected population.⁸³

Temporal scope of “foreseeability”

In identifying the scope of the obligation to take into account the reasonably foreseeable reverberating effects of an attack, a lot of attention has been focused on the appropriate temporal scope. In other words, when an attacker is assessing the compliance of an attack in accordance with the rules on proportionality and precautions in attack, how far into the future should he or she consider? Is it necessary to balance the concrete and direct military advantage anticipated against the effects of an attack that are expected to eventuate in the days, months or even years following the attack?

⁸² *Ibid.*, p. 23.

⁸³ Urban Services Report, above note 4, pp. 21–28; World Health Organization, “WHO Warns of Increased Risk of Disease Epidemics in Syria and in Neighbouring Countries as Summer Approaches”, press release, 3 June 2013 (indicating that 35% of Syria’s public hospitals were not functioning and in some areas, 70% of medical staff had fled the country), available at: www.emro.who.int/press-releases/2013/disease-epidemics-syria.html.

As was demonstrated during the CCW discussions concerning ERW,⁸⁴ there is no clear consensus on this question. On the one hand, it has been argued that the time frame of the “expected effects” of an attack should be limited, as long-term effects are too remote. For example, in 2002, Greenwood suggested that it is only the “immediate risk” (i.e., during the attack and in the hours immediately after the attack) from ERW that should be considered in the proportionality equation, because the “long-term risk” posed by ERW “turns on too many factors which are incapable of assessment at the time of the attack”.⁸⁵ According to Greenwood, such factors include “when and whether civilians will be permitted to return to an area, what steps the party controlling that area will have taken to clear unexploded ordnance, [and] what priority that party gives to the protection of civilians”.⁸⁶ At least two States at the CCW supported this view.⁸⁷ Similarly, Kenneth Rizer expressed the view in 2001 that “open-ended consideration of indirect effects is ... troubling” as it “opens up a Pandora’s box of other problems”, particularly the impossibility of defining a precise temporal limit for when indirect effects can be considered as too remote.⁸⁸ Ultimately, this line of argument seeks to remove the challenges posed by an unknown number of intervening factors by drawing a neat cut-off point after the “immediate” effects of an attack.

In contrast to this approach, a number of States and commentators have argued that the long-term effects of an attack are indeed relevant to the rules on proportionality and precautions in attack. At the CCW, a number of states including Brazil,⁸⁹ the Czech Republic,⁹⁰ Norway,⁹¹

84 The CCW examined legal regulation of ERW from 2000 to 2006, with adoption of Protocol V on ERW in 2004.

85 Christopher Greenwood, *Legal Issues Regarding Explosive Remnants of War*, Working Paper submitted to the CCW Group of Governmental Experts, CCW/GGE/I/WP.10, 22 May 2002, § 23. The paper was presented by the UK delegation to the first of several Groups of Governmental Experts that led to negotiations on Protocol V.

86 *Ibid.*

87 Pakistan, Statement at the 11th session of the Group of Governmental Experts, CCW, 2 August 2005; Response from the United States of America, “Responses to Document CCW/GGE/X/WG.1/WP.2, Entitled IHL and ERW, Dated 8 March 2005”, CCW/GGE/XI/WG.1/WP.4, 25 July 2005, available at: http://repository.un.org/bitstream/handle/11176/256880/CCW_GGE_XI_WG.1_WP.4-EN.pdf?sequence=3&isAllowed=y.

88 Kenneth Rizer, “Bombing Dual-Use Targets: Legal, Ethical and Doctrinal Perspectives”, *Air & Space Power Journal*, May 2001, p. 8.

89 Brazil noted that the proportionality rule applies if the remains of cluster munitions might continue to cause casualties long after the end of the armed conflict. Brazil stated that the “post-conflict” effects should be taken into account at the time of use. Response from Brazil, “Responses to Document CCW/GGE/X/WG.1/WP.2, Entitled IHL and ERW, Dated 8 March 2005”, CCW/GGE/XII/WG.1/WP.1, 12 September 2005, available at: <http://courseweb.stthomas.edu/vowiebe/ITHERWQuestionnaire%20and%20responses/Brazil050912.DOC>.

90 Response from the Czech Republic, “Responses to Document CCW/GGE/X/WG.1/WP.2, Entitled IHL and ERW, Dated 8 March 2005”, CCW/GGE/XIII/WG.1/WP.2, 10 February 2006: “the use of munitions [that are] likely to fail ... might contradict this principle [of proportionality], as the low reliability of such munitions could cause collateral damage exceeding the lawful level by increasing its probability and decreasing its military effectiveness”.

91 Norway stated that military commanders must take into consideration “both the humanitarian concerns related to the direct impact of the munitions as well as the humanitarian effects caused by unexploded ordnance remaining on the ground after the attack”. Response to the IHL Questionnaire from Norway,

Sweden,⁹² Switzerland⁹³ and Ireland⁹⁴ expressed the view that the “long-term” effects of ERW must be taken into account when complying with the rule on proportionality in attack.⁹⁵ Additionally, Austria indicated that the “subsequent effects” of ERW must also be considered as part of the obligation to take all feasible precautions in attack.⁹⁶ In particular, New Zealand questioned the “immediate effects” standard, noting that this was an arbitrary measurement: “the periods of ‘during an attack’ or ‘hours immediately’ after an attack may not always be when civilians are at greatest risk from submunitions”.⁹⁷ Similarly, the Committee Established to Review the NATO Bombing Campaign against the Federal Republic of Yugoslavia also referred to a standard based on the “long-term effects”: “even when targeting admittedly legitimate military objectives, there is a need to avoid excessive long-term damage to the economic infrastructure and natural environment with a consequential adverse effect on the civilian population”.⁹⁸ An extreme example is the case of a nuclear attack, where it is certainly foreseeable that the attack is likely to result in casualties not only in the days, weeks and months following the attack, but also during the subsequent years and decades.⁹⁹

“States Parties’ Responses to the ‘International Humanitarian Law and ERW’ Questionnaire”, CCW/GGE/XI/WG.1/WP.5, 29 July 2005, § 19, available at: <http://repository.un.org/handle/11176/256881>.

- 92 Statement by Sweden on the McCormack Report, CCW 13th Meeting of the Group of Government Experts on ERW, March 2006 (“a cluster bomb with submunitions that have a high dud rate and is used in populated areas is likely to create disproportionate suffering for the civilian population compared with the military advantage from the use of such a weapon”).
- 93 Response to the IHL Questionnaire from Switzerland, “States Parties’ Responses to the ‘International Humanitarian Law and ERW’ Questionnaire”, CCW/GGE/XI/WG.1/WP.13, 3 August 2005, § 15, available at: <http://repository.un.org/handle/11176/256892> (“proportionality assessment ... must also take into account the foreseeable incidental long-term effects of an attack such as the humanitarian costs caused by duds becoming ERW” such that “ammunitions with high dud rates will influence the proportionality balance negatively and diminish the options of their use against legitimate military objectives”).
- 94 Statement by Ireland on the McCormack Report, CCW 13th Meeting of the Group of Government Experts on ERW, March 2006 (Ireland agreed with the statement in the Report that “after years of experiencing the effects of ERW, including the collation of data on the humanitarian effects of ERW, parties to an armed conflict cannot simply ignore the likely longer term effects of the use of cluster munitions in civilian residential areas or in other areas civilians are expected to return to after the cessation of hostilities”).
- 95 The same view was expressed by McCormack and Mtharu in their analysis of States’ responses. See Tim McCormack, Paramdeep B. Mtharu and Sarah Fennin, *Report on States Parties’ Responses to the Questionnaire: International Humanitarian Law and Explosive Remnants of War*, February 2006, p. 20.
- 96 Response to the IHL Questionnaire from Austria, “States Parties’ Responses to the ‘International Humanitarian Law and ERW’ Questionnaire”, CCW/GGE/XI/WG.1/WP.14, 4 August 2005, § 11, available at: <http://repository.un.org/handle/11176/256893> (“the application of the principle [of proportionality] is not limited to the intended effects of an attack [T]he effects of duds – which are inherently incidental – seem to be covered by this provision”).
- 97 Statement by New Zealand at the CCW Meeting of Government Experts, June 2003 (“prior to an attack civilians may have fled to a safer area and it may be that immediately in the hours after an attack there is a low level of civilian casualties from ERW. A second possible scenario is where the presence of large numbers of military personnel limits the movement of civilians and it is some time before civilians have freedom of movement in an ERW-affected area.”).
- 98 ICTY, *Final Report to the Prosecutor*, above note 61, § 18.
- 99 L. Maresca and E. Mitchell, above note 67, p. 634.

A third view, according to Rogers, is that the issue of longer- or shorter-term effects probably “does not matter so long as the same timescale is applied to both limbs” of the proportionality test.¹⁰⁰ This is a controversial approach given that the scope of incidental damage is not qualified in Article 51(5)(b) by any adjectives. Thus, whilst the anticipated military advantage is limited to the “direct and concrete” military advantage – meaning that which is “substantial and relatively close” and not that which is “hardly perceptible” or “which would only appear in the long term” – as explained above, there is no reason based on the text of AP I to likewise limit the scope of incidental damage to “direct and concrete”.

While the very nature of reverberating effects means that they will typically not take place immediately,¹⁰¹ identifying a precise temporal scope for foreseeable reverberating effects is challenging. In this regard, it is important to query the added value of identifying the precise temporal scope of the effects that must be taken into account. On the one hand, specific temporal measurements risk being arbitrary. On the other hand, the temporal scope of broader phrases such as “long-term effects of an attack” remains ambiguous. Additionally, there is not necessarily a direct correlation between the foreseeability of reverberating effects and the time at which the effects eventuate. Indeed, the effects of an attack may be foreseeable and take place months or years in the future (e.g. environmental damage), or they may be unforeseeable and take place in the days following an attack (e.g. contamination of water due to an oil spill). Accordingly, it is preferable to focus on the objective foreseeability of the reverberating effects of an attack, regardless of the time at which such effects eventuate, meaning, those reverberating effects that are likely to occur based on the information reasonably available to the commander at the time of the attack.¹⁰²

Material scope of “foreseeability”

Regarding the material scope of the obligation to consider the reverberating effects of an attack, it is clear that it is not possible to establish clear-cut boundaries regarding the types of effects that should be taken into account. That said, it is helpful to identify some effects that may be considered reasonably foreseeable for the purposes of assessing the incidental harm that can be expected from an attack.

100 A. P. V. Rogers, above note 58, p. 22.

101 It should be noted that there may be some reverberating effects which will take place immediately, such as secondary explosions resulting from an attack on a munitions storage facility. However, in most cases, reverberating effects take place subsequent to an attack.

102 See C. Droege, above note 7, p. 573. A similar approach is taken by McCormack and Mtharu in a Working Paper submitted to the Third Review Conference of the CCW: “Whenever the use of weapons likely to cause ERW is contemplated in residential areas or in areas otherwise known to be frequented by the civilian population, assessments of expected civilian damage ought to take account of the consistent conclusion of numerous reports and studies carried out by international and non-governmental organizations, many of which include data on percentages of munitions which fail to explode and the effect of such unexploded ordnance on civilian populations.” See Tim McCormack and Paramdeep B. Mtharu, “Expected Civilian Damage and the Proportionality Equation – To What Extent Should the Mid to Longer Term Consequences of Explosive Remnants of War be Taken into Consideration in the Proportionality Assessment”, Working Paper, CCW/CONF.III/WP.9, 15 November 2006, para. 27.

As a starting point, the rules on proportionality and precautions in attack both limit the types of harm, including reverberating effects, which are to be taken into account by explicitly referring to the expected incidental “loss of civilian life, injury to civilians and damage to civilian objects”. In interpreting these terms, it is argued that loss of civilian life includes the death of military medical and religious personnel, who are considered civilians for the purposes of the IHL rules on the conduct of hostilities.¹⁰³ Additionally, it is widely held that damage to civilian objects includes loss of functionality of a civilian object¹⁰⁴ as well as environmental damage.¹⁰⁵ Finally, given that the ordinary meaning of “injury” includes both “an instance of being injured” and “the fact of being injured; harm or damage”,¹⁰⁶ “injury” should be understood broadly to include wounding as well as illness and disease. This view is supported in the *Tallinn Manual on the International Law Applicable to Cyber Warfare* (Tallinn Manual), which concludes that “serious illness and severe mental suffering that are tantamount to injury” also fall within the scope of incidental harm.¹⁰⁷

The idea that psychological injury should be taken into account in the proportionality assessment and in the application of the precautionary rules is increasingly accepted.¹⁰⁸ Moreover, there is no principled reason for restricting injury to physical injury, when its scope is acknowledged to include illness and disease, as there are also mental illnesses that may result from an attack. Liebllich relies on the IHL prohibition against terrorizing civilians and recent research on post-traumatic stress disorder to argue that “incidental mental harm cannot be brushed aside ... if IHL is to maintain its integrity as a legal body aiming to minimize civilian harm”.¹⁰⁹ While it is generally considered that mere inconvenience, stress or anxiety do not enter into the proportionality

103 Laurent Gisel, “Can the Incidental Killing of Military Doctors Never Be Excessive?”, *International Review of the Red Cross*, Vol. 95, No. 889, 2013, pp. 220–230.

104 2015 Challenges Report, above note 2, p. 41; Robin Geiss and Henning Lahmann, “Cyber Warfare: Applying the Principle of Distinction in an Interconnected Space”, *Israel Law Review*, Vol. 45, No. 3, 2012, p. 397, cited in M. Roscini, above note 30, p. 222. See also C. Droegge, above note 7, p. 559 (arguing that “disrupting the function of certain systems by interfering with their underlying computer systems can amount to damage insofar as it impairs their usefulness”). According to the Group of Experts who drafted the Tallinn Manual, the notion of “damage to civilian objects” might, in certain circumstances, include deprivation of functionality. See Tallinn Manual, above note 8, p. 160.

105 C. Droegge and M.-L. Tougas, above note 30, pp. 25–27; Karen Hulme, “Taking Care to Protect the Environment Against Damage: A Meaningless Obligation?”, *International Review of the Red Cross*, Vol. 82, No. 879, 2010, pp. 677–678. See also Laurent Gisel, *The Conduct of Hostilities and International Humanitarian Law: Challenges of 21st century Warfare*, Workshop Discussion Paper for Working Group 3, “Modern Warfare and the General IHL Principles Governing the Conduct of Hostilities”, International Law Association – Study Group, University of Leiden, 22–23 November 2013 (unpublished, on file with the author).

106 Oxford Dictionary of English, 3rd ed., Oxford University Press, Oxford, 2010, available at: www.oxforddictionaries.com/definition/english/injury.

107 Tallinn Manual, above note 8, p. 108.

108 See, for example, Eliav Liebllich, “Beyond Life and Limb: Exploring Incidental Mental Harm Under International Humanitarian Law”, in Derek Jinks, Jackson Maogoto and Solon Solomon (eds), *Applying International Humanitarian Law in Judicial and Quasi-Judicial Bodies*, Asser Press, The Hague, 2014, p. 185 ff; L. Gisel, above note 21, p. 120; Tallinn Manual, above note 8, p. 108.

109 E. Liebllich, above note 108, p. 189.

assessment,¹¹⁰ it is submitted that this should not be read as a rejection of the relevance of more severe mental suffering, but rather as a demonstration that the less severe the injury – whether physical or mental – the less likely it is that the incidental civilian damage will be considered excessive compared to the anticipated military advantage.¹¹¹

In addition to loss of civilian life, injury to civilians and damage to civilian objects, it has been argued that the types of harm which are relevant for the rules on proportionality and precautions in attack should be interpreted more broadly to include other humanitarian consequences – for example, displacement or economic hardship caused by contamination and loss of functionality of farming land. This approach has received some support. For example, Norway has previously expressed the view that military commanders should take into account “the humanitarian consequences caused by the attack” and the “more long-term humanitarian problems”.¹¹² Likewise, the recent report of the UK Iraq Inquiry (investigating the UK military intervention and presence in Iraq from 2003 to 2009) indicates that

a Government has a responsibility to make every reasonable effort to identify and understand the likely and actual effects of its military actions on civilians. That will include not only direct civilian casualties, but also the indirect costs on civilians arising from worsening social, economic and health conditions.¹¹³

Adopting an even broader view, Reynolds argues that a “thorough indirect collateral damage assessment must evaluate all foreseeable effects of a military operation on violence, crime, political infrastructure, housing, environment, public health, water and sanitation infrastructure, power infrastructure, poverty, economy, labour and unemployment and education”.¹¹⁴

Although many of these effects, particularly displacement, may be a reasonably foreseeable consequence of a particular attack, it is clear that the scope of incidental harm which must be taken into account is limited to loss of civilian life, injury to civilians and damage to civilian objects. As such, even under a broad interpretation of “injury,” incidental harm does not include effects such as poverty, unemployment or economic capacity. For example, the US *Law of War Manual* takes a clear position that some economic harm is too remote, although “the death of an enemy combatant might cause economic harm in the form of lost jobs; the attacker would not be required to consider such loss in applying

110 See L. Gisel, above note 21, p. 120.

111 *Ibid.*

112 Response from Norway, “Responses to Document CCW/GGE/X/WG.1/WP.2, Entitled IHL and ERW, Dated 8 March 2005”, CCW/GGE/XI/WG.1/WP.5, 29 July 2005, § 18–19.

113 Report of the Iraq Inquiry, 2016, § 277–278, available at: <http://www.iraqinquiry.org.uk/the-report/>.

114 According to Reynolds, collateral damage should be understood as both direct and indirect: “Failure to adequately evaluate these definitions suggests a faulty proportionality analysis, a defective effects-based targeting strategy, and a flawed post-conflict reconstruction assessment.” See Jefferson D. Reynolds, “Collateral Damage on the 21st Century Battlefield: Enemy Exploitation of the Law of Armed Conflict and the Struggle for a Moral High Ground”, *Air Force Law Review*, Vol. 56, 2005, p. 90.

the proportionality rule”.¹¹⁵ That said, some effects – including, for example, displacement – may still be relevant. Indeed, it may be reasonably foreseeable that displacement will result in increased mortality and deteriorating health of displaced persons, which fall squarely within the types of harm that must be taken into account. In addition, reasonably foreseeable displacement may be relevant in determining the weight to be given to destruction of civilian houses in the proportionality assessment.¹¹⁶ For instance, if it is reasonably foreseeable that incidental destruction of civilian houses will result in large-scale displacement, this may change the value given to the houses when assessing whether the expected incidental damage is excessive in relation to the direct and concrete military advantage.¹¹⁷

Geographical scope of “foreseeability”

A final dimension to consider is the geographical scope of the reverberating effects of an attack that must be taken into account by planners and decision-makers. In relation to the use of explosive weapons in populated areas, the incidental effects of an attack will be centred on the impact area of the explosion but may also include significant effects beyond the immediate impact zone. In particular, the interdependency of essential services in populated areas means that such services are vulnerable to the “domino effect” whereby a disruption in one service in the environs of the impact area can disrupt another service far away from it. For example, damage to distribution lines may cut off water supply to a larger number of persons than those in the immediate impact zone.¹¹⁸ While it is important to recognize that reverberating effects may take place over a wide geographical area, similarly to the temporal scope, it does not seem possible to identify a geographical cut-off point. Rather, it appears more appropriate to focus on which reverberating effects are foreseeable in a particular circumstance. This is reflected in a comment made by Egypt during the Diplomatic Conference of 1974–77, according to which a geographical limitation to the rule on proportionality “introduced a certain ambiguity into the article without necessarily ensuring the protection of civilians, for the loss and the damage had to be considered regardless of the geographical factor so long as the link of causality existed”.¹¹⁹

Foreseeable reverberating effects of using explosive weapons in populated areas

Having examined the meaning and scope of the obligation to take into account the foreseeable reverberating effects of an attack, what are the implications for the

115 US Law of War Manual, above note 9, p. 241, §5.12.2.1.

116 L. Gisel, above note 21, p. 124.

117 *Ibid.*

118 See Expert Meeting Report, above note 9, p 15; Urban Services Report, above note 4, pp. 19, 32, 35, 46.

119 Egypt, *Official Records of the Diplomatic Conference on the Reaffirmation and Development of International Humanitarian Law Applicable in Armed Conflicts*, CDDH/III/SR.21, Geneva, 1974–1977, p. 186.

use of explosive weapons in populated areas? Recent armed conflicts have confirmed that using explosive weapons in populated areas has a significant and devastating impact on civilians, including “destruction and damage of civilian residences and critical civilian infrastructure, with consequent disruption to essential services, such as health care and water distribution, and displacement of the civilian population”.¹²⁰ In particular, the use of explosive weapons in populated areas affects the ability of health-care facilities and services to operate and cope with the influx of wounded people and the injuries they present, and to provide adequate care.¹²¹ It also has a long-term impact on mental well-being.¹²² There is growing public awareness of the indirect effects caused by the use of explosive weapons in populated areas.

When explosive weapons are employed in populated areas, the reasonably foreseeable reverberating effects will usually arise from incidental damage to or destruction of civilian objects. Of course, the expected damage/destruction of such objects is relevant as such; but in many cases, such damage/destruction will also entail foreseeable reverberating effects for the civilian population. For example, an attack in a populated area using weapons with large blast and fragmentation effects may be expected to cause incidental damage to components of the electricity network in the area of the attack (e.g. electricity transmission lines or transformers).¹²³ While the precise effects of the attack would depend on the extent of the damage and the number of people affected, it is reasonably foreseeable that hospitals will be affected (particularly if backup generators are not available), which may lead to loss of civilian life or injury to civilians.¹²⁴ Likewise, damage to components of an electricity network may also affect water purification, storage and distribution systems. Damage to such systems can have significant and foreseeable reverberating effects on the health and well-being of the affected civilian population. For example, civilians may lose access to potable water and be forced to access unregulated and alternative water sources, leading to an increased risk of waterborne diseases. Acknowledging this possibility, US Joint Publication 3–60 (*Joint Targeting*) specifically requires that

[i]f the attack is directed against dual-use objects that might be legitimate military targets but also serve a legitimate civilian need (e.g., electrical power or telecommunications), then this factor must be carefully balanced against the military benefits when making a proportionality determination.¹²⁵

120 2015 Challenges Report, above note 2, pp. 47–48; Expert Meeting Report, above note 9, p. 4.

121 *Ibid.*, pp. 48 and 14 respectively.

122 *Ibid.*

123 Electricity networks can constitute dual-use objects. See the text at note 21 above, where it is noted that even where the object is rendered a military objective because of dual use, damage to the civilian part of that object, including loss of functionality and foreseeable reverberating effects, must be factored into the proportionality assessment.

124 K. Dörmann, above note 27, p. 17 (referring to the deaths of patients in medical facilities or the long-term disruption of electricity supplies); J. Crawford, above note 6, p. 110 (referring to decreased capacity to care for wounded and sick, and an inability to refrigerate adequate quantities of vaccines and medicines).

125 US Joint Targeting Manual, above note 19, Appendix A, “Legal Considerations in Targeting”, p. A-5.

Moreover, essential infrastructure which if damaged or destroyed would have significant reverberating effects for civilians is in most cases located above ground and visible to a trained eye.¹²⁶ This means that commanders should normally be aware of civilian infrastructure located in the vicinity of a military objective and should take into account the foreseeable reverberating effects of damaging such infrastructure. Additionally, in many contexts, commanders would have access to information on underground supply networks which must also be taken into account for the purposes of assessing the incidental civilian damage that is expected to result from an attack.

Regarding existing military policy and practice, there is limited information in the public domain on whether (and if so, how) armed forces take into account the reverberating impacts of explosive weapons that have wide area effects. The United Kingdom's *Joint Service Manual of the Law of Armed Conflict* (UK Joint Service Manual) states that "when used against targets in an urban or populated environment, artillery may be expected to cause a lot of incidental damage which would need to be considered in relation to the anticipated military advantage".¹²⁷ Moreover, the US Counterinsurgency Manual provides that employing tactics and weapons appropriate to the situation "[i]n some cases ... means avoiding the use of area munitions to minimize the potential harm inflicted on non-combatants located nearby".¹²⁸ While these policies do not relate specifically to the objectively foreseeable *reverberating effects* of an attack, they provide important examples of policy guidance based on past observations, which effectively put commanders on notice that the use of artillery in a populated area can be expected to cause significant incidental harm.

Further, in requiring that commanders consider the foreseeable effects of an attack for the purpose of the rule on proportionality, the UK Joint Service Manual includes a second noteworthy example. In the context of precision bombing, the Manual notes that if

an attack of a military fuel storage depot is planned but there is an expectation that the burning fuel will flow into a civilian residential area and cause injury to the civilian population which would be excessive in relation to the military advantage anticipated, that bombardment would be disproportionate and unlawful, owing to the excessive collateral damage.¹²⁹

126 For example, electricity services are comprised of infrastructure located above ground, such as power stations, transformers and substations, which if damaged or destroyed will have a significant impact on the service and will be more difficult to repair or replace; whereas infrastructure located below ground includes distribution pipes, which can be repaired relatively easily if circumstances permit. See Expert Meeting Report, above note 9, p. 16.

127 UK Joint Service Manual, above note 9, para. 5.32.4. This paragraph was amended in 2011. Prior to the amendment, the Manual read as follows: "Sometimes, especially during fighting in towns, the tactics employed can make a great difference to the control of incidental damage. Artillery fire can cause a lot of incidental damage without any appreciable military advantage."

128 US Counterinsurgency Manual, above note 9, § 7–36.

129 UK Joint Service Manual, above note 9, para. 5.33.4.

Another example is the African Union Mission in Somalia (AMISOM) Indirect Fire Policy, issued in 2011 to incorporate past practices and lessons learned in Somalia. The policy restricted the use of mortars and required a stricter chain of command for authorization of the use of mortar and artillery fire. It also created no-fire zones where civilians were known to be present.¹³⁰

Foreseeable reverberating effects and the obligation to take all feasible precautions in attack

As is noted in the ICRC Commentary to Article 57 of AP I, the rule of precautions in attack is “of greatest importance in urban areas because such areas are most densely populated”.¹³¹ With the previous section having set out the conceptual framework and scope of the obligation to take into account the expected incidental damage resulting from an attack, including the reasonably foreseeable reverberating effects, the following section focuses on practical steps to be taken by commanders in order to exercise the objective degree of diligence required in fulfilling their obligations. In particular, this section will examine the feasible precautionary measures required to ensure that the reasonably foreseeable reverberating effects of an attack are adequately assessed. Feasibility is a relative standard which requires that attackers take precautions that “are practicable or practically possible taking into account all circumstances ruling at the time, including humanitarian and military considerations”.¹³² While not imposing an absolute obligation of conduct, compliance with the rule of precautions in attack is also informed by the standard of the reasonable military commander. This means that attackers must take those measures “that a reasonable attacker would take in the same or similar circumstances” based on information “reasonably available [to the attacker] at the relevant time and place”.¹³³

130 See Paul D. Williams, “The African Union Mission in Somalia and Civilian Protection Challenges”, *Stability: International Journal of Security and Development*, Vol. 2, No. 2, 2013, p. 11. The tactical directives issued to the International Security Assistance Force in Afghanistan between 2009 and 2012 provide yet another example. The Tactical Directive on Defensive Operations of 6 July 2009 constrained the use of air-to-ground munitions and indirect fire against residential compounds. In August 2010, the Directive was revised to include the requirement that prior to authorizing a strike, commanders must determine that no civilians are present. In November 2011, the Directive was further updated to emphasize that civilians are to be presumed to be present “in every location where there is evidence of human habitation” and that “all compounds are civilian structures until otherwise apparent”. A later revision in June 2012 included the requirement to refrain from releasing air-delivered munitions on targets within civilian dwellings.

131 ICRC Commentary to AP I, § 219.

132 Amended Mines Protocol, Art. 3(10); Protocol V on Explosive Remnants of War, Geneva, 28 November 2003 (entered into force 12 November 2006), Art. 5(1). This understanding is shared by a number of States and is included in various military manuals. See, for example, Argentina, *Leyes de la Guerra*, PC-08-01, 1989, approved by Resolution No. 489/89 of the Ministry of Defence, 23 April 1990, § 4.20; Australian Defence Force, *Manual on the Law of Armed Conflict*, Operations Series, ADFP37 – Interim Edition, 1994, p. xxiv; and the interpretive declarations of Belgium, France, Germany, Ireland, Italy, the Netherlands, Spain, the United Kingdom and the United States upon ratification of AP I. All State practice is available on the ICRC online database on customary international humanitarian law.

133 M. N. Schmitt and E. W. Widmar, above note 8, p. 401.

The obligation to refrain from deciding to launch an attack that may be expected to violate the rule of proportionality

The obligation to refrain from deciding to launch a disproportionate attack requires that commanders “do everything feasible to assess whether the attack may be expected” to be disproportionate.¹³⁴ This includes doing everything feasible to assess the reasonably foreseeable reverberating effects of the attack.

While the concept of feasible precautions is fairly well established, it is not entirely clear how this obligation translates in practice. Are military commanders obliged to obtain information regarding the location of civilian objects that are critical to the provision of essential services? Is there an obligation to obtain technical expertise or guidance regarding the effects on the civilian population if particular civilian objects are damaged or destroyed? It is clear that the extent to which certain reverberating effects will be foreseeable in part depends on the level of expertise that goes into the assessment of incidental civilian damage. Moreover, should a distinction be drawn between what is considered feasible in a pre-planned attack as compared to an unplanned attack?

Quality and quantity of information

Regarding the quality and quantity of information that is required to assess the reasonably foreseeable reverberating effects of an attack, a number of States have explicitly declared that military commanders must make their decisions on the basis of the information that is available to them at the time of the attack,¹³⁵ whilst others have referred to information that is “reasonably available”.¹³⁶

134 ICRC Customary Law Study, above note 12, Rule 18.

135 Algeria, Australia (“on the basis of their assessment of the information from all sources, which is available to them at the relevant time”), Austria (“the information actually available at the time of the decision”), Belgium (“such relevant information as is then available”), Ecuador (“on the basis of an objective and reasonable estimate of the available information”), Egypt (“on the basis of their assessment of all kinds of information available to them at the time”), Germany (“on the basis of all information available to him at the relevant time”), Italy (“on the basis of their assessment of the information from all sources which is available to them at the relevant time”), the Netherlands (“on the basis of their assessment of the information from all sources which is available to them at the relevant time”), Spain (“shall not necessarily be based on anything more than the relevant information available at the relevant time”), the United Kingdom (“on the basis of their assessment of the information from all sources which is available to them at the relevant time”) and the United States (“on the basis of an honest and reasonable estimate of the facts available to him”).

136 Canada (“on the basis of their assessment of the information reasonably available to them”); Ireland (“on the basis of their assessment of the information from all sources which is reasonably available to them at the relevant time”); New Zealand (“on the basis of their assessment of the information from all sources which is reasonably available to them at the relevant time”); UK Joint Service Manual, above note 9, para. 5.20.4, note 79 (“assessment of what is expected is based on information from all sources which is reasonably available to them at the relevant time”), referring to the UK Statement upon ratification of AP I. The US Naval Handbook, above note 19, para. 8.3.1, states: “[T]he commander must decide, in light of all the facts known or reasonably available to him, including the need to conserve resources and complete the mission successfully, whether to adopt an alternative method of attack, if reasonably available, to reduce civilian casualties and damage.” Ecuador’s naval manual (Ecuador, *Aspectos importantes del derecho internacional marítimo que deben tener presente los comandantes de los buques*, Academia de Guerra Naval, 1989), para. 8.1.2.1, states: “The commander must determine whether

In reference to a standard of reasonableness, Rogers takes the view that the test “will depend to some extent on the amount of information readily available, the staff at hand to deal with it and whether that information raises questions that require further research of other sources of information”.¹³⁷ In addition, a number of military manuals require commanders to obtain “the best possible intelligence”¹³⁸ regarding aspects relevant to the assessment of incidental damage. For example, Australia’s *Law of Armed Conflict Manual* requires the best possible intelligence concerning “concentrations of civilians; civilians who may be in the vicinity of military objectives; [and] the nature of built-up areas such as towns, communities, [and] shelters”.¹³⁹ Although not explicitly specified, such an approach may require not only information regarding the location of essential infrastructure but also an understanding of the interconnectedness of essential services.

Practically speaking, it may be possible in some cases for militaries to obtain information relating to the location of essential civilian infrastructure and supply networks, including primary infrastructure (e.g. water distribution networks, water treatment plants, electricity generating plants) as well as secondary and tertiary infrastructure (e.g. transmission lines or sub-transformers). Availability of this kind of information will vary depending on the context: in some situations it may be publicly available (including online), while in other cases, particularly in the early stages of an operation, such information might not be easily accessible. In this regard, it should be noted that essential civilian infrastructure will typically be located at ground or above-ground level and will thus be visible to an expert eye (e.g. civil engineer).¹⁴⁰

Assessments of the foreseeable reverberating effects of an attack are likely to require technical expertise, including from engineers and/or public health experts. For example, in relation to computer network attacks, the Tallinn Manual recommends that where feasible, technical experts should be available to assist mission planners in determining whether appropriate precautionary measures have been taken.¹⁴¹ In the view of Droege, in the absence of such expertise, it

incidental injuries and collateral damage would be excessive, on the basis of an objective and reasonable estimate of the available information.” Canada and Ireland, in their declarations upon ratification of AP I (20 November 1990 and 19 May 1999 respectively), stated that “military commanders and others responsible for planning, deciding upon or executing attacks” must “reach decisions on the basis of their assessment of the information” that is “reasonably available to them at the relevant time”, and that “such decisions cannot be judged on the basis of information which has subsequently come to light”).

137 A. P. V. Rogers, above note 58, p. 151.

138 Benin, *Military Manual*, 1995 (“Military commanders must inform themselves about concentrations of civilian persons, important civilian objects and specially protected facilities, the natural environment and the civilian environment of military objectives.”); France’s *LOAC Summary Note*, 1992 (“Commanders are responsible for the consequences for civilians of the military actions they take. They must, prior to any action, obtain a maximum of information concerning the nature and the location of protected objects (medical units, cultural objects, installations containing dangerous forces) and concerning any concentration of civilians.”).

139 *Australia’s LOAC Manual*, 2006.

140 See Expert Meeting Report, above note 9, p. 16.

141 Tallinn Manual, above note 8, p. 166, § 6 (“Given the complexity of cyber operations, the high probability of affecting civilian systems, and the sometimes limited understanding of their nature and effects on the part of those charged with approving cyber operations, mission planners should, where feasible, have

may even be necessary for the attacker to refrain from the computer network attack.¹⁴² In the context of urban warfare, Boothby also implies that an assessment of the expected incidental damage should involve technical expertise: when attacks in urban areas

may be expected to damage utilities on which the civilian population relies, an assessment should be made of how long it is likely that the relevant services will remain out of action and what damage, injury, and death civilians are likely to suffer during that period as a result.¹⁴³

As noted by one expert, “a war-fighter does not normally have the necessary training to assess the public health risks of an attack”.¹⁴⁴ Thus, it will normally be necessary to incorporate specialists into targeting assessments.

In practice, some militaries already incorporate engineering expertise into targeting processes, in order to provide expertise on the physical impact of certain weapons on targeted buildings.¹⁴⁵ In addition, the US Army *Field Manual on Intelligence Support to Urban Operations* refers to the role for engineers in assessing “potential collateral damage by analysing risks of damage caused by the release of dangerous forces, power grid and water source stability, and the viability of sewage networks”.¹⁴⁶

More generally, it appears that some States have policy guidance and processes which require detailed analysis of essential infrastructure, which could feasibly be used for the purpose of assessing the expected incidental harm, including the foreseeable reverberating effects, of an attack. For example, the US manual *Joint Urban Operations* (US Joint Urban Operations Manual) emphasizes the importance of “critical infrastructure analysis” during the planning phase of an operation:

Critical infrastructure analysis is a combination of intelligence preparation, the targeting process, and staff planning. Its purpose is to examine closely the nature of the infrastructure systems and their components The initial steps in the critical infrastructure analysis will identify certain infrastructure to be preserved, protected, or to which damage should be minimized The targeting process should recognize the facilities or structures to be protected

technical experts available to assist them in determining whether appropriate precautionary measures have been taken.”).

142 C. Droege, above note 7, p. 574.

143 W. H. Boothby, above note 18, p. 414.

144 See University Centre for International Humanitarian Law Geneva, *Expert Meeting on “Targeting Military Objectives”*, report, 12 May 2005, p. 15.

145 See, for example, Expert Meeting Report, above note 9, p. 29 (one speaker said that “in terms of analyzing the data that are available, in particular as regards foreseeing secondary fragmentation, some militaries routinely incorporate the technical expertise of a structural engineer”). See also *ibid.*, p. 33 (“UPDF also carries out BDAs, which involve intelligence analysts, field engineers, weapon experts and target analysts.”).

146 Department of the Army, *Field Manual on Intelligence Support to Urban Operations*, FM 2-91.4, March 2008, p. 3–2, available at: <http://fas.org/irp/doddir/army/fm2-91-4.pdf>.

and give careful consideration to potential collateral damage resulting from attacks on nearby targets.¹⁴⁷

Although the US Joint Urban Operations Manual does not define “critical infrastructure”, it notes that systems and facilities may be selected for analysis for several reasons, including “[i]nfrastructure whose destruction would cause hardship for civilians”.¹⁴⁸ Other States such as Israel and Norway also give specific attention to the importance of minimizing damage to civilian infrastructure.¹⁴⁹ If the impact of warfare on essential infrastructure is already the subject of intensive intelligence gathering and analysis, the gathering of such intelligence is at least in some circumstances considered feasible, and should in those circumstances also inform the assessment of the expected incidental damage, including the foreseeable reverberating effects.

It is not entirely clear how militaries assess the foreseeable reverberating effects of an attack. However, it appears that this may occur in part through the use of advanced CDM processes. For example, the US CDM requires both an environmental damage assessment and an assessment of the chemical, biological and radiological (CBR) Plume Hazard for each attack,¹⁵⁰ noting that “special consideration must be given to the secondary and tertiary effects of engaging these types of targets”.¹⁵¹ Likewise, the US CDM requires special consideration of dual-use facilities, meaning “those valid military targets characterized as serving both a military and civilian (i.e. non-combatant) purpose/function”.¹⁵² Aside from attacks on dual-use facilities, it remains unclear if and how the US CDM includes an assessment of the foreseeable reverberating effects of attacks on other military objectives. Although it has not been possible to access CDM used by other militaries, it should be noted that the 2009 Australian military manual makes it clear that the collateral effects of an attack – including second- and third-order consequences which are unintended – “should be a major,

147 US Joint Chiefs of Staff, *Joint Urban Operations*, JP 3-06, 20 November 2013 (US Joint Urban Operations Manual), pp. III-8–III-9. The Manual also states that “[a]n analysis of the threat is essential as is detailed intelligence and information on the physical terrain and infrastructure characteristics of the urban environment” (p. I-8).

148 *Ibid.*

149 See, for example, Israel, *The Low Intensity Conflict: The Combat against Irregular Forces*, Ground 10–29, 2005, p. 91 (“To the extent possible, all impact should be avoided to water, power, sewage and communication infrastructures All such damage should be reduced to the minimum, with means also provided as required to repair the damages.”); Royal Army of the Netherlands, *The Humanitarian Law of War: A Manual*, 2005, § 1221 (“Damage to infrastructure and civilian casualties must be avoided or, in any case, kept to a minimum.”).

150 According to the US no-strike process and CDM, CBR Plume Hazards include “nuclear, biological or chemical production/storage facilities; nuclear power plants; fertilizers, pharmaceutical, pesticide/herbicide production/storage facilities”. See US Chairman of the Joint Chiefs of Staff, above note 80, Appendix A to Enclosure D, p. D-A-9.

151 *Ibid.*, Appendix A to Enclosure D, p. D-A-34. As noted above, the rationale for requiring special consideration is that “[e]nvironmental hazard targets present the significant danger of widespread and long-term lethal effects on civilians and non-combatants from ground water contamination, flooding, uncontrollable fire, and spread of disease”.

152 *Ibid.*, Enclosure B, p. B-7.

deliberate consideration in planning, executing, and assessing military actions on any scale”.¹⁵³

Pre-planned attacks vs. unplanned attacks

An issue related to the quantity and quality of information that a commander can feasibly be expected to take into account when analyzing the expected incidental damage of an attack is the relevance of the operational context. In a pre-planned attack, it might be both feasible and reasonable for commanders to consult experts prior to the attack, such as their medical or engineering branch, in order to estimate the incidental damage of the attack. Such information will likely render certain reverberating effects foreseeable that would not be foreseeable in unplanned operations. In a “troops-in-contact” (TIC) scenario, where friendly forces are under effective fire,¹⁵⁴ a reasonable commander would not be expected to proactively engage in extensive intelligence gathering before responding to incoming rounds, although pre-existing knowledge would still need to be taken into account. In unplanned operations other than TIC scenarios, where friendly forces are not in immediate danger but where “dynamic targeting” is employed to pursue a militarily important target of opportunity,¹⁵⁵ the military considerations weighing in favour of an immediate engagement are likely tempered to a greater extent than in TIC scenarios by the precautionary obligation to proactively gather information prior to an attack in order to inform the estimation of incidental damage.

While the condition of feasibility introduces some malleability into the rule of precautions in attacks, thereby accommodating different operational realities,¹⁵⁶ it does not altogether suspend the IHL obligation to take precautions in attack. Feasibility explicitly refers to military and *humanitarian* considerations. Thus, even in TIC situations, the attacker must gather a reasonable amount of information to inform his or her decision and must take into account those reverberating effects that are reasonably foreseeable,¹⁵⁷ including based on prior knowledge of the operational environment, training and past experiences.¹⁵⁸ For

153 Australian Department of Defence, *Australian Defence Doctrine Publication 3.14 on Targeting*, ADDP 3.14, 2 February 2009, § 1.21. Collateral effects are defined as follows: “A collateral effect is not damage to a target or any directly associated collateral damage to the immediate area, rather they are any effect (s) achieved beyond those for which the action was undertaken.” See also § 1.24.

154 See Eric C. Husby, “A Balancing Act: In Pursuit of Proportionality in Self-Defense for On-Scene Commanders”, *The Army Lawyer*, Vol. 6, 2012, p. 6; Marc Garlasco, *Troops in Contact: Airstrikes and Civilian Deaths in Afghanistan*, Human Rights Watch, 8 September 2008; J. Alexander Thier and Azita Ranjbar, *Killing Friends, Making Enemies: The Impact and Avoidance of Civilian Casualties in Afghanistan*, briefing, United States Institute of Peace, July 2008, p. 2; Winston S. Williams Jr., “Multinational Rules of Engagement: Caveats and Friction”, *The Army Lawyer*, Vol. 24, 2013, p. 27, note 34.

155 In US doctrine, dynamic targeting refers to the targeting process for current operational planning (current twenty-four hours), where the timing is such as to require a more immediate response than deliberate targeting allows for. See US Joint Targeting Manual, above note 19, p. x.

156 See W. H. Boothby, above note 18, p. 123.

157 See E. C. Husby, above note 154, pp. 12–13.

158 See, for example, Richard Jackson, “Empirical Approaches to the International Law of War”, *Willamette Journal of International Law and Dispute Resolution*, Vol. 16, 2008, p. 292.

instance, the on-scene commander should be trained on the general effects of the weapon system being used and should be able to reference training and intelligence relating to demographics, typical civilian patterns of life and types of structures commonly occupied by civilians.¹⁵⁹ The rule of precautions in attack is violated where feasibly available information is not obtained or is ignored, irrespective of the operational context.¹⁶⁰

The obligation to take all feasible precautions in the choice of means and methods of attack

Commanders are obliged to take all feasible precautions in the choice of means and methods of attack with a view to avoiding or minimizing the expected incidental harm,¹⁶¹ including the reasonably foreseeable reverberating effects of an attack. Compliance with this obligation will of course depend on the particular context, but will require assessment of the foreseeable effects of the available weapon systems, in view of their technical characteristics and the expected circumstances of their use. This should also include consideration of the way in which the technical features of each weapon can be manipulated, so as to minimize the foreseeable direct and indirect effects on civilians, including the type and size of the warhead, the type of fuse, the delivery system, the distance from which the weapon is launched, as well as the angle and timing of the attack.¹⁶²

In this respect, it should be noted that technological development has rendered measures that were militarily unfeasible in the past, feasible today. Schmitt has suggested that increasing attention on reverberating effects is in part due to technological developments in targeting capabilities: “Of course, reverberating effects were theoretically always calculated when assessing proportionality. However, it is only now that the means exist to limit dramatically direct collateral damage and incidental injury that we are being sensitized to reverberation.”¹⁶³ In other words, reverberating effects are now more relevant because new technology – including precision-guided missiles – enables attackers to be more precise in limiting the reverberating effects of an attack. A similar line of argument can also be applied to advanced CDMs, which use physics-based computer modelling to estimate and mitigate incidental civilian harm.¹⁶⁴ Indeed, the existence and use of more

159 See, for example, E. C. Husby, above note 154, p. 13.

160 Boothby writes that “[i]f the relevant information is reasonably available to the decision-maker, he is required to take it into account when determining whether the intended attack would be lawful”. W. H. Boothby, above note 18, p. 172.

161 AP I, Art. 57(2)(a)(ii); ICRC Customary Law Study, above note 12, Rule 17. See also M. N. Schmitt and E. W. Widmar, above note 8, p. 402; and Italy’s *LOAC Elementary Rules Manual*, 1997, which states: “To restrict civilian casualties and damages, the means of combat and weapons shall be adapted to the target.”

162 2015 Challenges Report, above note 2, p. 50; Expert Meeting Report, above note 9, pp. 5, 24–26. See also ICRC Commentary to AP I, Article 57(2)(a)(ii), § 2200, which notes that the “precision and range” of the available weapons “should be taken into account.”

163 Michael N. Schmitt, “The Principle of Discrimination in 21st Century Warfare”, *Yale Human Rights and Development Journal*, Vol. 2, 1999, p. 168.

164 See, for example, the US CDM, also used during NATO combat operations: Chairman of the Joint Chiefs of Staff, above note 80.

sophisticated means of measuring incidental damage has increased the capacity of commanders to calculate the reverberating effects of an attack, thereby making them more relevant.¹⁶⁵

This is an interesting approach to the issue, and it is indeed true that greater accuracy in weapons systems or greater capacity to calculate incidental damage may increase the possibility to minimize the reverberating effects of an attack.¹⁶⁶ However, it must be emphasized that the obligation to incorporate the foreseeable reverberating effects of an attack into targeting assessments is not dependent on the level of technology of a party to an armed conflict. Even militaries that are not using precision weapons and sophisticated means of measuring incidental damage can assess the foreseeable reverberating effects of an attack, particularly when using explosive weapons with a wide impact area in populated areas. This is especially true in the case of reverberating effects resulting from incidental damage to civilian objects. As most essential infrastructure is located at ground or above-ground level, it is visible to a trained eye and must be taken into account when assessing the foreseeable reverberating effects of an attack, regardless of technological developments in targeting capabilities. Additionally, an assessment of the foreseeable reverberating effects of an attack should be informed by lessons learned from previous conflicts and what is known in the public domain about the environment surrounding the target, and about the effects of specific weapons, including explosive weapons with a wide impact area. Thus, while technology may allow for a more demanding threshold regarding what is feasible or foreseeable, the obligation to take into account the reverberating effects of an attack is not dependent on having sophisticated technology such as precision-guided munitions or a sophisticated CDM process.

One question arising from the interpretation of this rule is whether it requires the employment of precision-guided munitions. This question is particularly relevant to the use of explosive weapons that are prone to wide area effects in populated areas. As the law currently stands, the answer to this question is somewhat nuanced. Despite arguments to the contrary,¹⁶⁷ there is no existing legal obligation to acquire the most precise weapons available on the market, or, once obtained, to use precision-guided munitions in all situations.¹⁶⁸ However, where such weapons are available, and their use is feasible, and they would allow the attacking party to avoid or minimize the expected incidental harm (including the reasonably foreseeable reverberating effects), they should be used.¹⁶⁹ Accordingly, Dinstein notes that if an attack is planned on “a small military objective located in the middle of a densely populated civilian area, the

165 L. Gisel, above note 21, p. 128.

166 *Ibid.*

167 See, for example, Stuart W. Belt, “Missiles over Kosovo: Emergence, *Lex Lata*, of a Customary Norm Requiring the Use of Precision Munitions in Urban Areas”, *Naval Law Review*, Vol. 47, No. 115, 2000.

168 Y. Dinstein, above note 10, p. 170; M. N. Schmitt and E. W. Widmar, above note 8, p. 402.

169 Jean-Francois Quéguiner, “Precautions Under the Law Governing the Conduct of Hostilities”, *International Review of the Red Cross*, Vol. 88, No. 864, 2006, p. 803.

only modus operandi minimizing the expected collateral damage to civilians *may* be the employment of [precision-guided munitions]”.¹⁷⁰ In a similar vein, Schmitt suggests that the obligation to minimize incidental damage may be complied with through the use of low-collateral weapons such as carbon filament bombs, which “can be used to interrupt electricity with far less collateral damage than regular bombs”.¹⁷¹ That being said, it must be emphasized that while precision-guided munitions or other sophisticated weapons may increase the capacity of the attacker to minimize the expected incidental harm of an attack, the use of such technology does not ensure compliance with the rule on proportionality in attack. Large precision-guided explosive munitions are also prone to indiscriminate effects due to their wide blast and fragmentation range. Regardless of the type of weapon used, if an attack is expected to be disproportionate, the commander must refrain from launching, or must suspend or cancel, the attack.

Regarding the use of less precise explosive weapons in populated areas, the obligation to minimize incidental casualties or damage to civilian objects may also trigger precautionary measures such as the establishment of no-fire zones or restrictions on the types of situations in which particular weapons can be used. For example, the 2011 US Army manual *Combined Arms Operations in Urban Terrain* (US Combined Arms Manual) notes that in regard to the use of field artillery in operations in urban terrain, “restrictive fire support coordination measures, such as a restrictive fire area or no-fire area may be imposed to protect civilians and critical installations”.¹⁷² Similarly, the 2013 US Joint Urban Operations Manual indicates several precautionary measures that can be taken in relation to the use of weapons fire in urban environments, including “restricting munitions used in the attacks” and “aborting attacks unless accuracy can be guaranteed”.¹⁷³ Another prominent example is the restrictions on high-explosive (HE) artillery that were put in place by the Israeli Defence Force (IDF) during the armed conflict in Gaza in 2014.¹⁷⁴ Although Israel was clear to underline that these directives were going beyond the requirements of IHL, they put in place a general prohibition on the use of HE artillery shells in populated areas and required the observance of specified “safety margins”.¹⁷⁵ Accordingly, HE artillery could only be used in populated areas on an exceptional basis where there was “an imperative military necessity for artillery fire support”.¹⁷⁶ These examples are illustrative of a certain acknowledgement by some armed forces of the fact that certain explosive weapon systems may be expected to result in substantial incidental damage when used in populated areas.

170 Y. Dinstein, above note 10, p. 169. Emphasis added.

171 M. N. Schmitt and E. W. Widmar, above note 8, p. 402. Schmitt also emphasizes that such weapons will reduce collateral damage whilst obtaining the same military advantage.

172 US Department of the Army, *Combined Arms Operations in Urban Terrain*, ATTP 3-06.11, June 2011 (US Combined Arms Manual), p. 12–4.

173 US Joint Urban Operations Manual, above note 147, p. IV-16. It should be noted that these measures are framed as ways of reducing operational- and tactical-level implications, rather than as a legal obligation.

174 State of Israel, above note 66, para. 354.

175 *Ibid.*

176 *Ibid.*

Aside from the choice of weapon, a particularly important aspect of complying with this obligation is the ability to manipulate the technical features of the chosen weapon system, in order to minimize incidental civilian harm, including foreseeable reverberating effects. For example, choices regarding the warhead, type of munition¹⁷⁷ and fusing can be made in order to minimize the effects of the attack on civilians and civilian objects located within the impact area.¹⁷⁸ In this regard, the US Combined Arms Manual places specific restrictions on the use of fuses on mortars in an urban environment: “When using HE ammunition in urban fighting, only point-detonating fuzes should be used. The use of proximity fuzes normally should be avoided because the nature of urban areas causes proximity fuzes to function prematurely.”¹⁷⁹ Policy directives regarding fusing were also implemented by the IDF during the 2014 conflict in Gaza whereby “in certain cases, the IDF employed delay fuses for bombs to detonate deep inside targets, to limit damage to adjacent structures”.¹⁸⁰ Considerations such as warhead type and fusing are also incorporated into the CDM used by several militaries.¹⁸¹

In addition, parties to an armed conflict should take feasible precautions in relation to the angle of attack.¹⁸² This is extremely important, particularly in densely populated areas, as the angle of an attack will influence the extent and direction of secondary fragmentation resulting from the attack – i.e., gravel, cement, wood,

177 See, for example, Kenya, *LOAC Manual*, 1997: “the destructive power of the ammunition used (quantity, ballistic data, precision, point or area covered, possible effects on the environment) should especially be taken into account”.

178 Expert Meeting Report, above note 9, p. 25.

179 US Combined Arms Manual, above note 172.

180 State of Israel, above note 66, para. 312.

181 For example, the US CDM – also used by NATO – requires a weaponeering analysis “which determines appropriate delivery systems, warhead, and fuze combinations that mitigate the risk of collateral damage while still achieving the desired effect on the target”. The US CDM is modelled around five questions, one of which is “Can I mitigate damage to those collateral concerns [including collateral objects] by striking the target with a different weapon or with a different method of engagement, yet still accomplish the mission?” Similarly, the Australian CDM provides that “for infrastructure targets, the assessment will consider the size, shape and construction of protected facilities, weapon type, size and accuracy, and blast and fragmentation radii”. See Australian Department of Defence, above note 153, pp. 4–8. The CDE Methodology used by the Australian military is detailed further in *ADFP 3.14.2 Targeting Procedures*, but this is not publicly available. See also Chairman of the Joint Chiefs of Staff, above note 80, pp. D-A-18, D-A-7.

182 J.-F. Quéguiner, above note 169, p. 800; Y. Dinstein, above note 10, p. 143. Precautionary measures regarding the timing and angle of attack are explicitly identified in a number of military manuals. See the Netherlands, *Military Manual*, 2005, § 0542 (“Thought must be given to the choice of methods or techniques of attack, resources (weapons and weapon systems), timing, and whether or not to warn the civilian population.”); State of Israel, *The Operation in Gaza (27 December 2008–18 January 2009): Factual and Legal Aspects*, 29 July 2009, § 258 (“to the extent feasible, the IDF timed attacks on targets so as to cause minimum collateral damage. For example, buildings normally occupied only during daylight hours, and military targets which were located in proximity to such buildings, were struck at night.”); Kenya, *LOAC Manual*, 1997 (“The direction and the moment of the attack shall be chosen so as to limit civilian casualties and damage (e.g. attack of factory after normal working hours.”); Ukraine, *IHL Manual*, 2004, § 2.3.3.2. (“Direction and time of offensive action shall be chosen in order to minimize human casualties and destruction of civilian objects, e.g. fire damage to an enemy military plant after the end of its working hours.”).

rocks, glass and metal which may be projected out by the blast wave.¹⁸³ By carefully managing the angle of attack, fragmentation effects can be shaped and mitigated so as to reduce the risk of civilian casualties and damage to civilian objects.¹⁸⁴ For example, by changing the angle of attack against a particular military objective in a populated area, it may be possible to ensure that secondary fragmentation is projected upwards or in the direction of an uninhabited block, rather than in the direction of a medical clinic. As the angle of attack is usually incorporated into CDM or other means of preparing an attack, in most cases it will be feasible to take such precautions.¹⁸⁵

Finally, the obligation to take all feasible precautions in the choice of means and methods of attack can also “impose restrictions on the location of an attack, by requiring, where circumstances permit, that parties avoid attacking a densely populated area if the attack is likely to cause heavy civilian losses”.¹⁸⁶ Indeed, in some cases, where there are no alternative means or methods of attack which would minimize incidental civilian damage, the only feasible option is to refrain from launching an attack that would be disproportionate or indiscriminate. Although framed as a way of reducing operational- and tactical-level implications (rather than as a legal obligation), this precautionary measure is reflected in the US Joint Urban Operations Manual in relation to the use of weapons fire in urban environments. Acknowledging that the presence of civilians can severely inhibit the use of weapons fire, the Manual refers to several measures that can be taken, including “prohibiting attacks on targets located in heavily populated areas”.¹⁸⁷

Conclusion

Although the rules on proportionality and precautions in attack require that reverberating effects are taken into consideration for all attacks, this obligation is particularly relevant in the context of attacks involving the use of explosive weapons that have wide area effects in a populated area. Indeed, recent conflicts have shown that when explosive weapons with a large destructive radius, an inaccurate delivery system or the capacity to deliver multiple munitions over a wide area are used in populated areas, there is a high likelihood that civilians will be killed and injured, and essential civilian infrastructure will be damaged or destroyed, with consequent disruption in essential services and subsequent effects on the lives and well-being of the civilian population.

In fleshing out its contextual scope and framework, this article has argued that the obligation to take into account the reasonably foreseeable reverberating effects of an

183 Expert Meeting Report, above note 9, pp. 11, 27.

184 *Ibid.*, p. 5; Kenneth Cross, Ove Dullum, N. R. Jenzen-Jones and Marc Garlasco, *Explosive Weapons in Populated Areas: Technical Considerations Relevant to their Use and Effects*, report, Armament Research Services, Australia, May 2016, p. 42.

185 *Ibid.*, p. 42; Expert Meeting Report, above note 9, p. 6.

186 J.-F. Quéguiner, above note 169, p. 800.

187 US Joint Urban Operations Manual, above note 147, p. IV-16.

attack derives from the requirement to estimate the “expected” incidental damage of an attack when applying the rules of proportionality and precautions in attack. This obligation imposes an objective standard of care, based on the standard of the “reasonable commander”. This implies that commanders must take into account those reverberating effects that are reasonably foreseeable in the circumstances ruling at the time, in light of the reasonably available information. Moreover, the objective standard of “reasonable foreseeability” means that commanders are put on notice regarding reverberating effects that may be considered reasonably and objectively foreseeable based on past practice and empirical research, lessons learned and publicly available information, including information about the reverberating effects of using explosive weapons in populated areas.

The obligation to take into account the reasonably foreseeable reverberating effects of an attack is reinforced by the precautionary obligation to refrain from launching a disproportionate attack, which imposes a duty to proactively gather information that will inform the assessment of the expected incidental damage of the attack. This includes, where feasible, obtaining information regarding the location and nature of essential infrastructure and ensuring that relevant technical experts are involved in assessing the expected incidental harm of an attack. While the operational context might impact the extent to which a commander is expected to proactively gather information to inform the estimation of incidental damage, a commander may never ignore reasonably available information, including such information that renders the reverberating effects of an attack reasonably foreseeable.

Additionally, all feasible precautions must be taken in the choice of means and methods of attack, by assessing the foreseeable effects of particular weapons, including reverberating effects, on the basis of their technical characteristics and the expected circumstances of their use. Feasible precautions include manipulating the technical features of explosive weapons such as the type of fuse and the type/size of the warhead, as well as considering the timing, angle and location of the attack. Yet even such precautions may not be sufficient to obviate the wide area effects of certain explosive weapons. In such cases, the only option may be to refrain from using the weapon, if its use is likely to lead to a violation of the prohibition on indiscriminate and disproportionate attacks.

As is the case currently for some militaries, policy guidance should be put in place to identify which kinds of precautions in attack can and should be implemented, in order to assess and minimize the reverberating effects of an attack using explosive weapons in populated areas, building on good practices already applied by a number of militaries. Likewise, when it is reasonably foreseeable that using a particular explosive weapon in a populated area will result in excessive incidental civilian harm, military manuals and policy should set out clear restrictions on the use of those weapons in populated areas. Although it is not possible to foresee and limit all of the possible effects of an attack, a lot more can be done to better understand the reverberating effects of an attack using explosive weapons in populated areas and to develop policy guidance setting out if and how such weapons should be used.