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The Dangerous Rise of “Dual-Use” Objects in War

ABSTRACT. Each day, the news brings stories of military attacks on schools, hospitals, apartment buildings, electrical facilities, and other critical civilian infrastructure. The militaries attacking these objects often seek to justify the attacks by claiming that the civilian objects are being used by militants. Objects that are believed to have both military and civilian use are often referred to as “dual-use” objects. Even though the term has become common, international law does not recognize a “dual-use” object as a legally meaningful category. Rather, the postwar Geneva Conventions that lie at the core of modern international humanitarian law establish a bright line between “military objectives” that are considered legitimate targets of military force, and civilians and “civilian objects,” which are to be strictly protected.

We show in this Article that the targeting of dual-use objects over the last several decades has blurred this line, placing civilians at great risk. The United States has played a critical role in the increasingly expansive targeting of dual-use objects. Indeed, most accounts of the origins of dual-use targeting start with the 1991 Gulf War, in which the U.S.-led coalition responded to Iraq’s occupation of Kuwait with airstrikes on Iraq’s electrical infrastructure and bridges. The Article reviews the history of dual-use targeting and presents an original dataset and primary-source evidence from the sites of U.S. airstrikes in Iraq and Syria from 2014 to 2018 to illustrate the wide range of dual-use objects that the U.S. military has struck. It draws on ground reporting and research to show the true costs of this dual-use targeting for civilians living in areas of conflict. The United States is far from alone in targeting dual-use objects, but we focus on it because it shapes the law of armed conflict by projecting force around the world, providing legal justifications for its use of force, and setting the standards by which other states are measured. Finally, this Article recommends that states engaging in military operations collect better information about dual-use objects so that they can make better-informed targeting decisions. We also offer several recommendations for clarifying international humanitarian law to prevent further erosion of the protections the law provides to civilians during war.

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INTRODUCTION

In April 2024, Israeli troops withdrew from al-Shifa Hospital, the largest medical complex in Gaza, leaving it in ruins.¹ The Israel Defense Forces (IDF) claimed that Hamas had established a headquarters inside the hospital and that the operation had killed hundreds of militants, though independent reporting cast doubt on those claims.² The raids and bombings around the complex also killed large numbers of civilians, including patients and medical staff.³ Al-Shifa is far from alone, as the conflict “has seen hospitals targeted with an intensity and overtness rarely seen in modern warfare.”⁴ In December 2024, the Office of the United Nations High Commissioner for Human Rights reported that attacks by the IDF had resulted “in the killing of medical staff, patients and IDPs” located in and around the facilities, “pushing the healthcare system to the point of almost complete collapse.”⁵ In early May 2025, the World Health Organization assessed that there had been 686 attacks on health facilities, damaging at least

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1. Lorenzo Tondo, *Israeli Forces Withdraw from Gaza’s al-Shifa Hospital After Two-Week Raid Leaving Facility in Ruins*, GUARDIAN (Apr. 1, 2024), <https://www.theguardian.com/world/2024/apr/01/israeli-forces-withdraw-from-gaza-al-shifa-hospital-after-two-week-raid> [https://perma.cc/7XTU-3HN5].
 2. *Id.*; Matthew Mpoke Bigg & Hiba Yazbek, *Israel’s Raid on al-Shifa Hospital Grows into One of the Longest of Gaza War*, N.Y. TIMES (Mar. 21, 2024), <https://www.nytimes.com/2024/03/21/world/middleeast/israel-al-shifa-hospital-raid-gaza.html> [https://perma.cc/7NEK-B8KB]; Louisa Loveluck, Evan Hill, Jonathan Baran, Jarrett Ley & Ellen Nakashima, *The Case of al-Shifa: Investigating the Assault on Gaza’s Largest Hospital*, WASH. POST (Dec. 21, 2023), <https://www.washingtonpost.com/world/2023/12/21/al-shifa-hospital-gaza-hamas-israel> [https://perma.cc/TWH9-8JXC].
 3. Tondo, *supra* note 1.
 4. Isabel Debre, Julia Frankel & Lee Keath, *Still Wrecked from Past Israeli Raids, Hospitals in Northern Gaza Come Under Attack Again*, AP NEWS (Nov. 3, 2024, 12:28 AM EDT), <https://apnews.com/world-news/still-wrecked-from-past-israeli-raids-hospitals-in-northern-gaza-come-under-attack-again-00000192eebfd414a79ffbf88cc0000> [https://perma.cc/6TJP-7P7L].
 5. *Thematic Report: Attacks on Hospitals During the Escalation of Hostilities in Gaza (7 October 2023 - 30 June 2024)*, UNITED NATIONS HUM. RTS. OFF. OF THE HIGH COMM’R 1 (Dec. 31, 2024), <https://www.ohchr.org/sites/default/files/documents/countries/opt/20241231-attacks-hospitals-gaza-en.pdf> [https://perma.cc/ZJH9-T2UA]. Israel responded to the report, claiming that it was “one of the many examples of the inherent obsession of OHCHR with vilifying Israel.” *Israel’s Initial Comments to OHCHR 4th Thematic Report*, MISSION PERMANENTE D’ISRAËL 1 (Dec. 2024), <https://www.un.org/unispal/wp-content/uploads/2024/12/israel-comments-gaza-hospitals-report-2024.pdf> [https://perma.cc/9Z5P-SRTF]. However, independent reporting has arrived at similar conclusions regarding the scale of destruction of the medical sector in Gaza. See, e.g., Frances Vinall & Mohamad El Chamaa, *Mapping the Damage to Gaza’s Hospitals: Battered, Abandoned and Raided*, WASH. POST (May 21, 2024, 5:02 AM EDT), <https://www.washingtonpost.com/world/2024/05/21/gaza-hospitals-attacks-bombed-israel-war> [https://perma.cc/P5LE-CJHV].

thirty-three of Gaza's thirty-six hospitals.⁶ Israel has defended the attacks as justified by Hamas's use of medical facilities for military purposes, but the *Associated Press* found "Israel has presented little or even no evidence of a significant Hamas presence" in the cases it investigated.⁷

Throughout its war in Ukraine, Russia has attacked electrical facilities in the country. A study of the war identified 223 instances of Russian strikes on Ukraine's power infrastructure over seven months.⁸ The impact on Ukraine's civilians has been devastating, leaving millions without electricity, water, or heat in life-threatening winter temperatures.⁹ After a strike on a power station in Kyiv in April 2024, Putin explained that "in this way we will affect Ukraine's military industrial complex and in a very direct way."¹⁰

In Syria, on the evening of March 20, 2017, aircraft from the U.S.-led coalition attacked a three-story building in the Raqqa countryside it identified as an ISIS¹¹ "intelligence headquarters and weapons storage facility" where "more

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6. *oPt Emergency Situation Update: Issue 58, 7 Oct 2023 – 7 May 2025*, WORLD HEALTH ORGANIZATION [WHO] 1, https://www.emro.who.int/images/stories/Sitrep_58s.pdf [<https://perma.cc/54SV-7NE2>].
 7. Debre et al., *supra* note 4; see also Ben van der Merwe, Kaitlin Tosh, Freya Gibson & Sophia Massam, *Gaza Hospital Attack: Analysis Contradicts Israel's Evidence Justifying Airstrike*, SKYNEWS (May 15, 2025), <https://news.sky.com/story/gaza-hospital-attack-analysis-contradicts-israels-evidence-justifying-airstrike-13367823> [<https://perma.cc/6GRD-HMDA>] (examining Israel's justifications for hospital attacks); Mick Krever, *Israel's Military Releases Interrogation Video in Bid to Defend Assault on Gaza Hospitals*, CNN (Jan. 8, 2025, 10:46 AM EST), <https://www.cnn.com/2025/01/08/middleeast/israel-military-kamal-adwan-gaza-interrogation-video-intl> [<https://perma.cc/DKW7-TM84>] ("The IDF has also regularly released videos of, and shown journalists, caches of small arms allegedly found at hospitals, though CNN analysis has shown that some of those weapons may have been moved or placed there prior to journalists' visits.").
 8. Humanitarian Rsch. Lab, *Remote Assessment of Bombardment of Ukraine's Power Generation and Transmission Infrastructure, 1 October 2022 to 30 April 2023*, YALE SCH. OF PUB. HEALTH 4 (Feb. 29, 2024), <https://reliefweb.int/attachments/c7b12d93-5b3b-4efb-a8fo-c69264e62a44/Remote%20assessment%20of%20bombardment%20of%20Ukraine's%20power%20generation%20and%20transmission%20infrastructure%2C%201%20October%202022%20to%2030%20April%202023%20-%20a%20Conflict%20Observatory%20Report%20%2829%20February%202024%29.pdf> [<https://perma.cc/VSS9-GTGL>].
 9. *Ukraine: Russian Attacks on Energy Grid Threaten Civilians*, HUM. RTS. WATCH (Dec. 6, 2022, 12:01 AM EST), <https://www.hrw.org/news/2022/12/06/ukraine-russian-attacks-energy-grid-threaten-civilians> [<https://perma.cc/5KJS-P3Q3>].
 10. Tom Balmforth, *Major Russian Air Strikes Destroy Kyiv Power Plant, Damage Other Stations*, REUTERS (Apr. 11, 2024, 2:45 PM PDT), <https://www.reuters.com/world/europe/russian-missile-strike-targets-cities-across-ukraine-2024-04-11> [<https://perma.cc/7G2F-QXPB>].
 11. ISIS is a term often used to refer to the group sometimes referred to as "the Islamic State," "ISIL," or "Daesh." Here, we use the term ISIS, as this is the term by which the group is most commonly known in the United States.

than 30 ISIS militants typically stayed.”¹² The coalition maintained that the target “was exclusively used by and under the control of ISIS” and that “no civilians had been harmed.”¹³ But a Human Rights Watch (HRW) investigation, based on multiple visits to the site and over a dozen interviews with survivors and eyewitnesses, told a different story: the building had served as a boarding school called the “Badia school” until 2011, when it began to host families displaced by the war.¹⁴ While local residents said ISIS had some presence, the building also housed a large number of civilians completely unaffiliated with ISIS.¹⁵ Survivors told harrowing accounts of waking up to explosions, finding relatives covered in shrapnel, and collecting the bodies of men, women, and children.¹⁶ HRW documented at least forty civilians—including fifteen women and sixteen children—who were killed, but it believed the actual number was higher.¹⁷ Some estimates were in the hundreds.¹⁸ The coalition later admitted forty civilians had been killed, at which point they described the target as an ISIS “militant multifunctional center.”¹⁹ Such strikes were also common during U.S. anti-ISIS operations in Iraq, where ISIS forces often operated from buildings in dense urban environments where civilians also lived and worked.

The targets of these attacks in Gaza, Ukraine, and Syria are what some have dubbed “dual-use” objects—meaning that, according to the militaries targeting them, the objects have both military and civilian uses.²⁰ International law does

12. Ole Solvang & Nadim Houry, *All Feasible Precautions? Civilian Casualties in Anti-ISIS Coalition Airstrikes in Syria*, HUM. RTS. WATCH (Sept. 24, 2017), <https://www.hrw.org/report/2017/09/25/all-feasible-precautions/civilian-casualties-anti-isis-coalition-airstrikes-syria> [https://perma.cc/DVR5-LGMV].

13. *Id.*

14. *Id.*

15. *Id.*

16. *Id.*

17. *Id.*

18. *Civilian Casualties Incident Code CS598*, AIRWARS, <https://airwars.org/civilian-casualties/cs598-march-20-2017> [https://perma.cc/27M2-BGUG] (reporting “at least 40 civilians died” in the March 20, 2017, incident but listing at least seventy-two confirmed individual deaths).

19. Press Release, U.S. Cent. Command, Combined Joint Task Force - Operation Inherent Resolve Monthly Civilian Casualty Report (June 28, 2018), <https://www.centcom.mil/MEDIA/PRESS-RELEASES/Press-Release-View/Article/1562287/combined-joint-task-force-operation-inherent-resolve-monthly-civilian-casualty> [https://perma.cc/PF5K-7Q25].

20. For example, the North Atlantic Treaty Organization (NATO) defines a “dual-use facility/entity” as follows: “An object or facility/entity characterised as serving both a military and civilian on non-combatant function, thus presenting duality in their use.” *NATO Standard AJP-3.9: Allied Joint Doctrine for Joint Targeting*, N. ATL. TREATY ORG. 1-6 (Nov. 2021), https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1033306/AJP-3.9_EDB_V1_E.pdf [https://perma.cc/7AYZ-HFS4].

not recognize a formal category of “dual-use” objects.²¹ Indeed, a critical innovation of the postwar Geneva Conventions, which lie at the core of modern international humanitarian law, was to establish a bright line separating “military objectives,” which were deemed legitimate targets of military force, from civilians and “civilian objects,” which were to be strictly protected.²² That bright-line distinction meant new and important protections for civilians in war. The gradual rise of the idea of dual-use objects over the last several decades, however, has blurred this line.

A variety of objects might be considered dual-use. A first set of dual-use objects are objects that, by their nature, serve or have the potential to serve civilian and military purposes alike—for example, transportation infrastructure like bridges, roads, trains, and airports.²³ A second set of dual-use objects are civilian objects that become dual-use because they are used by armed groups—for example, an apartment building that houses civilian families might become a dual-use object if part of it is used as a storage facility for weapons or a meeting place for an armed group. A third set of dual-use objects are civilian in nature, but at least in part support or sustain armed forces or their members—for example, banks, bakeries and other food-production facilities, or oil wells and refineries (where some of the proceeds of oil sales go to the armed forces). These objects are sometimes referred to as “war-sustaining” because they support or sustain the enemy’s war effort, even though they are equally essential to civilians.²⁴

The rise of the concept of dual-use objects has not served to protect civilians. To be sure, many of the objects that are today labeled “dual-use” have long been considered lawful “military objectives” under international humanitarian law. And calling these objects “dual-use” recognizes their civilian use. Yet it appears

21. See *International Humanitarian Law and the Challenges of Contemporary Armed Conflicts: Excerpt of the Report Prepared by the International Committee of the Red Cross for the 28th International Conference of the Red Cross and Red Crescent Geneva, December 2003*, 86 INT’L REV. RED CROSS 213, 223 (2004) [hereinafter *Excerpts of the Report*]; Off. of Gen. Couns., U.S. Department of Defense *Law of War Manual*, U.S. DEP’T OF DEF. § 5.6.1.2 (July 2023) [hereinafter *DOD Law of War Manual*], <https://ogc.osd.mil/Portals/99/Law%20of%20War%202023/DOD-LAW-OF-WAR-MANUAL-JUNE-2015-UPDATED-JULY%202023.pdf> [https://perma.cc/WKQ5-L3JJ].

22. See Protocol Additional to the Geneva Conventions of 12 August 1949, and Relating to the Protection of Victims of International Armed Conflicts (Protocol I) art. 52(2), June 8, 1977, 1125 U.N.T.S. 3 [hereinafter *Additional Protocol I*] (defining a “military objective” as an object that “make[s] an effective contribution to military action” and whose destruction “offers a definite military advantage”); *id.* art. 52(1) (“Civilian objects are all objects which are not military objectives as defined in paragraph 2.”).

23. Potential future use, not just current use, may also be considered. For example, infrastructure like roads, bridges, or airports are often targeted to deny their future use by the enemy, not because of current active use by the enemy.

24. See *infra* Section III.B.2.

that, rather than prompting caution in targeting, dubbing objects “dual-use” has had the effect of creating a porous category of targetable objects that are obviously critical to civilian life and yet are lawfully targetable—including traditionally protected objects such as private homes, schools, and hospitals. Thus, while this Article is fundamentally concerned with what states *do*—that is, the targeting of dual-use objects—we also note that the creation of this category appears to have had the effect of casting suspicion on objects critical to civilian life, thus reducing inhibitions in targeting them. Global audiences have become accustomed to witnessing the destruction of these objects when the targeting military asserts that they serve some military purpose, however modest and however poorly documented. At the same time, the range of dual-use objects targeted in recent decades has grown in both type and scale. The addition of “war-sustaining” objects to the list of targetable objects—a development that is still contested—has significantly expanded the type of dual-use objects that are considered targetable. That greater willingness to target such objects presents a dangerous challenge to modern international humanitarian law and its aim to protect civilians from the worst horrors of war.

As we will show, the United States has played a critical role in both popularizing the idea of dual-use objects and spreading the practice of targeting such objects. The United States deployed the concept in the context of air warfare during the 1991 Gulf War, in which the U.S.-led coalition’s response to Iraq’s occupation of Kuwait included airstrikes on Iraq’s electrical infrastructure and bridges.²⁵ The practice became widespread in the decades following the 9/11 attacks, as the United States waged war against nonstate armed groups, the members of which are often embedded in and difficult to distinguish from the civilian population.²⁶ The difficulty of distinguishing between combatants and civilians and between military objectives and civilian objects is especially pronounced in conflicts involving nonstate armed groups that capture territory and attempt to govern civilian populations, including conflicts involving al-Qaeda and ISIS.²⁷

25. See *infra* notes 121–123 and accompanying text.

26. The U.S. Department of Defense (DOD) considers all members of an adversary nonstate armed group as “engaged in hostilities” and thus targetable, regardless of their role within the group. *DOD Law of War Manual*, *supra* note 21, § 4.18.4. Indeed, the *DOD Law of War Manual* even treats people who are not part of a nonstate armed group yet provide support services to it (cooking, cleaning, driving) as “constructively part of the group.” *Id.* This lies in contrast with the International Committee of the Red Cross (ICRC), which offers a more constrained definition of civilians directly participating in conflict. See Nils Melzer, *Interpretive Guidance on the Notion of Direct Participation in Hostilities Under International Humanitarian Law*, INT’L COMM. OF THE RED CROSS 20–36 (2009), <https://www.icrc.org/sites/default/files/external/doc/en/assets/files/other/icrc-002-0990.pdf> [<https://perma.cc/L5SG-GPCZ>].

27. See, e.g., Mara R. Revkin, *When Terrorists Govern: Protecting Civilians in Conflicts with State-Building Armed Groups*, 9 HARV. NAT’L SEC. J. 100, 103–04 (2018).

Battles against such groups are often fought in or near urban civilian population centers—what military practitioners describe as “complex battlespaces.”²⁸ In these conflicts, civilians and combatants rely on the same critical infrastructure, shelter, and sources of financial support. As the range of objects considered dual-use has expanded and as wars are increasingly waged in complex battlespaces, we now see conflicts in which dual-use objects are everywhere—and civilians suffer as a result.

The situation is made worse by armed groups that use the difficulty of distinguishing between their members and civilians to their advantage, embedding their activities in areas with large numbers of civilians whom they exploit as human shields, in an act some have referred to as “lawfare”—the use of legal rules by nonstate actors and other groups to undermine the advantage of their more powerful law-abiding adversaries.²⁹ Although these armed groups are to blame for entrapping civilians and, in some cases, “baiting” counterinsurgents into attacking them,³⁰ the concept of dual-use objects plays into their hands by dramatically expanding the scope of legitimate targets to include almost anything. Indeed, when conflict takes place against nonstate actors in densely populated areas, much of the infrastructure and underpinnings of the economy critical to civilian thriving might be labeled dual-use objects.

The rise of dual-use objects and the accompanying erosion of the bright line between civilian objects and military objectives have produced contradictions in states’ positions on targeting objects that may be considered dual-use. For example, the United States has in the past attacked electrical power systems. One paper by a U.S. Air Force major in 1994 claimed that “[e]lectric power has been

28. Thomas E. Ayres & Jeffrey S. Thurnher, *Legitimacy: The Lynchpin of Military Success in Complex Battlespaces*, in *COMPLEX BATTLESPACES: THE LAW OF ARMED CONFLICT AND THE DYNAMICS OF MODERN WARFARE* 223, 224 (Winston S. Williams & Christopher M. Ford eds., 2018).

29. In the article that popularized the term “lawfare,” Charles J. Dunlap, Jr. asked, “Is lawfare turning warfare into unfair? In other words, is international law undercutting the ability of the U.S. to conduct effective military interventions?” See Charles J. Dunlap, Jr., *Law and Military Interventions: Preserving Humanitarian Values in 21st[-Century] Conflicts* 1 (Nov. 29, 2001) (unpublished manuscript), <https://people.duke.edu/~pfeaver/dunlap.pdf> [<https://perma.cc/N7KD-332Z>].

30. Ryan Goodman, *ISIS Tactic of “Baiting” US–Coalition to Kill Civilians—And Who Bears Responsibility*, JUST SEC. (Mar. 31, 2017), <https://www.justsecurity.org/39448/history-repeats-itself-isis-tactic-baiting-us-coalition-kill-civilians> [<https://perma.cc/78RA-JFRC>]; see also *Department of Defense Press Briefing by Colonel Work via Teleconference from Iraq*, U.S. DEP’T DEF. (July 21, 2017), <https://www.defense.gov/News/Transcripts/Transcript-View/Article/1255012/departament-of-defense-pressbriefing-by-colonel-work-via-teleconference-from-ir> [<https://perma.cc/6EUH-LXD3>] (describing the repurposing of a school by ISIS for military purposes).

considered a critical target in every war since World War II.”³¹ And, indeed, the U.S. Department of Defense’s (DOD’s) *Law of War Manual* states that electrical power stations are “generally recognized to be of sufficient importance” to a state’s military functions “to qualify as military objectives during armed conflicts.”³² Yet, when Russia fired missiles at Ukraine’s energy grid, Chairman of the Joint Chiefs of Staff Mark Milley told reporters that “the deliberate targeting of the civilian power grid, causing excessive collateral damage and unnecessary suffering on the civilian population is a war crime.”³³

Some of the worst suffering by civilians in wars taking place today has happened as a result of targeting dual-use objects. In Gaza, Israeli attacks have targeted not only hospitals but also schools,³⁴ the electrical grid,³⁵ agricultural

31. Thomas E. Griffith, Jr., *Strategic Attack of National Electrical Systems*, at v (Oct. 1994) (thesis, School of Advanced Airpower Studies), https://media.defense.gov/2017/Dec/29/2001861964/-1/-1/o/t_griffith_strategic_attack.pdf [<https://perma.cc/9V2V-DS4T>].

32. *DOD Law of War Manual*, *supra* note 21, § 5.6.8.5.

33. Amanda Macias, *Pentagon Says Moscow’s Deliberate Targeting of Ukrainian Energy Grids Is a War Crime*, CNBC (Nov. 16, 2022, 6:40 PM EST), <https://www.cnbc.com/2022/11/16/targeting-of-ukrainian-energy-grid-is-a-war-crime-pentagon-says.html> [<https://perma.cc/9J4A-Y8UT>].

34. See, e.g., *Humanitarian Situation Update #197: Gaza Strip*, U.N. OFF. FOR COORDINATION HUMANITARIAN AFFS. (July 29, 2024), <https://www.unocha.org/publications/report/occupied-palestinian-territory/humanitarian-situation-update-197-gaza-strip-enar> [<https://perma.cc/B4JY-VDL3>] (reporting many deadly incidents relating to dual-use objects, including an assessment that eighty-five percent of school buildings had been “directly hit or damaged”).

35. See *Gaza Strip Interim Damage Assessment*, WORLD BANK GRP. [WBG] AND EUR. UNION AND UNITED NATIONS 15 (Mar. 29, 2024), <https://thedocs.worldbank.org/en/doc/14e309cd34e04e40b90eb19afa7b5d15-0280012024/original/Gaza-Interim-Damage-Assessment-032924-Final.pdf> [<https://perma.cc/95VV-HCG4>] (noting that the electricity sector experienced an estimated \$279 million in “severe damage . . . primarily affecting electricity grid distribution networks”).

production,³⁶ camps for displaced persons,³⁷ and apartment buildings.³⁸ The IDF has justified these strikes as aimed at members of Hamas, its command-and-control centers, and its weapon-storage facilities.³⁹ Whether those claims are accurate or not, the result has been the utter devastation of Gaza's critical infrastructure, which will take billions of dollars and a generation to rebuild.⁴⁰ In Ukraine, too, critical infrastructure has been subject to devastating attacks. While it is less clear that Russia, which rarely explains the legal justifications for its targeting decisions, has targeted these objects as dual-use objects rather than simply ignoring international humanitarian law's protections for civilian objects, the end result is much the same: civilians have lost access to schools, public transportation, reliable electricity, and more.⁴¹

Importantly, the rise of the concept of dual-use objects has not only affected targeting. In the provision of humanitarian aid, it has also led to restrictions on essential items such as pipes, water filters and pumps, spare parts for electrical

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36. Nilo Tabrizy, Imogen Piper & Miriam Berger, *Israel's Offensive Is Destroying Gaza's Ability to Grow Its Own Food*, WASH. POST (May 3, 2024, 1:00 PM EST), <https://www.washingtonpost.com/investigations/interactive/2024/gaza-israel-agriculture-food-fisheries> [https://perma.cc/X997-MZKJ]; Jason Burke & Malak A. Tantesh, *Gaza Food Production "Decimated" with 70% of Farmland Hit, UN Finds*, GUARDIAN (Nov. 21, 2024), <https://www.theguardian.com/world/2024/nov/21/gaza-food-production-decimated-70-per-cent-farmland-hit> [https://perma.cc/RA8J-2WRG].
 37. *Gaza: UN Officials Condemn Israeli Airstrikes on Camp for Displaced*, UN NEWS (May 27, 2024), <https://news.un.org/en/story/2024/05/1150261> [https://perma.cc/VU9C-UJ3S]; Stephen Farrell, Aditi Bhandari, Prasanta Kumar Dutta & Claire Trainor, *No Place of Refuge: Israeli Strikes Hit Gaza Refugee Camps*, REUTERS (Nov. 3, 2023), <https://www.reuters.com/graphics/ISRAEL-PALESTINIANS/GAZA-JABALIA/byprdygje> [https://perma.cc/ZJN8-322B]; Becky Sullivan & Bill Chappell, *Israeli Military Hits Gaza's Largest Refugee Camp*, NPR (Oct. 31, 2023, 7:53 PM ET), <https://www.npr.org/2023/10/31/1209646548/israel-military-central-gaza-fighting-hamas> [https://perma.cc/6YQ4-8HE7].
 38. *See Gaza Strip Interim Damage Assessment*, *supra* note 35, at 11 (noting that damage to apartment buildings constituted eighty-two percent of an estimated \$13.3 billion in total damage to housing units); Leanne Abraham, Bora Erden, Nader Ibrahim, Elena Shao & Haley Willis, *Israel's Controlled Demolitions Are Razing Neighborhoods in Gaza*, N.Y. TIMES (Feb. 1, 2024), <https://www.nytimes.com/interactive/2024/02/01/world/middleeast/Israel-gaza-war-demolish.html> [https://perma.cc/S8G8-GMDJ].
 39. *See* Ephrat Livni & Gaya Gupta, *What We Know About the War Between Israel and Hamas*, N.Y. TIMES (Nov. 20, 2023), <https://www.nytimes.com/article/israel-gaza-hamas-what-we-know.html> [https://perma.cc/72YD-YSCE].
 40. *Gaza Strip Interim Damage Assessment*, *supra* note 35, at 1-2.
 41. *The Total Amount of Damage Caused to Ukraine's Infrastructure Due to the War Has Increased to Almost \$138 Billion*, KYIV SCH. ECON. (Jan. 24, 2023), <https://kse.ua/about-the-school/news/the-total-amount-of-damage-caused-to-ukraine-s-infrastructure-due-to-the-war-has-increased-to-almost-138-billion> [https://perma.cc/VX73-VSD3].

generators, and even medical scissors.⁴² Such restrictions may hinder armed groups, but they can also cripple efforts to meet the basic humanitarian needs of civilians. Beyond areas of conflict, there are extensive export controls on dual-use goods and technology⁴³ – and an ever-growing list of items subject to such controls.⁴⁴

Part I of this Article reviews the historical development of the concept, law, and practice of dual-use targeting. We show that dual-use targeting has been shaped heavily by the United States and its close ally Israel but is increasingly used by a growing number of other states, including U.S. rivals and nondemocracies like Russia, Iran, and Saudi Arabia.⁴⁵

Part II presents primary-source evidence from the sites of U.S. airstrikes in Iraq and Syria from 2014 to 2018 to illustrate the wide range of objects that the U.S. military has either explicitly or implicitly identified as dual-use. We focus on the United States because it plays an outsize role in shaping the law of armed conflict as a result of its capacity to project force around the world, its efforts to provide legal justifications for its use of force, and its role in setting the standards by which other states are measured.⁴⁶ We also have more detailed information

42. See Victoria Kim, *Many Aid Deliveries for Gaza Are Rejected for ‘Dual-Use’ Items, Groups Say*, N.Y. TIMES (Mar. 13, 2024), <https://www.nytimes.com/2024/03/13/world/middleeast/unrwa-gaza-aid-trucks-israel.html> [<https://perma.cc/JW8V-A3V4>]; CHRISTOPHER M. BLANCHARD, CONG. RSCH. SERV., RL33487, ARMED CONFLICT IN SYRIA: OVERVIEW AND U.S. RESPONSE 17 (2022).

43. See, e.g., Exp. Control & Related Border Sec. Program, *Overview of U.S. Export Control System*, U.S. DEP’T STATE, <https://2009-2017.state.gov/strategictrade/overview/index.htm> [<https://perma.cc/53DH-JBXD>] (explaining the U.S. export-control system, including export restrictions on dual-use goods, technology, and software); *Wassenaar Arrangement on Export Controls for Conventional Arms and Dual-Use Goods and Technologies: Founding Documents*, WASSENAAR ARRANGEMENT SECRETARIAT 4-5 (Dec. 2019), <https://www.wassenaar.org/app/uploads/2019/12/WA-DOC-19-Public-Docs-Vol-I-Founding-Documents.pdf> [<https://perma.cc/96XE-PJTR>] (establishing a multilateral international arrangement for the restriction of transfers of conventional arms and dual-use goods and technologies).

44. See, e.g., *Wassenaar Arrangement on Export Controls for Conventional Arms and Dual-Use Goods and Technologies: Lists of Dual-Use Goods and Technologies and Munitions List*, WASSENAAR ARRANGEMENT SECRETARIAT (Dec. 1, 2023), <https://www.wassenaar.org/app/uploads/2023/12/List-of-Dual-Use-Goods-and-Technologies-Munitions-List-2023-1.pdf> [<https://perma.cc/3FPA-QS3Y>] (listing items in the Wassenaar Arrangement’s control lists, as updated in December 2023).

45. See, e.g., Michael N. Schmitt, *Ukraine Symposium: Attacking Power Infrastructure Under International Humanitarian Law*, LIEBER INST. W. POINT: ARTICLES WAR (Oct. 20, 2022), <https://lieber.westpoint.edu/attacking-power-infrastructure-under-international-humanitarian-law> [<https://perma.cc/J79H-56KM>] (making this point about Russia).

46. This role dates back to the 1863 Lieber Code – the first attempt to codify the laws of war – which strongly influenced subsequent regulations by other states. See generally FRANCIS

about U.S. use of military force in Syria and Iraq than in any other contemporary military conflict. Using an original dataset constructed from DOD's strike releases, we show that dual-use objects have been targeted in U.S. military operations.⁴⁷ We then use documents obtained from DOD under the Freedom of Information Act (FOIA), as well as ground reporting and field research by two of the authors, to show that the targeting of dual-use objects is far more common than these public disclosures suggest—and the human cost to civilians even more grave. This evidence helps demonstrate that the rise of dual-use targeting has come to threaten core principles of international humanitarian law, particularly the principles of distinction and proportionality.

Part III offers recommendations for reforms to better protect civilians and prevent further erosion of foundational legal commitments of the postwar legal order.⁴⁸ As Part II makes clear, states often know very little about how the destruction of dual-use objects will affect the civilian population. We thus recommend that states engaging in military operations collect better information about dual-use objects that are critical to civilian well-being in areas of conflict so that they can anticipate, and take steps to mitigate, the impact of their targeting decisions on civilians. We also offer several recommendations for clarifying international humanitarian law to account more effectively for—and thus more effectively prevent—the grave harm that targeting dual-use objects inflicts on civilians during war, with effects that can be felt for generations.

I. HISTORICAL BACKGROUND

This Part reviews the history of the law and state practice of targeting dual-use objects. We begin by showing that under the international law that governed before the mid-twentieth century, there was no concept of dual-use targeting because civilians were not protected from the use of military force. In effect, everything that might help the enemy was regarded as a legitimate object of military force. Beginning at the end of the nineteenth century, there were modest efforts to protect civilians from senseless violence in war, but it was not until the four Geneva Conventions of 1949 and the Additional Protocols that the protection of

LIEBER, INSTRUCTIONS FOR THE GOVERNMENT OF ARMIES OF THE UNITED STATES IN THE FIELD (Washington, Gov't Prtg. Off. 1898) [hereinafter LIEBER CODE] (reprinting the 1863 military order, originally issued as General Orders No. 100 by the U.S. War Department's Adjutant General's Office).

47. DOD's strike releases are likely biased in ways that underestimate the full extent of civilian harm caused by airstrikes. See *infra* Section II.A.

48. As explained above, Azmat Khan did not contribute to Part III or any other mention of reform in this Article.

civilians from conflict—even when violence against them might be useful—was legally enshrined as a critical principle of international humanitarian law.

Under this postwar international-humanitarian-law framework, the concept of dual-use objects is not recognized.⁴⁹ Either an object is a “military objective” and may be attacked (subject to proportionality and necessity analyses), or it is a “civilian object” and protected from attack.⁵⁰ The decisions of some states, most prominently the United States, to begin expressly targeting dual-use objects as such—and the subsequent expansion of the category of targetable dual-use objects to include a wide array of war-sustaining objects—threaten to undermine the protection of civilians and civilian objects. They thus put at risk one of the most critically important and hard-won achievements of the postwar legal order.

A. *The Emergence of (Some) Protections for Civilians in War*

For much of world history, there was no distinction between civilians and combatants when it came to war. In the Old World Order—the legal order that governed from the early 1600s through the early 1900s—states were permitted to wage war, and thus to kill, to enforce their legal rights.⁵¹ Hugo Grotius, often celebrated as the “Father of International Law,” developed rules that authorized mass killing of human beings as a justified moral and legal procedure if done for a “just cause,” by which he meant to right a legal wrong.⁵² Such legal wrongs could include everything from failure to pay debts to wife-stealing.⁵³

There were few limits on what soldiers could do in war, as long as they were acting to enforce states’ legal rights. According to Grotius, soldiers were legally prohibited from using poison, treacherous assassination, and rape.⁵⁴ These

49. See *Excerpts of the Report*, *supra* note 21, at 223; *DOD Law of War Manual*, *supra* note 21, § 5.6.1.2. The historical background in this Part also draws on Oona A. Hathaway, *War Unbound: Gaza, Ukraine, and the Breakdown of International Law*, FOREIGN AFFS. (Apr. 23, 2024), <https://www.foreignaffairs.com/ukraine/war-unbound-gaza-hathaway> [https://perma.cc/SL9W-RYTR].

50. Additional Protocol I arts. 51–52, *supra* note 22. As noted below, see *infra* note 92, the United States is not party to the Additional Protocols and recognizes only some of its provisions as customary international law.

51. OONA A. HATHAWAY & SCOTT J. SHAPIRO, *THE INTERNATIONALISTS: HOW A RADICAL PLAN TO OUTLAW WAR REMADE THE WORLD*, at xv–xvii (2017).

52. See *id.* at 28–29, 44.

53. *Id.* at 43.

54. *Id.* at 71 (citing HUGO GROTIUS, *DE JURE BELLI AC PACIS LIBRI TRES* [THE LAW OF WAR AND PEACE IN THREE BOOKS] (James B. Scott ed., Francis W. Kelsey trans., Oxford Univ. Press 1925) (1625)).

offenses constituted the only consistent exceptions to the soldier's license to kill.⁵⁵ Soldiers were not legally prohibited from taking many other horrific actions, including slavery, torture, execution of prisoners, and pillage.⁵⁶ Nor were they prohibited from intentionally killing unarmed civilians, as long as doing so was useful to the war effort.⁵⁷ Yet even though senselessly slaughtering innocent civilians was technically illegal (because senseless violence was not necessary to pursue their legal rights), it was not criminal.⁵⁸ Grotius wrote, "[T]he slaughter even of infants and of women is made with impunity."⁵⁹ In short, civilians could be slaughtered as long as doing so would help the war effort.

This permissive view of civilian harm—that is, as a necessary and inevitable externality of military success—began to change in the middle of the eighteenth century with the emergence of two principles that later became bedrocks of international humanitarian law: distinction and proportionality. International jurist Emer de Vattel explained that the enemy's civilian population, including women, children, and the elderly, "come under the description of enemies."⁶⁰ However, as long as these civilians do not participate in hostilities, they do not present a threat, and therefore, killing them would serve no lawful purpose.⁶¹ He explained, "[W]ar is carried on by regular troops: the people, the peasants, the citizens [civilians not directly participating in hostilities], take no part in it, and generally have nothing to fear from the sword of the enemy."⁶²

The rules governing war continued to evolve over the course of the next century. The famous Lieber Code, issued to the Union armies during the American Civil War, was an early effort to impose legal limits on the use of force. Yet it, too, permitted what it deemed "necessary" violence against civilians. It did include some protections for civilians who posed no threat: "Private citizens are no longer murdered, enslaved, or carried off to distant parts, and the inoffensive individual is as little disturbed in his private relations as the commander of the hostile troops can afford to grant in the overruling demands of a vigorous war."⁶³

55. *Id.*

56. *Id.* at 72.

57. *Id.*

58. *Id.*

59. HUGO GROTIUS, ON THE LAW OF WAR AND PEACE 352 (Stephen C. Neff ed., Cambridge Univ. Press 2012) (1625).

60. EMER DE VATTEL, THE LAW OF NATIONS; OR, PRINCIPLES OF THE LAW OF NATURE, APPLIED TO THE CONDUCT AND AFFAIRS OF NATIONS AND SOVEREIGNS 351 (Joseph Chitty trans., Philadelphia, T. & J.W. Johnson, Law Booksellers 1853) (1758).

61. *Id.*

62. *Id.* at 352.

63. LIEBER CODE, *supra* note 46, at 9-10.

But it allowed violent measures against civilians if deemed “indispensable for securing the ends of the war, and which are lawful according to the modern law and usages of war.”⁶⁴ It also permitted “all destruction of property, and obstruction of the ways and channels of traffic, travel, or communication, and of all withholding of sustenance or means of life from the enemy.”⁶⁵ It endorsed plunder as long as it was “necessary for the subsistence and safety of the army.”⁶⁶ The limitations were modest: following Grotius, the Code prohibited the “use of poison,” “acts of perfidy,” “torture to extort confessions,” and “the infliction of suffering for the sake of suffering or for revenge [and] maiming or wounding except in fight” – that is, unnecessary violence.⁶⁷ *Useful* infliction of violence and suffering on civilians, however, was still allowed. Indeed, the Code specifically endorsed starvation as a method of warfare,⁶⁸ today considered a war crime.⁶⁹

General William Tecumseh Sherman’s infamous 1864-1865 march through the South, destroying railroads and cotton production among other industrial and economic targets, was consistent with the Code’s permission to deprive the enemy of “sustenance or means of life.”⁷⁰ Sherman explained that “[w]e are not only fighting hostile armies, but a hostile people, and must make old and young, rich and poor, feel the hard hand of war.”⁷¹ He aimed to “demonstrate the vulnerability of the South, and make its inhabitants feel that war and individual ruin are synonymous terms.”⁷² His orders permitted corps commanders to “destroy mills, houses, cotton-gins, &c.”⁷³ There were some modest limits:

64. *Id.* at 7.

65. *Id.*

66. *Id.*

67. *Id.* at 8.

68. *Id.* (“It is lawful to starve the hostile belligerent, armed or unarmed, so that it leads to the speedier subjection of the enemy.”).

69. *Rule 53. Starvation as a Method of Warfare*, ICRC INT’L HUMANITARIAN L. DATABASES, <https://ihl-databases.icrc.org/en/customary-ihl/v1/rule53> [<https://perma.cc/8C8Y-HYTP>].

70. LIEBER CODE, *supra* note 46, at 7. For more on Sherman’s march and its relationship to the Lieber Code, see JOHN FABIAN WITT, *LINCOLN’S CODE: THE LAWS OF WAR IN AMERICAN HISTORY* 274-84 (2012).

71. Letter from W.T. Sherman, U.S. Major-Gen., to Henry W. Halleck, Chief of Staff of Union Armies (Dec. 24, 1864), in *SHERMAN’S CIVIL WAR: SELECTED CORRESPONDENCE OF WILLIAM T. SHERMAN, 1860-1865*, at 775, 776 (Brooks D. Simpson & Jean V. Berlin eds., 1999).

72. JOSEPH T. GLATTHAAR, *THE MARCH TO THE SEA AND BEYOND: SHERMAN’S TROOPS IN THE SAVANNAH AND CAROLINAS CAMPAIGNS 6-7* (1985).

73. Special Field Orders, No. 120, art. V (Nov. 9, 1864), in 39 *THE WAR OF THE REBELLION: A COMPILATION OF THE OFFICIAL RECORDS OF THE UNION AND CONFEDERATE ARMIES*, ser. 1, pt. 3, at 713, 713 (Washington, Gov’t Prtg. Off. 1892).

In districts and neighborhoods where the army is unmolested no destruction of such property should be permitted; but should guerrillas or bushwhackers molest our march, or should the inhabitants burn bridges, obstruct roads, or otherwise manifest local hostility, then army commanders should order and enforce a devastation more or less relentless according to the measure of such hostility.⁷⁴

The destruction that resulted was vast: Sherman's "massive army carved a path of destruction 30 to 60 miles wide and almost 300 miles long, annihilating or confiscating 'anything of any military value' between Atlanta and the sea: 'rail-road tracks, machinery, cotton mills, horses, mules, and foodstuffs – and much more.'"⁷⁵

The Lieber Code was highly influential, inspiring a number of states to publish similar manuals.⁷⁶ It also formed the basis for the International Declaration Concerning the Laws and Customs of War, signed in Brussels in 1874, which prohibited "[t]he employment of arms, projectiles or material calculated to cause unnecessary suffering" as well as the "destruction or seizure of the enemy's property that is not imperatively demanded by the necessity of war."⁷⁷ In 1899, the Convention with Respect to the Laws and Customs of War on Land (Hague II) added specificity to the prohibition on unnecessary violence. Among other provisions, it required states parties to enforce their armed forces' compliance with a set of uniform regulations that included rules for the treatment of prisoners of war and sought further to limit attacks on civilians by, for example, prohibiting attacks on undefended towns and prohibiting pillage.⁷⁸ The 1907 Convention Respecting the Laws and Customs of War on Land (Hague IV) built on these rules.⁷⁹ Yet even then, only "unnecessary suffering" was prohibited.⁸⁰ Useful suffering was still largely permitted.

74. *Id.*

75. WITT, *supra* note 70, at 277 (quoting GLATTHAAR, *supra* note 72, at 8).

76. *Instructions for the Government of Armies of the United States in the Field (Lieber Code)*. 24 April 1863., ICRC INT'L HUMANITARIAN L. DATABASES, <https://ihl-databases.icrc.org/en/ihl-treaties/liebercode-1863> [<https://perma.cc/3BJK-U6D3>].

77. Project of an International Declaration Concerning the Laws and Customs of Wars art. XIII, *adopted by the Conference of Brussels*, Aug. 27, 1874, *reprinted in* 1 AM. J. INT'L L. 96, 98 (Supp. 1907).

78. See Convention with Respect to the Laws and Customs of War on Land, Annex arts. 4-20, 25, 28, July 29, 1899, 32 Stat. 1803, 1812-18.

79. See Conventions Respecting the Laws and Customs of War on Land, Oct. 18, 1907, 36 Stat. 2277.

80. *Id.* Annex art. 23, 36 Stat. at 2301-02.

In World War I, states regularly attacked infrastructure that would now be classified as dual-use, including “aqueduct[s]; blast furnaces; electric works; gas works; iron works and foundries; magneto works; motor works; steel works; and petroleum, oil and lubricant production, manufacturing, [and] storage facilities.”⁸¹ The development of air-warfare technologies during World War I led to the development of new rules. In 1923, a group of states met to draft a proposed set of rules, the Hague Rules of Air Warfare.⁸² That document stated that “[a]erial bombardment is legitimate only when directed at a military objective, that is to say, an object of which the destruction or injury would constitute a distinct military advantage to the belligerent.”⁸³ It also limited attacks on manufacturing plants to those producing war materiel and limited attacks against lines of communication to those used for military purposes.⁸⁴ This effort to regulate warfare from the air was largely ineffective. In the 1930s, the U.S. Air Corps Tactical School began to articulate an “industrial web theory” that provided a justification for aerial bombardment of an enemy’s “vital centers,” which were defined broadly to include resources and infrastructure that contributed to the enemy’s warmaking “potential.”⁸⁵

During World War II, all major parties engaged in widespread indiscriminate bombing “without concern for civilian casualties or damage to civilian objects.”⁸⁶ Common targets included dams and dikes, without regard to the potential “dangerous forces” their destruction might unleash on civilian populations.⁸⁷ Most devastating of all, the United States targeted Hiroshima and Nagasaki with nuclear weapons, wiping out everyone and everything within the blast radii,

81. W. Hays Parks, *Asymmetries and the Identification of Legitimate Military Objectives*, in INTERNATIONAL HUMANITARIAN LAW FACING NEW CHALLENGES 65, 76 (Wolff Heintschel von Heinegg & Volker Epping eds., 2007).

82. Commission of Jurists to Consider and Report upon the Revision of the Rules of Warfare, Part II: Aerial Warfare, Feb. 19, 1923, *reprinted in* MISCELLANEOUS NO. 14, 1924, Cmd. 2201, at 15 (UK). Delegations were present from France, Italy, Japan, the Netherlands, the United Kingdom, and the United States. *See id.* at 2.

83. *Id.* at 27.

84. *Id.*

85. *See* Kenneth R. Rizer, *Bombing Dual-Use Targets: Legal, Ethical, and Doctrinal Perspectives* 9 (n.d.) (unpublished manuscript) (citing Edward C. Holland III, *Fighting with a Conscience: The Effects of an American Sense of Morality in the Evolution of Strategic Bombing Campaigns*, at v (May 1992) (thesis, U.S. Air Force School of Advanced Airpower Studies), https://media.defense.gov/2017/Dec/29/2001861995/-1/-1/0/T_HOLLAND_FIGHTING_WITH_CONSCIENCE.PDF [<https://perma.cc/3VSK-PAT8>]), <https://www.airuniversity.af.edu/Portals/10/ASPJ/journals/Chronicles/Rizer.pdf> [<https://perma.cc/DSQ9-7GAE>].

86. Parks, *supra* note 81, at 82.

87. *Id.* at 83.

unleashing firestorms, and contaminating both cities with harmful nuclear radiation.⁸⁸

B. The Geneva Conventions and the Protection of Civilians from Useful Violence

In the aftermath of World War II, states convened and negotiated four treaties, now known as the Geneva Conventions, to serve as the international legal standards for conduct in war.⁸⁹ For the first time, the law prohibited not just *useless* violence against civilians, but *useful* violence against them as well. The Conventions and their Additional Protocols prohibited states from intentionally targeting civilians and civilian objects, regardless of whether doing so may be useful to the war effort (that is, unless the civilians directly participated in the fight—then, they could be targeted). They also prohibited attacks against military objectives that are “expected to cause incidental loss of civilian life, injury to civilians, damage to civilian objects, or a combination thereof, which would be excessive in relation to the concrete and direct military advantage anticipated.”⁹⁰

The Geneva Conventions did not recognize a formal category of “dual-use” objects.⁹¹ Under the Conventions and the customary international law that has emerged in the postwar era, an object is either a “military objective” and may be attacked (subject to proportionality and necessity analyses) or it is a “civilian object” and may not be attacked.⁹² The first Additional Protocol to the Geneva

88. Maso Tomonaga, *The Atomic Bombings of Hiroshima and Nagasaki: A Summary of the Human Consequences, 1945-2018, and Lessons for Homo Sapiens to End the Nuclear Weapon Age*, 2 J. PEACE & NUCLEAR DISARMAMENT 491, 494-95 (2019).

89. Geneva Convention for the Amelioration of the Condition of the Wounded and Sick in Armed Forces in the Field, Aug. 12, 1949, 6 U.S.T. 3114, 75 U.N.T.S. 31; Geneva Convention for the Amelioration of the Condition of Wounded, Sick and Shipwrecked Members of Armed Forces at Sea, Aug. 12, 1949, 6 U.S.T. 3217, 75 U.N.T.S. 85; Geneva Convention Relative to the Treatment of Prisoners of War, Aug. 12, 1949, 6 U.S.T. 3316, 75 U.N.T.S. 135; Geneva Convention Relative to the Protection of Civilian Persons in Time of War, Aug. 12, 1949, 6 U.S.T. 3516, 75 U.N.T.S. 287.

90. Additional Protocol I art. 57, *supra* note 22; see also *Proportionality*, INT’L COMM. RED CROSS: CASEBOOK, https://casebook.icrc.org/a_to_z/glossary/proportionality [<https://perma.cc/3N5S-PX3Q>] (identifying this prohibition as a component of proportionality).

91. See *Excerpts of the Report*, *supra* note 21, at 223 (“‘[D]ual-use’ is not a legal term.”); *DOD Law of War Manual*, *supra* note 21, § 5.6.1.2 (“[F]rom the legal perspective, [so called ‘dual-use’] objects are either military objectives or they are not; there is no intermediate legal category.”).

92. Additional Protocol I art. 52, *supra* note 22. The United States has signed but not ratified Additional Protocol I. *Protocol Additional to the Geneva Conventions of 12 August 1949, and Relating to the Protection of Victims of International Armed Conflicts (Protocol I)*, UNITED NATIONS TREATY COLLECTION, <https://treaties.un.org/pages/showdetails.aspx?objid=o80000028oof3586> [<https://perma.cc/EMJ8-SD7S>]. However, its definitions of military objectives and

Conventions articulates definitions of military objectives and proportionality that are widely accepted as customary international law and inform debates around dual-use targeting today.⁹³ Article 48 requires that belligerents “at all times distinguish between . . . civilian objects and military objectives and accordingly shall direct their operations only against military objectives.”⁹⁴ Article 52 defines “military objectives” as “those objects which by their nature, location, purpose or use make an effective contribution to military action *and* whose total or partial destruction, capture or neutralization, in the circumstances ruling at the time, offers a definite military advantage.”⁹⁵ Article 52 defines “civilian objects” as “all objects which are not military objectives.”⁹⁶ Although there is no definitive list of military objectives, some categories – weapon caches, barracks, military vehicles – fit clearly into Article 52’s two-pronged definition. Likewise, places like religious sites, schools, and hospitals are paradigmatic examples of protected civilian objects, provided they have not lost their civilian character by being employed in military action.

This postwar law excludes the existence of any intermediate dual-use category. The structure of Article 52 means an object can be either a military objective or a civilian object, but never both. The International Committee of the Red Cross’s (ICRC’s) commentaries on Additional Protocol I “stress[] that ‘dual use’ is not a legal term” and the “nature of any object must be assessed under the

civilian objects are used verbatim in other treaties that the United States has ratified. *See, e.g.*, Protocol on Prohibitions or Restrictions on the Use of Mines, Booby-Traps and Other Devices as Amended on 3 May 1996 (Protocol II as Amended on 3 May 1996) 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 art. 2(6)-(7), May 3, 1996, 2048 U.N.T.S. 93; 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, Protocol on Prohibitions or Restrictions on the Use of Incendiary Weapons (Protocol III) art. 1(3)-(4), *concluded at Geneva* Oct. 10, 1980, 1342 U.N.T.S. 137 (entered into force Dec. 2, 1983).

93. *See, e.g.*, 1 JEAN-MARIE HENCKAERTS & LOUISE DOSWALD-BECK, CUSTOMARY INTERNATIONAL HUMANITARIAN LAW 46-49 (2009) (citing Additional Protocol I as the articulation of the principle of proportionality); *id.* at 29-31 (describing how Additional Protocol I’s definition of military objective is customary international law for both international and non-international armed conflicts); Partial Award, Western Front, Aerial Bombardment and Related Claims (Eri. v. Eth.), 26 R.I.A.A. 291, 330, 334 (Eri.-Eth. Claims Comm’n 2005) (finding Additional Protocol I to be an expression of customary international law on distinction); YORAM DINSTEIN, THE CONDUCT OF HOSTILITIES UNDER THE LAW OF INTERNATIONAL ARMED CONFLICT 102 (3d ed. 2016) (noting the finding of the Eritrea-Ethiopia Claims Commission).

94. Additional Protocol I art. 48, *supra* note 22.

95. *Id.* art. 52(2) (emphasis added).

96. *Id.* art. 52(1).

definition of military objectives provided for in Additional Protocol I.”⁹⁷ DOD’s *Law of War Manual* similarly holds that “from the legal perspective . . . objects are either military objectives or they are not; there is no intermediate legal category.”⁹⁸ Leading treatises on international law also reject separate standards for dual-use objects.⁹⁹

Today, the Geneva Conventions are ratified by every member state of the United Nations.¹⁰⁰ They have been called a “moral revolution”¹⁰¹ and “one of the greatest achievements of inter-State cooperation.”¹⁰² And yet, as the next Section shows, the protections for civilians that were the critical innovation of the post-war revolution in international humanitarian law have been slowly undermined, in part by the emergence of the concept of “dual-use” objects.

C. *The Postwar Era*

The modern law of war embodied in the Geneva Conventions and their Additional Protocols requires military forces to draw a binary distinction between military objectives that are legitimate potential targets (subject to proportionality and necessity analyses) and civilian objects that are protected from attack. Yet over time, this binary distinction has come under pressure as a result of at least two major changes in patterns and technologies of modern warfare that have gradually blurred the lines between civilians and combatants, and between civilian objects and military objectives.

First, wars fought by states against organized nonstate armed actors have replaced conventional interstate wars (wars between two or more states) as the most common type of armed conflict.¹⁰³ Many of these nonstate armed groups not only engage in military operations but also aspire to establish state-like

97. *Excerpts of the Report*, *supra* note 21, at 223.

98. *DOD Law of War Manual*, *supra* note 21, § 5.6.1.2.

99. See, e.g., DINSTEIN, *supra* note 93, at 120 (“A ‘dual-use’ object, by definition, is a military objective.”).

100. See generally *States Party to the Following International Humanitarian Law and Other Related Treaties as of 02-June-2025*, ICRC, https://ihl-databases.icrc.org/public/refdocs/IHL_and_other_related_Treaties.pdf [<https://perma.cc/MS4W-S69D>] (listing the states parties to various international-humanitarian-law treaties, including the Geneva Conventions).

101. See DAVID TRAVEN, *LAW AND SENTIMENT IN INTERNATIONAL POLITICS: ETHICS, EMOTIONS, AND THE EVOLUTION OF THE LAWS OF WAR* 238–64 (2021).

102. Press Release, United Nations, Geneva Conventions More Crucial than Ever, Humanitarian Experts Stress, as Security Council Marks Seventieth Anniversary of Key Instruments (Aug. 13, 2019), <https://press.un.org/en/2019/sc13917.doc.htm> [<https://perma.cc/6CN6-VP52>] (summarizing remarks of Peter Maurer, President of the ICRC).

103. See HATHAWAY & SHAPIRO, *supra* note 51, at 352–70.

political entities that control territory and govern civilians – a phenomenon described as “rebel governance.”¹⁰⁴ A characteristic of nonstate armed groups that engage in rebel governance is their extensive entanglement with civilians, civilian institutions, and infrastructure, making it difficult to distinguish between civilian and military personnel, and between civilian and military objects.¹⁰⁵

The second major shift has been from ground wars to air wars. This trend has been driven both by technological innovation and public pressure on political and military leaders to minimize combat losses, particularly during the War on Terror.¹⁰⁶ New methods of “smart warfare” – fought from the air or “over the horizon” with drones and other so-called “smart weapons” – have made war significantly less dangerous for soldiers, but at the expense of civilians.¹⁰⁷

Even as early as the U.S. war in Vietnam, these shifts generated pressure that began to erode the protections for civilians in war. During the Vietnam War, the U.S. rules of engagement emphasized that “[w]hile the goal is maximum effectiveness in combat operations, every effort must be made to avoid civilian casualties, minimize the destruction of private property, and conserve diminishing resources.”¹⁰⁸ And yet, the United States frequently bombed what today might be referred to as dual-use objects – transportation routes, industrial sites, and other economic infrastructure.¹⁰⁹ Some argued that the extensive and

104. See, e.g., Revkin, *supra* note 27, at 115, 133; Mara R. Revkin & Kristen Kao, *No Peace Without Punishment? Reintegrating Islamic State “Collaborators” in Iraq*, 71 AM. J. COMPAR. L. 989, 990 (2024).

105. Revkin, *supra* note 27, at 133.

106. Benjamin Krick, Jonathan Petkun & Mara Revkin, *Civilian Harm and Military Legitimacy in War* 29 (Households in Conflict Network, Working Paper No. 402, 2024), <https://hicn.org/wp-content/uploads/2023/11/HiCN-WP-402-2.pdf> [<https://perma.cc/D36T-LA79>]; see also SEBASTIAN KAEMPF, *SAVING SOLDIERS OR CIVILIANS?: CASUALTY-AVERSION VERSUS CIVILIAN PROTECTION IN ASYMMETRIC CONFLICTS* 48 (2018) (noting that combatant-casualty aversion can undermine civilian protection when these two objectives conflict).

107. See, e.g., *Human Cost of Post-9/11 Wars: Direct War Deaths in Major War Zones, Afghanistan & Pakistan (Oct. 2001 – Aug. 2021); Iraq (March 2003 – March 2023); Syria (Sept. 2014 – March 2023); Yemen (Oct. 2002–Aug. 2021) and Other Post-9/11 War Zones*, WATSON INST. FOR INT’L & PUB. AFFS.: BROWN UNIV. (Mar. 2023), <https://watson.brown.edu/costsofwar/figures/2021/WarDeathToll> [<https://perma.cc/ZFW9-ECYW>]; Scott Sigmund Gartner, *Iraq and Afghanistan Through the Lens of American Military Casualties*, SMALL WARS J. (Apr. 3, 2013, 3:30 AM), <https://archive.smallwarsjournal.com/jrnl/art/iraq-and-afghanistan-through-the-lens-of-american-military-casualties> [<https://perma.cc/9EK9-JCJ5>].

108. 131 CONG. REC. 6263 (1985) (statement of Sen. Goldwater) (entering the Rules of Engagement for the Employment of Firepower in the Republic of Vietnam into the record).

109. CENT. INTEL. AGENCY AND DEF. INTEL. AGENCY, S-3378/AP-4A, *AN APPRAISAL OF THE BOMBING OF NORTH VIETNAM*, 1 JULY–31 OCTOBER 1968, at 5–7 (1994), <https://vva.vietnam.ttu.edu/images.php?img=/images/041/04111148003.pdf> [<https://perma.cc/V35N-UZ87>].

sometimes-indiscriminate bombing campaign was unlawful under the Geneva Conventions; yet others argued that the Conventions did not apply, and even if they did, only the bare-bones rules applicable to non-international armed conflicts were relevant.¹¹⁰ Public outcry over atrocities committed during the war helped spur the U.S. military to make greater efforts to comply with international humanitarian law.¹¹¹ The war also helped prompt the creation of the 1977 Additional Protocols to the Geneva Conventions – international agreements that clarified the rules applicable to international armed conflicts (Additional Protocol I) and non-international armed conflicts (Additional Protocol II).¹¹² Among other things, the Protocols reaffirmed and clarified the principle of distinction between combatants and civilians.¹¹³

After the Vietnam War, military doctrine, particularly the doctrine developed for aerial warfare, continued to place pressure on the core principles of international humanitarian law. The United States signed but never ratified either of the Additional Protocols, and in 1980, the U.S. Air Force's *Commander's Handbook on the Law of Armed Conflict* claimed it was "permissible to attack economic targets that give only indirect support to enemy operations, so long as that support is effective and definite military advantage can be foreseen."¹¹⁴ In 1989, the U.S. Navy followed suit in its *Commander's Handbook on the Law of Naval Operations*, stating that "[e]conomic targets of the enemy that indirectly but effectively support and sustain the enemy's war-fighting capability may also be attacked."¹¹⁵

In 1990, W. Hays Parks, a Marine veteran then serving as Special Assistant to the Judge Advocate General of the Army for Law of War Matters,¹¹⁶ published

110. See generally Keiichiro Okimoto, *The Vietnam War and the Development of International Humanitarian Law*, in ASIA-PACIFIC PERSPECTIVES ON INTERNATIONAL HUMANITARIAN LAW 156 (Suzannah Linton, Tim McCormack & Sandesh Sivakumaran eds., 2019) (examining international humanitarian law in the context of the Vietnam War).

111. SAMUEL MOYN, HUMANE: HOW THE UNITED STATES ABANDONED PEACE AND REINVENTED WAR 161-92 (2021) (documenting what Samuel Moyn calls "the Vietnamese pivot").

112. See Additional Protocol I, *supra* note 22; Protocol Additional to the Geneva Conventions of 12 August 1949, and Relating to the Protection of Victims of Non-International Armed Conflicts (Protocol II), June 8, 1977, 1125 U.N.T.S. 609 (1987) [hereinafter Additional Protocol II].

113. See, e.g., Additional Protocol I arts. 50-52, *supra* note 22.

114. U.S. AIR FORCE JUDGE ADVOC. GEN., AFP 110-34, COMMANDER'S HANDBOOK ON THE LAW OF ARMED CONFLICT ¶ 2-3(a) (1980).

115. U.S. NAVY, NWP 9 (REV. A)/FMFM 1-10, ANNOTATED SUPPLEMENT TO COMMANDER'S HANDBOOK ON THE LAW OF NAVAL OPERATIONS ¶ 8-3 (1989).

116. R. Scott Adams, *W. Hays Parks and the Law of War*, JAG REP. (Mar. 26, 2020), <https://www.jagreporter.af.mil/Post/Article-View-Post/Article/2536400/w-hays-parks-and-the-law-of-war> [<https://perma.cc/3GFZ-XBDD>]. Parks is generally credited as the first author of what

a lengthy guide to “Air War and the Law of War” in which he briefly noted the problem of “the dual use of certain objects of civilian and defense-related purposes.”¹¹⁷ He stated that targeting such objects was lawful even though “[c]om-mingling” placed “civilians and the civilian population as such at risk.”¹¹⁸ He asserted that under customary international law, the primary responsibility for preventing civilian casualties in such cases “rests with the defender and the individual civilian, with little or no responsibility imposed upon an attacker”¹¹⁹ — a view at odds with international humanitarian law.¹²⁰

During the 1990-1991 Gulf War, President Bush granted significant discretion over targeting policy to the Pentagon.¹²¹ Perhaps following Parks’s advice, the military proceeded to target dual-use facilities in Iraq extensively, including transportation, electrical, oil, and media infrastructure.¹²² The policy proved

became the *DOD Law of War Manual*, though it was not published until 2015, five years after he retired. *Id.*; Charlie Dunlap, *In Memoriam: Colonel W. Hays Parks, U.S. Marine Corps (Ret.)*, LAWFIRE (May 17, 2021), <https://sites.duke.edu/lawfire/2021/05/17/in-memoriam-colonel-w-hays-parks-u-s-marine-corps-ret> [<https://perma.cc/W9YB-A7EJ>].

117. W. Hays Parks, *Air War and the Law of War*, 32 A.F. L. REV. 1, 152 (1990). This is the first discussion of the concept of dual-use objects in the context of targeting that we have identified. The term was not entirely new, even if the context of its use may have been. Indeed, the idea of dual-use objects was commonly used in discussions of export controls as early as the late 1970s. See, e.g., OFF. OF TECH. ASSESSMENT, OTA-BP-ISC-115, TECHNOLOGIES UNDERLYING WEAPONS OF MASS DESTRUCTION 191 (1993); Mitchel B. Wallerstein, *Controlling Dual-Use Technologies in the New World Order*, 7 ISSUES SCI. & TECH., no. 4, 1991, at 70, 70; Hesh Wiener, *The Computer: A Boon or Monster?*, GLOBE & MAIL (Toronto), June 25, 1979, at 7, 7 (describing a section on “dual-use technologies” (items that have both military and civilian applications) in a White House report derived from a National Security Council paper called Presidential Review Memorandum 31).
118. Parks, *supra* note 117, at 152.
119. *Id.* at 153. Tellingly, Parks primarily relies on examples that predate the Geneva Conventions and Additional Protocol I, which he says “constitutes an improvement in the law of war” but is “unrealistic” in its aims. *Id.* at 152-53 & 153 n.458.
120. Rule 1. *The Principle of Distinction Between Civilians and Combatants*, ICRC INT’L HUMANITARIAN L. DATABASES, <https://ihl-databases.icrc.org/en/customary-ihl/v1/rule1> [<https://perma.cc/G9JK-MKBS>] (“State practice establishes this rule [the principle of distinction between civilians and combatants] as a norm of customary international law applicable in both international and non-international armed conflicts.”).
121. Melissa Healy & Mark Fineman, *U.S. Forced to Defend Basic Targeting Goals*, L.A. TIMES (Feb. 14, 1991, 12:00 AM PT), <https://www.latimes.com/archives/la-xpm-1991-02-14-mn-1679-story.html> [<https://perma.cc/7VL9-HCLA>].
122. U.S. DEP’T OF DEF., CONDUCT OF THE PERSIAN GULF WAR: FINAL REPORT TO CONGRESS 133 (Apr. 1992) (“The weapon system, munition, time of attack, direction of attack, desired impact point, and level of effort all were carefully planned. For example, attacks on known dual (i.e., military and civilian) use facilities normally were scheduled at night, because fewer people would be inside or on the streets outside.”); Françoise J. Hampson, *Proportionality and*

controversial as “horrifying images of civilian casualties” flooded Americans’ living rooms, forcing the Administration to defend its “rising emphasis on dual-use and quasi-civilian elements in Iraq’s infrastructure that is beginning to heighten concern about Bush’s hands-off approach to the day-to-day prosecution of the war, especially as it applies to aerial targeting policy.”¹²³

Despite the controversy, the U.S. military continued its expansive targeting policy in subsequent conflicts. During the North Atlantic Treaty Organization (NATO) intervention in Bosnia and Herzegovina between 1992 and 1995, NATO targeted highways and railroad bridges, oil refineries, petroleum reserves, and Serbian industrial facilities including nine major electric-power-generating facilities.¹²⁴ During the NATO-led intervention in Yugoslavia in 1999, NATO widened the categories of acceptable dual-use targets over time, attacking transportation infrastructure, oil refineries, and industrial facilities.¹²⁵ NATO also struck utilities, a hydroelectric plant, and petrochemical and fertilizer factories that were claimed to be dual-use, “producing chemicals and parts for both military and civilian uses.”¹²⁶ The United States pushed for broader attacks that some coalition partners worried would not be lawful.¹²⁷ When coalition partners pushed back,¹²⁸ the United States adopted its own independent approval process

Necessity in the Gulf Conflict, 86 PROC. ASIL ANN. MEETING 45, 48-49, 50-51 (1992) (describing targeting of bridges and electricity-generating plants in the Gulf War); *United States: Department of Defense Report to Congress on the Conduct of the Persian Gulf War - Appendix on the Role of the Law of War*, 31 I.L.M. 612, 623-24 (1992) (noting that “many objects intended for civilian use also may be used for military purposes” and justifying the targeting of bridges, airports, communications facilities, and utilities).

123. Healy & Fineman, *supra* note 121. The United States did set limits on permissible dual-use targets and the means of targeting them. For example, a U.S. Central Command official claimed that the United States targeted only “electrical power distribution facilities, but not generation facilities,” and conducted most attacks with “carbon fiber bombs designed to incapacitate temporarily rather than to destroy.” *Off Target: The Conduct of the War and Civilian Casualties in Iraq*, HUM. RTS. WATCH 42 (2003), <https://www.hrw.org/sites/default/files/reports/usa1203.pdf> [<https://perma.cc/L7TU-ESFZ>].
124. Stephen T. Hosmer, *The Conflict over Kosovo: Why Milosevic Decided to Settle When He Did*, RAND CORP. 66-68 (2001), https://www.rand.org/content/dam/rand/pubs/monograph_reports/MR1351/MR1351.ch6.pdf [<https://perma.cc/27WS-6EEA>].
125. Letter from Kenneth Roth, Exec. Dir., Hum. Rts. Watch., to Javier Solana, Sec’y Gen., NATO (May 13, 1999), <https://www.hrw.org/legacy/campaigns/kosovo98/solana.shtml> [<https://perma.cc/CPM8-SM84>]; Hosmer, *supra* note 124, at 67-68.
126. *Water Conflict Chronology*, PAC. INST., <https://www.worldwater.org/conflict/list> [<https://perma.cc/UV2R-PH4U>].
127. SARAH B. SEWALL, CHASING SUCCESS: AIR FORCE EFFORTS TO REDUCE CIVILIAN HARM 126 (2016).
128. A committee established by the prosecutor at the International Criminal Tribunal for the former Yugoslavia (ICTY) stated that “opinions may differ” on whether “dual-use objects”

for targets¹²⁹ in which the commanding general was given the authority to approve operations that were predicted to cause fewer than twenty civilian deaths; any more than that required higher-level approval.¹³⁰ After the operation concluded, a General Accounting Office review of the operation argued that the restrictions put in place by coalition partners had lengthened the conflict unnecessarily because “[t]he military was not allowed initially to use overwhelming forces to attack many of the enemy’s vital interests,” citing roads, bridges, fuel-storage facilities, and transportation networks as examples of vital interests that could not be decisively attacked.¹³¹

The 9/11 attacks on the United States proved to be a critical accelerant for the targeting of dual-use objects. The wars that followed brought together the two trends that placed international-humanitarian-law protections under pressure: the rise of wars between states and nonstate actors and the shift from ground to air wars. During the U.S.-led invasion of Iraq in 2003, the United States targeted electrical-power-distribution facilities, though it was criticized for failing to explain adequately how they contributed to Iraqi military efforts and why targeting them would offer a definite military advantage to the United States.¹³² In its Military Commissions Act of 2009, the United States adopted criteria that permit attacks on objects that by “their nature, location, purpose, or use, effectively contribute to the war-fighting or war-sustaining capability of an opposing force.”¹³³ A 2013 DOD publication on targeting assumed the legality of attacks on war-sustaining targets.¹³⁴ Later, during operations against ISIS starting in 2014, the

constitute a military objective. *Final Report to the Prosecutor by the Committee Established to Review the NATO Bombing Campaign Against the Federal Republic of Yugoslavia*, U.N. INT’L CRIM. TRIBUNAL FOR THE FORMER YUGOSLAVIA ¶ 37, <https://www.icty.org/x/file/Press/natoo61300.pdf> [<https://perma.cc/XD57-SJL4>].

129. Annie Shiel, *The Sum of All Parts: Reducing Civilian Harm in Multinational Coalition Operations*, CTR. FOR CIVILIANS IN CONFLICT 8-9 (2019), https://civiliansinconflict.org/wp-content/uploads/2019/02/SumofAllParts_CIVICReport-2.pdf [<https://perma.cc/F3VX-QZS6>] (citing SEWALL, *supra* note 127).

130. U.S. GEN. ACCT. OFF., GAO-01-784, KOSOVO AIR OPERATIONS: NEED TO MAINTAIN ALLIANCE COHESION RESULTED IN DOCTRINAL DEPARTURES 8 n.9 (2001).

131. *Id.* at 6.

132. *Preplanned Targets*, HUM. RTS. WATCH (Dec. 2003), <https://www.hrw.org/reports/2003/usa1203/4.5.htm> [<https://perma.cc/22ND-GPUZ>].

133. Military Commissions Act of 2009, Pub. L. No. 111-84, § 950p(a)(1), 123 Stat. 2574, 2606 (codified as amended at 10 U.S.C. § 950p).

134. See *Joint Publication 3-60: Joint Targeting*, JOINT CHIEFS OF STAFF, at A-3 (Jan. 31, 2013), https://www.justsecurity.org/wp-content/uploads/2015/06/Joint_Chiefs-Joint_Targeting_20130131.pdf [<https://perma.cc/5GW7-W2VN>] (“The connection of some objects to an enemy’s war-fighting, war-supporting, or war-sustaining effort may be direct, indirect, or even discrete.”).

Obama Administration followed the same approach, striking banks,¹³⁵ “cash collection and distribution point[s],”¹³⁶ “storage sites where ISIL holds its cash,”¹³⁷ and oil wells, refineries, and tanker trucks.¹³⁸

Israel, a close U.S. ally, has also played a major role in the expansion of dual-use targeting. During the 2006 war between Israel and Hezbollah, General Gadi Eisenkot first articulated the “Dahiya doctrine,” which permits attacks against “civilian infrastructure deemed hostile.”¹³⁹ Israel is believed to have applied this doctrine in its current war against Hamas in Gaza.¹⁴⁰ The likelihood of harm to civilians and civilian objects is exacerbated by the shared U.S. and Israeli position that as long as any part of an object is a military objective, the entirety of it is a military objective, even if the vast majority is used for civilian purposes.¹⁴¹ In other words, the nonmilitary “share” of the object is not taken into consideration

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135. Stephen Kalin, *IS Video Shows Destruction from U.S. Airstrike on Mosul Bank*, REUTERS (Jan. 12, 2016, 5:39 AM EST), <https://www.reuters.com/article/us-mideast-crisis-usa-cash-idUSKCN0UQ13V20160112> [<https://perma.cc/VF8Y-RGRE>].
 136. Barbara Starr, *First on CNN: U.S. Bombs ‘Millions’ in ISIS Currency Holdings*, CNN (Jan. 13, 2016, 6:21 AM EST), <https://www.cnn.com/2016/01/11/politics/us-bombs-millions-isis-currency-supply/index.html> [<https://perma.cc/G3MA-MA8Q>].
 137. Remarks on United States Efforts to Combat the Islamic State of Iraq and the Levant (ISIL) Terrorist Organization at the Department of State, 2016 DAILY COMP. PRES. DOC. 103 (Feb. 25, 2016), <https://www.govinfo.gov/content/pkg/DCPD-201600103/pdf/DCPD-201600103.pdf> [<https://perma.cc/HC7Z-W37D>].
 138. Roberta Rampton & Jeff Mason, *Faster Progress Needed Against Islamic State – Obama*, REUTERS (Dec. 14, 2015, 1:50 PM EST), <https://www.reuters.com/article/mideast-crisis-obama/faster-progress-needed-against-islamic-state-obama-idINKBN0TX25D20151214> [<https://perma.cc/2SVL-9QZU>].
 139. *Stopping Famine in Gaza*, INT’L CRISIS GRP. 3 & n.11 (Apr. 8, 2024), https://www.crisisgroup.org/sites/default/files/2024-04/244-stopping-famine-in-gaza_o.pdf [<https://perma.cc/A4K8-2A7E>].
 140. Ishaan Tharoor, *The Punishing Military Doctrine That Israel May Be Following in Gaza*, WASH. POST (Nov. 10, 2023, 12:00 AM EST), <https://www.washingtonpost.com/world/2023/11/10/israel-dahiya-doctrine-disproportionate-strategy-military-gaza-idf/> [<https://perma.cc/Z842-HSGS>].
 141. *DOD Law of War Manual*, *supra* note 21, § 5.6.1.2 (“If an object is a military objective, it is not a civilian object and may be made the object of attack.”); U.S. DEP’T OF THE ARMY AND U.S. MARINE CORPS., FM 6-27/MCTP 11-10C, THE COMMANDER’S HANDBOOK ON THE LAW OF LAND WARFARE ¶ 2-72 (Aug. 2019) (“The principle of proportionality does not impose an obligation to reduce the risk of harm to military objectives.”); John J. Merriam & Michael N. Schmitt, *Israeli Targeting: A Legal Appraisal*, 68 NAVAL WAR COLL. REV. 15, 25 (2015) (“The IDF takes the position that, as a matter of law, the building is a single military objective, and therefore damage to other parts of the building need not be considered as collateral damage”); see Adil Ahmad Haque, *The IDF’s Unlawful Attack on Al Jalaa Tower*, JUST SEC. (May 27, 2021), <https://www.justsecurity.org/76657/the-idfs-unlawful-attack-on-al-jalaa-tower/> [<https://perma.cc/CYD3-N33X>].

in proportionality assessments.¹⁴² So, for instance, if one apartment out of thirty in an apartment building is used to store weapons, the entire building is a military objective. Its loss is not considered in the proportionality analysis, though the loss of any civilian lives would be.¹⁴³ IDF commanders claim that when targeting dual-use buildings, efforts are made to avoid damage to the components of the building that the enemy is not using for military purposes.¹⁴⁴ In practice, however, the colocation of civilians and combatants and density of dual-use buildings in urban population centers, which are often multistory apartment buildings, render such precautions ineffective.

Although the United States and Israel were historically outliers in their expansive interpretations of dual-use objects, over time their views appear to have been increasingly accepted by the international community. For example, French,¹⁴⁵ Russian,¹⁴⁶ and British¹⁴⁷ leaders all made public statements justifying attacks on ISIS-controlled oil infrastructure on the grounds that oil sales were helping finance the terrorist organization.

While the United States and other Western democracies pioneered the theory of dual-use objects, U.S. rivals and nondemocracies have also begun to adopt dual-use justifications for their own military operations. In 2013, Russian General Valery Gerasimov advocated a new military strategy of hybrid warfare that included the “destruction of critically important facilities of [adversary] military and civilian infrastructure”¹⁴⁸ — a strategy deployed by Russia in a range of

142. Michael N. Schmitt, *Targeting Dual-Use Structures: An Alternative Interpretation*, LIEBER INST. W. POINT: ARTICLES WAR (June 28, 2021), <https://lieber.westpoint.edu/targeting-dual-use-structures-alternative> [<https://perma.cc/C7NL-AXM7>].

143. *Id.*

144. Merriam & Schmitt, *supra* note 141, at 26.

145. Alissa J. Rubin & Anne Barnard, *France Strikes ISIS Targets in Syria in Retaliation for Attacks*, N.Y. TIMES (Nov. 15, 2015), <https://www.nytimes.com/2015/11/16/world/europe/paris-terror-attack.html> [<https://perma.cc/GDT5-SDP6>] (“Jean Yves le Drian, the French defense minister . . . said the oil and gas target was chosen because the Islamic State uses the black market sale of oil and gas as a way to finance its weapon acquisition.”).

146. *Russian Airstrikes Blast ISIS Oil Facilities in Syria*, CBS NEWS (Nov. 20, 2015, 2:41 PM EST), <https://www.cbsnews.com/news/russian-airstrikes-blast-isis-oil-facilities-in-syria> [<https://perma.cc/8ECB-U5ZA>] (offering an account of how Russian strikes on oil facilities deprived ISIS of \$1.5 million in daily income from oil sales).

147. *Guidance: RAF Air Strikes in Iraq and Syria: December 2015*, U.K. MINISTRY DEF. (July 31, 2024), <https://www.gov.uk/government/publications/british-forces-air-strikes-in-iraq-monthly-list/raf-air-strikes-in-iraq-and-syria-december-2015> [<https://perma.cc/D6JL-AMK2>] (explaining that strikes on “[c]arefully selected elements of the oilfield infrastructure” were intended to diminish ISIS’s ability to extract the oil to fund their terrorism).

148. See Valery Gerasimov, *The Value of Science Is in the Foresight: New Challenges Demand Rethinking the Forms and Methods of Carrying Out Combat Operations*, MIL. REV., Jan.-Feb. 2016, at 23, 25.

conflicts, from Syria to Eastern Ukraine.¹⁴⁹ It comes as no surprise, then, that Russia has extensively targeted dual-use objects – particularly energy infrastructure – since its full-scale invasion of Ukraine beginning in February 2022. Russian attacks on at least 112 different energy targets had damaged more than fifty percent of Ukraine’s energy infrastructure by April 2023.¹⁵⁰ A Russian foreign ministry official stated at a meeting of the United Nations (U.N.) General Assembly First Committee that “[q]uasi-civil infrastructure may be a legitimate target for a retaliation strike.”¹⁵¹

Other states have targeted dual-use objects without providing public justifications. This is a particularly common practice of authoritarian governments that often do not provide public justifications for specific military operations or publish military manuals. During its conflict with Yemen, for example, Saudi Arabia targeted numerous objects with civilian use, including the water-supply system, fishing vessels, hospitals, and a fish market.¹⁵² Saudi airstrikes on water infrastructure are believed to have contributed to one of the most serious cholera outbreaks in Yemen’s history.¹⁵³ During the Syrian civil war, government airstrikes on rebel-held areas targeted dual-use objects including gasoline stations, often killing civilians.¹⁵⁴ In Sudan, government forces have damaged critical

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149. Arsalan Bilal, *Russia’s Hybrid War Against the West*, NATO REV. (Apr. 26, 2024), <https://www.nato.int/docu/review/articles/2024/04/26/russias-hybrid-war-against-the-west/index.html> [https://perma.cc/7AVV-96YN].
 150. Press Release, World Bank, \$200 Million Grant Supported by the World Bank Will Help Repair Energy Infrastructure in Ukraine (Apr. 12, 2023), <https://www.worldbank.org/en/news/press-release/2023/04/12/200-million-grant-supported-by-the-world-bank-will-help-repair-energy-infrastructure-in-ukraine> [https://perma.cc/9BCA-X486].
 151. *US Satellites May Be Legitimate Targets if Used in Conflict in Ukraine – Russian Diplomat*, TASS RUSS. NEWS AGENCY (Oct. 26, 2022), <https://tass.com/politics/1527943> [https://perma.cc/T8CX-RWZN].
 152. See Rep. of the Panel of Experts on Yemen, transmitted by Letter dated 26 January 2018 from the Panel of Experts on Yemen mandated by Security Council Resolution 2342 (2017) addressed to the President of the Security Council, U.N. Doc. S/2018/594, at 245-46, 271, 314 (Jan. 26, 2018); Mohammed Ali Kalfood & Margaret Coker, *Dozens of Dead in Yemen, and Blame Pointing in Both Directions*, N.Y. TIMES (Aug. 6, 2018), <https://www.nytimes.com/2018/08/06/world/middleeast/yemen-port-attack.html> [https://perma.cc/CKH2-VJ3V]; Jeanne Sowers & Erika Weinthal, *Saudi-Led Attacks Devastated Yemen’s Civilian Infrastructure, Dramatically Worsening the Humanitarian Crisis*, WASH. POST (Feb. 22, 2021), <https://www.washingtonpost.com/politics/2021/02/22/saudi-led-attacks-devastated-yemens-civilian-infrastructure-dramatically-worsening-humanitarian-crisis> [https://perma.cc/CA9Y-5YA6].
 153. Paul Spiegel, Ruwan Ratnayake, Nora Hellman, Mija Ververs, Moise Ngwa, Paul H. Wise & Daniele Lantagne, *Responding to Epidemics in Large-Scale Humanitarian Crises: A Case Study of the Cholera Response in Yemen, 2016-2018*, 4 BMJ GLOB. HEALTH art. no. e001709, at 9 (2019).
 154. Erika Solomon & Oliver Holmes, *Syrian Air Strike Kills at Least 54 – Activists*, REUTERS (Sept. 20, 2012, 3:57 PM EDT), <https://www.reuters.com/article/world/syrian-air-strike-kills-at-least-54-activists-idUSDEE88JoC3> [https://perma.cc/UEG3-VBBD].

infrastructure including water-treatment plants.¹⁵⁵ Although China has not publicly defended targeting dual-use objects, a recent DOD report expressed concern about China’s potential to use cyberwarfare or kinetic attacks against Taiwan’s economic infrastructure.¹⁵⁶ The same report suggested that China is intentionally “eroding the principle of distinction under the law of armed conflict and obscuring crucial lines between warships and non-warships, civilians and combatants, and civilian objects and military objectives.”¹⁵⁷ In these cases and others like them, it is difficult to know whether the militaries in question have developed their own internal doctrines to justify the targeting of dual-use objects, are simply following what they observe to be an increasingly common state practice, or have decided to disregard the principle of distinction and other international-humanitarian-law constraints.¹⁵⁸

In short, the history of state practice shows a gradual proliferation of dual-use targeting from one conflict to the next and from one state to others. It also suggests a concerning “ratchet effect” in which incremental expansions of the interpretation of “dual-use” to include objects that are primarily used by civilians (e.g., roads, bridges, and the electrical grid) are treated as precedents for subsequent wars.¹⁵⁹

And yet this erosion of the principle of distinction has not gone unchallenged. In *Prosecutor v. Prlić*, the International Criminal Tribunal for the former Yugoslavia (ICTY) condemned the destruction of a historic bridge by Croatian

155. *Sudan: Explosive Weapons Harming Civilians*, HUM. RTS. WATCH (May 4, 2023, 12:00 AM EDT), <https://www.hrw.org/news/2023/05/04/sudan-explosive-weapons-harming-civilians> [<https://perma.cc/662D-9S5K>].

156. *Military and Security Developments Involving the People’s Republic of China: 2023 Annual Report to Congress*, U.S. DEP’T OF DEF. 141 (2023), <https://media.defense.gov/2023/Oct/19/2003323409/-1/-1/1/2023-military-and-security-developments-involving-the-peoples-republic-of-china.pdf> [<https://perma.cc/MN35-978T>].

157. *Id.* at 142.

158. Future research conducted in archives or interviews in the languages of these states could provide further insight into these and other possible explanations for the targeting of objects widely recognized as dual-use by states that have not publicly justified these strikes on dual-use grounds.

159. One may ask whether this means that more expansive interpretations have become customary international law. We think not, because customary international law requires widespread *opinio juris* and state practice. See, e.g., Dustin A. Lewis, Naz K. Modirzadeh & Gabriella Blum, *Quantum of Silence: Inaction and Jus ad Bellum*, HARV. L. SCH. PROGRAM ON INT’L L. & ARMED CONFLICT 3 (2019), <https://dash.harvard.edu/bitstream/handle/1/40931878/Quantum%20of%20Silence%202019.pdf> [<https://perma.cc/TG45-DXXZ>]. Here, the endorsement of dual-use targeting as a matter of law, and state practice of such targeting, are limited to a small handful of states. These states turn to one another to determine what they regard as permissible, but in the process, they ignore the vast majority of states whose views are critical to forming a principle of customary international law. *Id.* at 5-6.

forces despite its temporary use for military purposes, concluding that the Croatian forces had not adequately considered the bridge's utility to the civilian population and its "great symbolic, cultural and historical value."¹⁶⁰ Later, when the United States pushed members of the International Security Assistance Force to begin directly targeting poppy production in Afghanistan because the narcotics profits were funding the insurgency, several NATO countries opposed the move, arguing that "domestic lawsuits could be filed if their soldiers carried out attacks to kill noncombatants" – acts that would violate international humanitarian law.¹⁶¹ And, most recently, Russia's targeting of the electrical grid in Ukraine has formed the basis for arrest warrants at the International Criminal Court against Sergei Ivanovich Kobylash and Viktor Nikolayevich Sokolov.¹⁶² Hence, while targeting of dual-use objects has been on the rise, it has not been accepted or condoned by the global community as a whole.

The next Part turns to more detailed evidence from U.S. military operations against ISIS in Iraq and Syria to illustrate patterns in U.S. targeting of dual-use objects as reported by DOD itself, followed by qualitative evidence from in-depth ground reporting on the human costs of these practices.

II. U.S. TARGETING OF DUAL-USE OBJECTS IN IRAQ AND SYRIA

In the summer of 2014, ISIS militants swept through broad swaths of territory in northern Iraq¹⁶³ and eastern Syria.¹⁶⁴ In a matter of weeks, the group had defeated U.S.-trained security forces in Mosul, seized military equipment,

160. Prosecutor v. Prlić, Case No. IT-04-74-T, Judgement (Volume 3 of 6), ¶¶ 1581-84, 1690 (Int'l Crim. Trib. for the Former Yugoslavia May 29, 2013), <https://ucr.irmct.org/LegalRef/CMSDocStore/Public/English/Judgement/NotIndexable/IT-04-74/JUD251R2000462230.pdf> [https://perma.cc/A22L-UEM5].

161. Thom Shanker, *Obstacle Seen in Bid to Curb Afghan Trade in Narcotics*, N.Y. TIMES (Dec. 23, 2008), <https://www.nytimes.com/2008/12/23/world/asia/23iht-23poppy.18882248.html> [https://perma.cc/X6KZ-TNHX].

162. Press Release, Int'l Crim. Ct., Situation in Ukraine: ICC Judges Issue Arrest Warrants Against Sergei Ivanovich Kobylash and Viktor Nikolayevich Sokolov (Mar. 5, 2024), <https://www.icc-cpi.int/news/situation-ukraine-icc-judges-issue-arrest-warrants-against-sergei-ivanovich-kobylash-and> [https://perma.cc/78XH-GTFV].

163. Suadad Al-Salhy & Tim Arango, *Sunni Militants Drive Iraqi Army Out of Mosul*, N.Y. TIMES (June 10, 2014), <https://www.nytimes.com/2014/06/11/world/middleeast/militants-in-mosul.html> [https://perma.cc/VLZ6-FKHN].

164. Emp. of the N.Y. Times & Ben Hubbard, *Life in a Jihadist Capital: Order with a Darker Side*, N.Y. TIMES (July 23, 2014), <https://www.nytimes.com/2014/07/24/world/middleeast/islamic-state-controls-raqqa-syria.html> [https://perma.cc/8EBP-D4J7].

kidnapped or killed Yazidi minority communities,¹⁶⁵ and then threatened to advance upon Baghdad.¹⁶⁶ Faced with the proposition of another costly ground war, the United States instead launched a campaign of airstrikes against the group in August 2014.¹⁶⁷ More than a dozen allied countries¹⁶⁸ participated in the U.S.-led coalition known as Operation Inherent Resolve (OIR).¹⁶⁹ Over the next eight years, coalition aircraft unleashed at least 35,000 strikes in Iraq and Syria against purported ISIS targets.¹⁷⁰ Many airstrikes took place in densely populated urban areas where ISIS had embedded itself within the local population, seizing civilian infrastructure and residences.¹⁷¹ Such “urban combat against a hybrid adversary”¹⁷² meant that many targets had the potential for “dual-use” by civilians and combatants.

To understand when and how dual-use objects are targeted and the impact on civilians, we examined primary sources generated by the U.S. military and original qualitative evidence from ground reporting and field research. We begin with an analysis of more than 1,000 coalition-strike press releases. We then

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165. Azam Ahmed, *Betrayal of Yazidis Stokes Iraqi Fears of Return to 2006 Sectarian Horrors*, N.Y. TIMES (Aug. 26, 2014), <https://www.nytimes.com/2014/08/27/world/middleeast/iraq-isis-yazidis-kurds-sunni-arabs.html> [<https://perma.cc/S5VV-AW5B>].
 166. Becca Wasser, Stacie L. Pettyjohn, Jeffrey Martini, Alexandra T. Evans, Karl P. Mueller, Nathaniel Edenfield, Gabrielle Tarini, Ryan Haberman & Jalen Zeman, *The Air War Against the Islamic State: The Role of Airpower in Operation Inherent Resolve*, RAND CORP. 16 (2021), https://www.rand.org/content/dam/rand/pubs/research_reports/RR300/RR388-1/RAND_RRA388-1.pdf [<https://perma.cc/2YX6-3Q2P>].
 167. *Statement from Chief Pentagon Spokesman Sean Parnell Announcing the Consolidation of Forces in Syria Under Combined Joint Task Force – Operation Inherent Resolve*, U.S. DEP’T DEF. (Apr. 18, 2025), <https://www.defense.gov/News/Releases/Release/article/4160500/statement-from-chief-pentagon-spokesman-sean-parnell-announcing-the-consolidati> [<https://perma.cc/WN3V-HTB9>].
 168. *US-Led Coalition in Iraq & Syria*, AIRWARS, <https://airwars.org/conflict/coalition-in-iraq-and-syria> [<https://perma.cc/L9LM-9WBT>].
 169. Press Release, U.S. Cent. Command, Iraq and Syria Operations Against ISIL Designated as Operation Inherent Resolve (Oct. 15, 2014), <https://www.centcom.mil/MEDIA/NEWS-ARTICLES/News-Article-View/Article/884877/iraq-and-syria-operations-against-isil-designated-as-operation-inherent-resolve> [<https://perma.cc/QWZ7-V6PY>]. Operation Inherent Resolve is still ongoing as of this writing. See *Statement from Chief Pentagon Spokesman Sean Parnell Announcing the Consolidation of Forces in Syria Under Combined Joint Task Force – Operation Inherent Resolve*, *supra* note 167.
 170. Press Release, Combined Joint Task Force Operation Inherent Resolve, Civilian Casualty Assessment (Mar. 10, 2022), <https://www.inherentresolve.mil/Portals/14/Documents/CIVCAS%20Releases/2022/CJTF-OIR%20CIVCAS%20Press%20release%20Mar%202022.pdf> [<https://perma.cc/55FM-MKJF>].
 171. *Mapping Urban Warfare*, AIRWARS, <https://airwars.org/research/mapping-urban-warfare> [<https://perma.cc/QW6P-7NW6>].
 172. Wasser et al., *supra* note 166, at 113.

conduct a deeper dive into the targeting of dual-use objects as described in more than 1,300 civilian-casualty assessments and documented in more than 190 coalition videos of airstrikes. To explore the broader impact of airstrikes on civilians and civilian infrastructure beyond DOD's casualty counts, we draw on investigative reporting at the sites of airstrikes and open-source reports. This Part concludes with a multisource grounded analysis of the targeting of fourteen separate dual-use objects. In doing so, it provides an unprecedented look at a modern military's targeting of dual-use objects and concludes that the U.S. military's targeting of such objects is far more common—and far more destructive to civilians—than previously understood.

A. Sources of Information About Dual-Use Objects

1. Strike-Summary Press Releases

The U.S. Central Command regularly released information on its strikes during OIR. We examined 9,611 separate entries in these strike summaries between October 2014 and December 2018.¹⁷³ The press releases were published on a daily basis from October 2, 2014, to November 6, 2017. Those releases generally reported all of the strikes from the previous twenty-four hours, though on occasion a release would cover forty-eight hours.¹⁷⁴ From November 10, 2017, to January 4, 2018, the frequency of press releases changed to twice per week;¹⁷⁵ from January 5 to December 15, 2018, they were released once per week;¹⁷⁶ from

173. See *Press Release Archive*, U.S. CENT. COMMAND, <https://www.centcom.mil/media/press-releases> [<https://perma.cc/W9QC-M6XY>]. Most are also available at the Operation Inherent Resolve website. *Strike Releases*, OPERATION INHERENT RESOLVE, <https://www.inherentresolve.mil/NEWSROOM/Strike-Releases> [<https://perma.cc/W9QC-M6XY>].

174. Press releases occasionally described strikes from previous days. See, e.g., Press Release, Combined Joint Task Force Operation Inherent Resolve, Military Strikes Continue Against Daesh Terrorists in Syria and Iraq (Feb. 16, 2018), <https://www.inherentresolve.mil/Portals/14/2018StrikeReleases/20180216%20Strike%20Release%20FINAL.pdf> [<https://perma.cc/7RM8-3HN8>] (“Additionally, we received late reporting of the following strikes . . .”).

175. Press Release, Combined Joint Task Force Operation Inherent Resolve, Military Strikes Continue Against ISIS Terrorists in Syria and Iraq (Nov. 10, 2017), <https://www.inherentresolve.mil/Portals/14/Documents/Strike%20Releases/2017/11November/20171110%20Strike%20Release.pdf> [<https://perma.cc/APH7-7WR5>] (announcing the shift to twice-weekly strike releases).

176. Press Release, Combined Joint Task Force Operation Inherent Resolve, Military Strikes Continue Against ISIS Terrorists in Syria and Iraq (Jan. 5, 2018), <https://www.inherentresolve.mil/Portals/14/2018StrikeReleases/CJTF-OIR%20Strike%20Release%2020180105-01.pdf> [<https://perma.cc/9W3R-RQ84>] (announcing the shift to weekly strike releases).

December 16, 2018, to May 31, 2019, they were published every two weeks;¹⁷⁷ and from June 1 to December 31, 2019, they were published monthly.¹⁷⁸ The online Appendix to this Article provides additional information about the process used to construct this dataset.¹⁷⁹

We acknowledge several limitations of relying on these press releases as a source of data on coalition targets. First, the content and timing of the reports is not uniform or consistent. Locations were not always consistently reported and, indeed, later in the period of study, the reports often referred only to the country, rather than the city, in which the strike took place. Perhaps most important, as discussed in more detail below, the reports identify the intended targets of the strikes, which does not necessarily reflect what was in fact hit.¹⁸⁰ Below, we discuss additional sources we use to triangulate and infer missing information as best we could.¹⁸¹ Despite these limitations, a simple time-series analysis of correlations¹⁸² between different categories of targets suggests some degree of internal consistency and reliability in DOD’s reporting practices.¹⁸³ Overall, we

177. Press Release, Combined Joint Task Force Operation Inherent Resolve, CJTF-OIR Strike Summary Dec. 16-Dec. 29 (Jan. 4, 2019), https://www.inherentresolve.mil/Portals/14/CJTF-OIR%20%2020190104_01%20Strike%20Release.pdf [<https://perma.cc/XS4C-FL2X>] (announcing the shift to biweekly strike releases).

178. Unlike the other changes, this was not announced; the frequency of releases simply declined. We ultimately did not use the data from the 2019 press releases, given that we found it less detailed and thus less reliable.

179. The online Appendix can be found at <https://dataverse.harvard.edu/dataset.xhtml?persistentId=doi:10.7910/DVN/CGGQTY>.

180. See *infra* Section II.A.2. A report by the RAND Corporation also relied on the press releases to develop a database but did not track dual-use targets. See Wasser et al., *supra* note 166, at 393 (describing the methodology). Its Appendix D concluded that “[d]espite these inconsistencies, the aggregate data from the CJTF-OIR strike releases provide useful information about coalition operations, albeit with clear limitations.” *Id.* at 395.

181. See *infra* Section II.A.3.

182. This analysis uses a Pearson’s correlation test, which measures linear relationships between pairs of continuous variables in time-series data. See RONET D. BACHMAN & RAYMOND PATERNOSTER, *STATISTICS FOR CRIMINOLOGY AND CRIMINAL JUSTICE* 355 (4th ed. 2017). The test generates a coefficient ranging from -1 to 1, where 0 indicates no linear relationship between two variables, -1 indicates a perfect negative linear correlation between two variables (as one variable increases, the other decreases), and 1 indicates a perfect positive linear correlation between the two variables (the two variables increase in lockstep). See *id.* The results of this analysis are presented in the online Appendix. See *supra* note 179.

183. For example, strong correlations between time trends in the frequency of targeting the categories of vehicles, transportation infrastructure, and manufacturing/production/construction suggest that missing data on variables such as city or village location were distributed randomly across these different categories such that all are underestimated to a similar degree. In contrast, if some categories were more affected by missing data than others, we would not see such strong correlations between them.

expect that our data underestimate the targeting of dual-use objects, but we nonetheless have reason to believe that these underestimates are fairly consistent between different categories of dual-use objects and do not significantly distort the underlying patterns we observe. Our findings should be interpreted as a conservative estimate and one that reflects DOD's own description of its targeting practices.

2. *Coalition Civilian-Casualty Reports*

Civilian-casualty assessment records are the primary means through which the U.S. military tracks when U.S. military operations are alleged to have caused civilian casualties, defined as civilian death or physical injury as a direct result of the effects of munitions. Each assessment was triggered by an allegation of civilian harm¹⁸⁴ and resulted in a finding of either "credible" or "noncredible" by the coalition. The more than 1,300 coalition civilian-casualty assessments from air-strikes in Iraq and Syria between September 2014 and January 2018 provide the most detailed data available with which to examine the coalition's beliefs about a purported target and the process it used to authorize the strike. They were obtained by one of the authors of this Article through a years-long FOIA lawsuit against DOD and the U.S. Central Command.¹⁸⁵

Though the records are not all uniform, those that identify a corresponding strike often contain several standard features, such as underlying intelligence, casualty estimates prior to the strike, efforts to mitigate civilian harm, chat logs between those involved in the execution of the strike, and descriptions of video captured before, during, or after the strike.¹⁸⁶

These records show, by the U.S. military's own admission, how imperfect its information sometimes is with regard to dual-use targets. Some reports reflect that objects with both civilian and military uses were targeted after a determination that the military advantage gained would be proportional to the expected

184. Allegations can come from nongovernmental organizations (NGOs) (especially the NGO Airwars) or public sources such as social-media posts or news reports, or from internal referrals. If the unit conducting the strike reports believes civilians may have been killed, it can trigger a "self-reported" allegation. See Memorandum on Combined Joint Task Force-Operation Inherent Resolve (CJTF-OIR) Policy for Reporting to Civilian Casualty Incidents 2 (May 9, 2018), <https://int.nyt.com/data/documenttools/cjtf-oir-policy-civilian-casualty-incidents-2018/acd1dd219d5ba55b/full.pdf> [<https://perma.cc/8LU9-R5DN>] (outlining reporting procedures for civilian-casualty incidents).

185. See generally Complaint, *Khan v. U.S. Dep't of Def.*, No. 18-5334 (S.D.N.Y. June 13, 2018) (initiating this lawsuit).

186. Azmat Khan, *Hidden Pentagon Records Reveal Patterns of Failure in Deadly Airstrikes*, N.Y. TIMES (Dec. 18, 2021), <https://www.nytimes.com/interactive/2021/12/18/us/airstrikes-pentagon-records-civilian-deaths.html> [<https://perma.cc/Q2S4-4LSK>].

effects on civilians and civilian objects. For example, in a January 2017 airstrike in west Mosul, the coalition was conducting prestrike surveillance on what it believed to be a bed-down location exclusively used by ISIS when three children were spotted on the roof.¹⁸⁷ The target was reevaluated, and this time it was determined that while there was use by both civilians and combatants, the target – it had now been reevaluated as a weapons-manufacturing facility – was serious enough that the potential deaths of three children were proportional to the military advantage that would be gained from eliminating it.¹⁸⁸ In fact, ground reporting revealed the target had been misidentified, and the military had hit a civilian home.¹⁸⁹

Frequently, however, objects that might be considered “dual-use” were later reclassified as no longer having dual or civilian use and were, according to the military’s assessment, now used exclusively or primarily by the enemy and therefore removed from protected “no-strike” lists. For example, in a November 2014 airstrike in al-Harim, Syria, the protective status of two compounds first classified as civilian residences or accommodations was lifted after it was determined that “their predominant use was for hostile purposes – a meeting place and safe-house for foreign extremists.”¹⁹⁰ Following the strike, the United States Agency for International Development (USAID) reported that the strike had killed two children and injured two workers of a local nongovernmental organization (NGO) affiliated with USAID.¹⁹¹

At times, records suggest the coalition repeatedly dismissed dual-use objects as having no civilian use, despite its own intelligence that suggested the opposite. For example, a series of strikes in March 2017 in Tabqa, Syria, revealed that multiple targets had been classified as “exclusively” used by ISIS when in fact

187. Memorandum on CIVCAS Credibility Report (CCAR) – Strike [redacted] Planned Dynamic Target, [redacted] Mosul An Nahrawan ISIL BDL 001, 30 [redacted] January 2017 (CJFLCC-OIR 07/17) 1 (Feb. 2, 2017), <https://int.nyt.com/data/documenttools/c-1-30-17-iraq/6747b75e76514e83/full.pdf> [<https://perma.cc/MVH8-4MDJ>] (reporting on the January 30, 2017 incident).

188. *Id.* at 2.

189. Azmat Khan, *The Human Toll of America’s Air Wars*, N.Y. TIMES MAG. (Dec. 19, 2021), <https://www.nytimes.com/2021/12/19/magazine/victims-airstrikes-middle-east-civilians.html> [<https://perma.cc/9MPQ-4K5N>].

190. Memorandum on Army Regulation (AR) 15-6 Investigation into Allegations of Civilian Casualties (CIVCAS) Resulting from 5-6 November 14 Airstrikes in the Vicinity of (IVO) Harim, Syria 8 (Feb. 13, 2015), <https://int.nyt.com/data/documenttools/c-11-5-14-syria/33f211120650b542/full.pdf> [<https://perma.cc/EZL5-XAZG>] (describing the November 5, 2014 incident).

191. *Id.* at 4.

their underlying intelligence strike packages indicated otherwise.¹⁹² One of these targets was identified as a weapons factory that the coalition determined had previously functioned as a bakery and food-distribution center.¹⁹³ Another was identified by the coalition as an “ISIS police station” that had “previously functioned” as a fire station.¹⁹⁴ Airwars tracked more than thirty local sources alleging civilian harm, as well as graphic imagery,¹⁹⁵ but the coalition rejected the allegations on the basis that there was “insufficient evidence available to support a credible CIVCAS [civilian-casualty] assessment to a ‘more likely than not’ standard.”¹⁹⁶ But no video footage was available for review of the strike on the alleged fire station, and the two minutes of footage of the alleged bakery taken after the strike did not show “human activity,” even as the coalition stated that heat and smoke obscured the area surrounding the target.¹⁹⁷

One of the greatest impediments to relying upon government records alone – whether press releases or civilian-casualty reports – to identify dual-use objects is how frequently the stated target in these sources made no mention of the civilian use of the larger surrounding object or the infrastructure in which it was located. Particularly in the coalition’s strike summaries, attacks on critical civilian infrastructure such as dams, water-sanitation facilities, and electricity grids were publicly categorized as targets functioning with other uses, such as “weapons-storage facilities” and “weapons caches,” as detailed below. To understand the true scale of dual-use targeting, then, it is necessary to draw on a wider range of sources.

3. *Other Open-Source Materials and Ground Reporting*

For the reasons discussed above, relying only on U.S. government press releases or civilian-casualty assessment records would provide a limited portrait of dual-use targeting. Thus, we also examined the coalition’s own strike summaries and strike videos, as well as extensive ground reporting in Iraq and Syria.¹⁹⁸

192. Memorandum on Civilian Casualty Credibility Assessment Report for Allegation 389, Tabaqah, Syria, 19 March 2017, at 4 (July 13, 2017), <https://int.nyt.com/data/documenttools/c-3-20-17-syria/393b2ddb6e2a1250/full.pdf> [<https://perma.cc/LDL3-3ZQE>] (describing the March 19, 2017 incident).

193. *Id.*

194. *Id.* at 8.

195. *Id.*

196. *Id.* at 5.

197. *Id.*

198. Azmat Khan & Anand Gopal, *The Uncounted*, N.Y. TIMES MAG. (Nov. 16, 2017), <https://www.nytimes.com/interactive/2017/11/16/magazine/uncounted-civilian-casualties-iraq-air-strikes.html> [<https://perma.cc/3JSY-8EKV>].

Strike Videos. The U.S. government has made public more than 190 coalition videos of airstrikes in Iraq and Syria between 2015 and 2017.¹⁹⁹ These videos can often be matched to particular incidents, allowing for comparison of descriptions in press releases and civilian-casualty reports to what can be discerned in the videos—including the visibility of nearby buildings or civilians.

Airwars. The NGO Airwars “is a not-for-profit transparency watchdog which tracks, assesses, archives and investigates civilian harm claims in conflict-affected nations.”²⁰⁰ It conducts detailed analyses of airstrikes, including U.S. airstrikes in Syria and Iraq during the period under study.²⁰¹ Airwars traces claims of casualties, drawing on a number of sources, including “international and local news agencies and NGOs; and more fragmentary social media sites including local residents’ groups, Facebook pages (for example[,] martyrs’ pages), YouTube footage of incidents, and tweets relating to specific events.”²⁰²

Ground Reporting and Field Research. One of the authors, Azmat Khan, is a reporter for the *New York Times* who has engaged in extensive on-the-ground reporting in Syria and Iraq and is the author of the Pulitzer Prize-winning series *The Civilian Casualty Files*.²⁰³ As part of that reporting, she visited many of the sites where the incidents described below took place and interviewed people familiar with those events. Another of the authors, Mara R. Revkin, has conducted extensive field research in formerly ISIS-controlled areas of Iraq and Syria between 2017 and 2024.²⁰⁴ She interviewed many employees of local-governance and economic institutions that ISIS captured in 2014, including municipal service departments, tax-collection offices, and factories—objects that the coalition considered dual-use when they were under ISIS’s control. She also worked with Iraqi research partners to conduct a survey of a random sample of 1,458 residents of Mosul in 2018, just seven months after Iraqi forces recaptured the city from ISIS, about the harms they experienced during ISIS rule and OIR. Our analysis is informed by these many years of on-the-ground reporting and research.

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199. The videos are published at DEF. VISUAL INFO. DISTRIB. SERV., <https://dvidshub.net> [<https://perma.cc/FSF2-69YS>].

200. *Who We Are*, AIRWARS, <https://airwars.org/about/team> [<https://perma.cc/UH9H-2EDL>].

201. *US-Led Coalition in Iraq & Syria*, *supra* note 168.

202. *Methodology*, AIRWARS, <https://airwars.org/about/methodology> [<https://perma.cc/47F6-GLJG>].

203. Azmat Khan, Lila Hassan, Sarah Almkhtar & Rachel Shorey, *The Civilian Casualty Files*, N.Y. TIMES (Dec. 18, 2021), <https://www.nytimes.com/interactive/2021/us/civilian-casualty-files.html> [<https://perma.cc/93VV-KCJ9>].

204. This research was approved by the Institutional Review Board of Duke University under Protocols 1506016040, 2023-0565, and 2023-0560.

As Section II.C will demonstrate in more detail, the systemic shortcomings of government records are confirmed by other open-source information and ground research and reporting. First, the data the military consistently makes public—strike-summary press releases—are not an accurate reflection of the prevalence of dual-use objects and provide little understanding of the toll on civilian infrastructure or the reverberating or cumulative effects on a civilian population. Second, ground reporting and civilian-casualty assessment records reveal that the coalition was often unaware of important civilian infrastructure and dual-use objects, kept poor strike logs, and did little to investigate claims that it had misidentified civilian infrastructure or incorrectly classified dual-use objects as single-use. Ground reporting and the close study of coalition records help illustrate the damaging impact such errors can have on civilian populations.²⁰⁵

B. Dual-Use Objects Based on DOD Press Releases

We began our analysis by creating an original dataset of targets of OIR using data gathered from the U.S.-led coalition's strike-summary press releases.²⁰⁶ There are often many targets identified in one press release. Each press release can include multiple dates with multiple entries. Each entry may reflect multiple "strikes," and each strike can entail one or more kinetic events with multiple targets.²⁰⁷ For example, for the press release shown in Figure 1 below, there are three entries for September 30, 2017, strikes in Syria. The first entry identifies two targets, the second identifies one, and the third identifies four. From October 2014 through the end of 2018, our dataset includes 9,611 separate entries that included 32,376 separate targets.

205. See, e.g., Khan & Gopal, *supra* note 198 (finding the rate of civilian deaths caused by coalition strikes was "31 times as high" as the coalition admitted and many other discrepancies "between the dates or locations of strikes and those recorded in the [strike] logs"); Heather Ford & Michael Richardson, *Framing Data Witnessing: Airwars and the Production of Authority in Conflict Monitoring*, 45 MEDIA CULTURE & SOC'Y 805, 806 (2023) ("This article uses Airwars as a case study to show how one open-source investigation agency catalyses on-the-ground testimony to produce authoritative accounts of civilian harm that can contribute to and even spur public debate while also being legible and credible to militaries and other government actors.").

206. For a description of the press releases, see *supra* Section II.A.1. For periods before January 2015, we relied on the text of press releases archived by one of the authors, Azmat Khan, at the time they were issued.

207. See, e.g., *supra* note 170 and accompanying text.

FIGURE 1. SAMPLE OPERATION INHERENT RESOLVE PRESS RELEASE²⁰⁸



Combined Joint Task Force
Operation Inherent Resolve

October 2, 2017
Release # 20171002-02
FOR IMMEDIATE RELEASE

Military Strikes Continue Against ISIS Terrorists in Syria and Iraq

SOUTHWEST ASIA – On Sep. 30 and Oct. 1, Coalition military forces conducted 69 strikes consisting of 88 engagements against ISIS terrorists in Syria and Iraq.

In Syria, on Sept. 30, Coalition military forces conducted 33 strikes consisting of 38 engagements against ISIS targets.

- Near Abu Kamal, three strikes destroyed an ISIS well head and engaged two tactical units.
- Near Dayr Az Zawr, one strike destroyed an ISIS tactical vehicle.
- Near Raqqa, 29 strikes engaged seven ISIS tactical units, destroyed 20 fighting positions and a supply route, and suppressed 10 fighting positions.

In Syria, on Oct. 1, Coalition military forces conducted 25 strikes consisting of 28 engagements against ISIS targets.

- Near Abu Kamal, two strikes destroyed two ISIS well heads and a fighting position.
- Near Dayr Az Zawr, three strikes engaged an ISIS tactical unit and destroyed two headquarters.
- Near Raqqa, 20 strikes engaged two ISIS tactical units and destroyed 16 fighting positions, 11 vehicles; and disrupted two supply routes.

In Iraq, on Sept. 30, Coalition military forces conducted 10 strikes consisting of 15 engagements against ISIS targets.

- Near Baiji, five strikes engaged two ISIS tactical units and destroyed four weapons caches and two mortar systems.
- Near Huwajah, three strikes engaged two ISIS tactical units and destroyed 10 vehicles and two command and control nodes.
- Near Rawah, one strike destroyed an ISIS VBIED factory.
- Near Tuz, one strike engaged an ISIS tactical unit.

In Iraq, on Oct. 1, Coalition military forces conducted one strike consisting of 7 engagements against ISIS targets.

- Near Huwajah, one strike engaged an ISIS tactical unit and destroyed two weapons caches, two command and control nodes, a VBIED facility, a VBIED; and suppressed a tactical unit.

-MORE-

208. Press Release, Combined Joint Task Force Operation Inherent Resolve, Military Strikes Continue Against ISIS Terrorists in Syria and Iraq (Oct. 2, 2017), https://www.inherentresolve.mil/Portals/14/Documents/Strike%20Releases/2017/10October/20171001_02%20Strike%20Release.pdf [<https://perma.cc/ZNE4-YQT7>].

To develop the dataset, we combined automated text analysis in R with careful hand-coding. First, we distilled all the unique target terms from the press-release text and reduced them to their stem letters (known as “stemming” in text-analysis methodology). This required extracting the targets from the text, which includes many terms that do not identify distinct targets. In the press release in Figure 1, for example, the first strike event listed under September 30, 2017, is stemmed into the following: “near abu kamal three strike destroy isi wellhead engag two tacticalunit.” We then eliminated terms that were action verbs (“strike”); locations (“abu kamal”); numbers (“two”); or other (“isi[s/l]”). For this entry, that leaves two targets: “wellhead” and “tacticalunit.” We aggregated target terms across all the entries in the press releases and generated a spreadsheet with all the unique terms across all the press releases to generate a list of unique target terms for coding. This was an iterative process informed by the team’s deep knowledge of the context, as some terms required surrounding text to code. In the press release above, for example, the term “facility” is modified by “VBIED” (vehicle-borne improvised explosive device). Coders identified “VBIED facility” as a term that should be coded as a distinct term. When such multiword terms were identified by coders, they were added to the code and thus appeared as distinct target terms.

We developed fifteen categories based on prior literature on dual-use objects; our knowledge of the conflicts in Iraq and Syria; ground reporting and field research in both contexts; reporting by the NGO Airwars; and careful review of our primary-source documents, especially the coalition civilian-casualty assessments.²⁰⁹ One category aggregates single-use targets: military personnel, equipment, and facilities. Then there are fourteen dual-use categories: (1) water infrastructure; (2) medical facilities; (3) electrical infrastructure; (4) prison and detention facilities; (5) religious, cultural, and historical sites; (6) educational facilities; (7) residential buildings; (8) oil infrastructure; (9) transportation infrastructure; (10) media and telecom facilities; (11) financial and banking facilities; (12) manufacturing, production, and construction; (13) vehicles (excluding those specifically identified as vehicles used in the oil sector and military vehicles); and (14) terrain. Indeed, we see one of the contributions of this Article as providing a detailed, grounded account of what objects fall into the “dual-use” category.

In analyzing the U.S. government’s targeting practices, we recognize that a challenge in the study of military targeting decisions is that researchers rarely have access to the underlying intent and intelligence behind a particular strike. Public justifications are often incomplete. Given this, and given the United States’s policy of complying with its interpretation of international humanitarian

209. See *supra* Section II.A.

law, we assume that all objects intentionally targeted by the coalition were assessed to be lawful military objectives. Hence we identify as dual-use objects those objects that are known to have civilian uses that were identified in the press releases as targets. In doing so, we acknowledge that the coalition has frequently struck purely civilian objects unintentionally or “by mistake,” as two of the authors have documented in another article.²¹⁰

Figure 2 shows the most common targets from October 2, 2014, to December 19, 2018, by the number of times each target type appeared in press releases each quarter. Notably, several categories of civilian objects do not appear in the press releases at all and therefore do not appear in Figure 2: medical facilities; religious, cultural, and historical sites; and educational facilities. Prison facilities appear only once in the press releases and so are also not included in the figure.²¹¹ As we explain more fully in Section II.C, this does not mean that they were not hit by coalition strikes, just that they were not acknowledged in the press releases. In fact, evidence from ground reporting discussed below indicates that coalition strikes did hit schools; medical facilities; and religious, cultural, and historical sites. While the number of incidents of such strikes in the press releases was relatively small compared to some of the other categories, the impact, as can be seen from the ground reporting described in Section II.C, was often devastating.

Several additional points are important to note. In coding targets, we took the characterization of targets in the press releases at face value. For the purpose of constructing the database, we did not examine whether there was other available information suggesting that a target identified as, for example, an “ISIS headquarters” might have also been something else – a school, apartment building, or hospital. If the press release identified the target as one that fell within “military personnel, equipment, or facilities,” we did not second-guess that characterization. As we explain in detail in Section II.C, we know with certainty that this approach *undercounts* dual-use objects, because press releases generally characterize a target based on its purported military use – the reason the object was targeted – without acknowledging the civilian purposes it may also have served. Dual-use objects were often identified as “ISIS-held,” “ISIL-held,” or modified

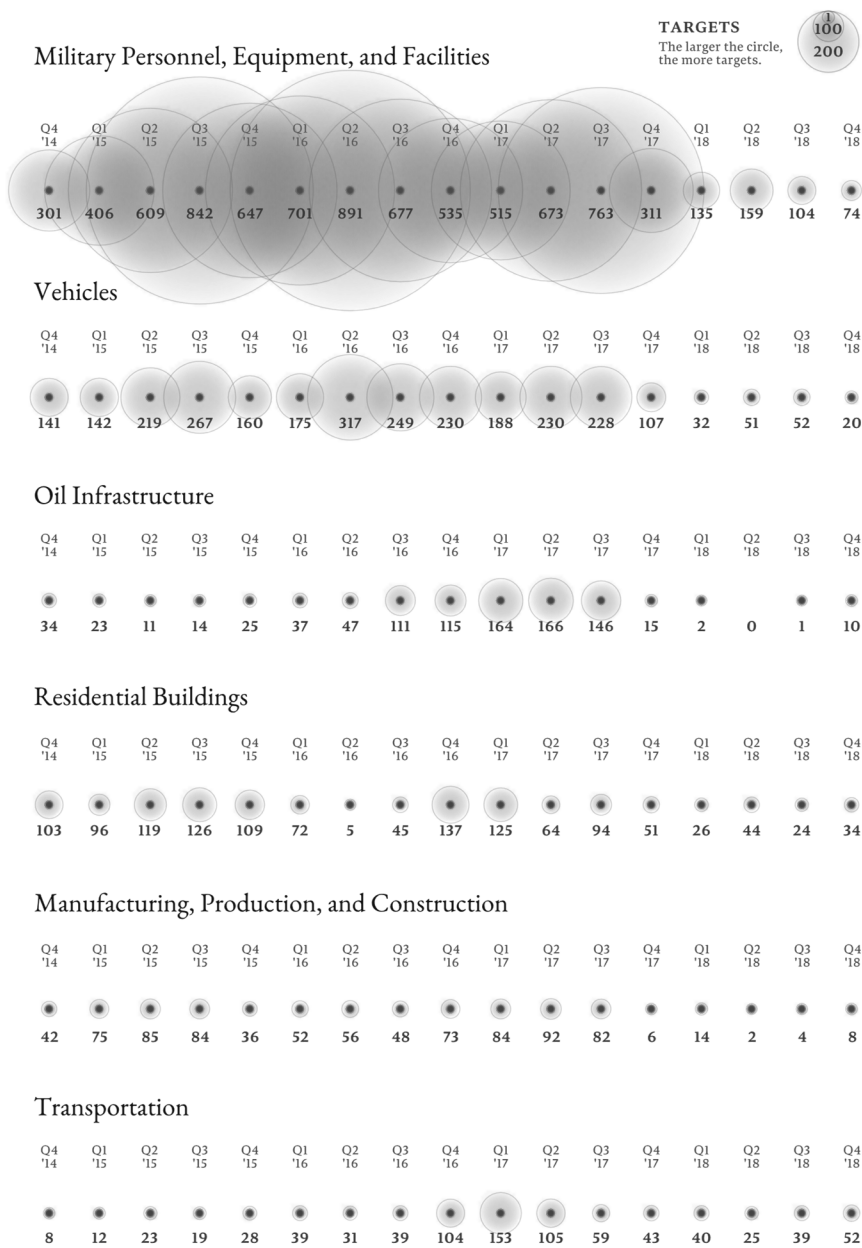
210. See generally Oona A. Hathaway & Azmat Khan, “Mistakes” in War, 173 U. PA. L. REV. 1 (2024) (documenting this finding). Because these objects were not targets of the strikes, we do not include them in our taxonomy of dual-use objects that are targeted.

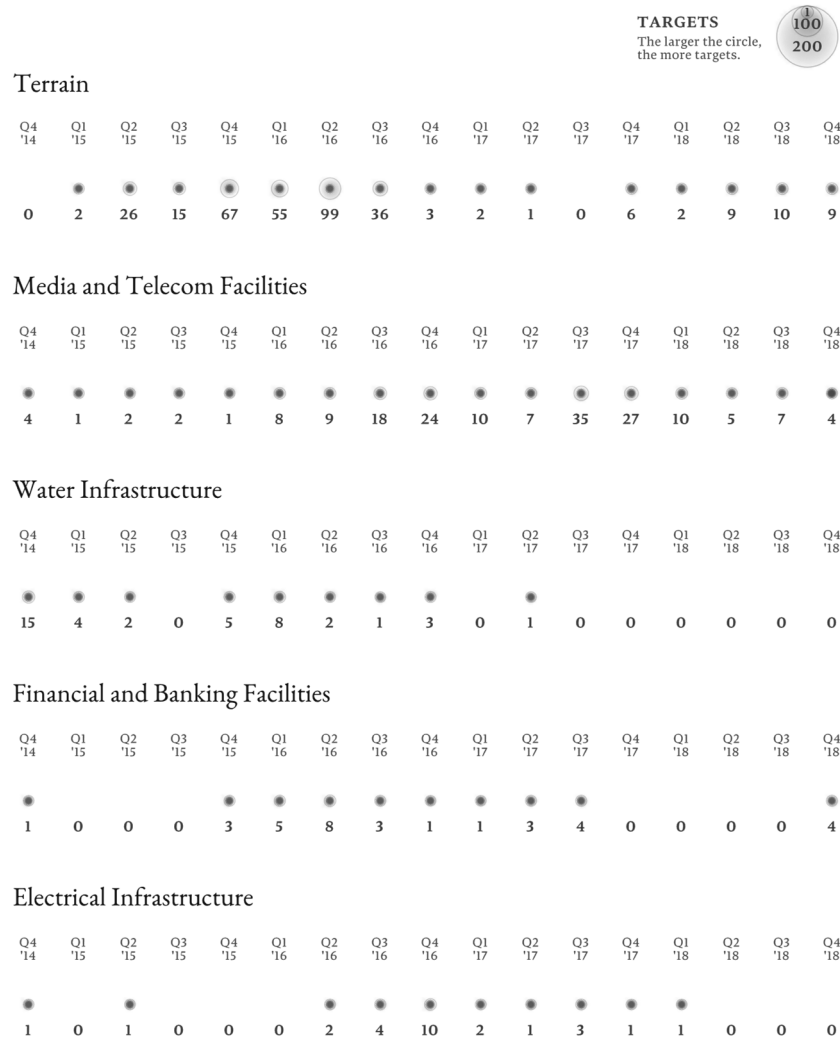
211. Press Release, *supra* note 208 (“During a Coalition strike that destroyed an ISIS detention facility, it was assessed that eight civilians were unintentionally killed.”). The coalition civilian-casualty report for this incident indicated that as many as forty-two civilians were detained at the facility and assessed that it was more likely than not that eight were killed. Memorandum on CIVCAS Credibility Assessment Report (CCAR) for Allegation 560, Mayadin, Syria, 26 June 2017, at 1 (July 21, 2017), <https://int.nyt.com/data/documenttools/c-6-26-17-syria/aad35f38d304a163/full.pdf> [<https://perma.cc/KT6T-7Y7R>].

simply with “ISIS” or an equivalent (“Daesh” or “ISIL”). For example, the press release in Figure 1 identifies an “ISIS well head.” In those cases, we characterized the target based on the object (e.g., a well head would be categorized as “oil production”).

Figure 2 shows the number of targets in each category as identified in the press releases, per quarter, from October 2014 through the end of 2018. The categories shown in Figure 2 are ordered from most frequently targeted at the top (military personnel, equipment, and facilities) to least frequently targeted at the bottom (electrical infrastructure). It is perhaps no surprise that by U.S. Central Command’s own characterization of its targets, the most frequent target is military personnel, equipment, or facilities. But the press releases acknowledge substantial numbers of dual-use targets as well.

FIGURE 2. TARGETS IN IRAQ AND SYRIA, AS DESCRIBED IN PRESS RELEASES





What is critically important about these data for our purposes is that even the U.S. military’s own press releases often identify strikes on objects that would commonly be characterized as dual-use objects. The precise character of the dual-use objects targeted changed over time, in part due to variation between more rural and more urban battlespaces. This variation can be seen by comparing the sites of the two largest battles of OIR: Mosul in Ninewa Governorate, ISIS’s Iraqi capital, and Raqqa in Raqqa Governorate, ISIS’s Syrian capital.

Figure 3 shows the targets as reflected in the press releases identifying strikes in the district of Mosul, which includes the city of Mosul – Iraq’s second-largest city, controlled by ISIS for more than three years as its Iraqi “capital” starting in June 2014.²¹² Again, the categories shown in Figure 3 are ordered from most frequently targeted at the top (military personnel, equipment, and facilities) to least frequently targeted at the bottom (financial and banking facilities).

Mosul was recaptured by Iraqi ground forces backed by significant airpower from the U.S.-led coalition after a devastating nine-month battle between October 2016 and July 2017, described by senior military commanders at the time as “the most significant urban combat . . . since World War II.”²¹³ The victory came at an enormous cost: at least 5,000 civilians were killed,²¹⁴ and tens of thousands of homes suffered more than \$5 billion of damage.²¹⁵ Only some of this is reflected in the press releases and therefore in Figure 3. But Figure 3 does reflect the destruction of transportation infrastructure, the second most common dual-use target (the first was vehicles). Notably, among the critical transportation infrastructure targeted were all five major bridges in Mosul, which were destroyed

212. See Margaret Coker, *After Fall of ISIS, Iraq’s Second-Largest City Picks Up the Pieces*, N.Y. TIMES (Dec. 10, 2017), <https://www.nytimes.com/2017/12/10/world/middleeast/iraq-isis-mosul.html> [https://perma.cc/63NU-MYMV]; see also Mara R. Revkin, *Competitive Governance and Displacement Decisions Under Rebel Rule: Evidence from the Islamic State in Iraq*, 65 J. CONFLICT RESOL. 46, 54–57 (2021) (describing ISIS’s capture and governance of Mosul in more detail).

213. *Department of Defense Briefing by Gen. Townsend via Telephone from Baghdad, Iraq*, U.S. DEP’T DEF. (Mar. 28, 2017), <https://www.defense.gov/News/Transcripts/Transcript/Article/1133033/departments-of-defense-briefing-by-gen-townsend-via-telephone-from-baghdad-iraq> [https://perma.cc/EZ3D-TDFS].

214. See Jane Ferguson, *Why the Human Toll of the Battle for Mosul May Never Be Known*, PBS NEWS (Dec. 19, 2018, 6:30 PM EST), <https://www.pbs.org/newshour/show/why-the-human-toll-of-the-battle-for-mosul-may-never-be-known> [https://perma.cc/6CGH-SPPZ].

215. *Iraq Reconstruction & Investment Part 2: Damage and Needs Assessment of Affected Governorates*, WORLD BANK GRP. [WBG] 14 (Jan. 2018), <https://documents1.worldbank.org/curated/en/600181520000498420/pdf/123631-REVISED-Iraq-Reconstruction-and-Investment-Part-2-Damage-and-Needs-Assessment-of-Affected-Governorates.pdf> [https://perma.cc/G6BF-TCWS].

in an effort to hinder ISIS's resupply efforts.²¹⁶ Residential buildings are the third most common dual-use target across the conflict, as reflected in the press releases. Manufacturing, production, and construction was the fourth most common dual-use target. Oil infrastructure was also heavily targeted, not in Mosul city itself but in less urban areas of Mosul district, including the Qayarah refinery thirty-seven miles south of the city.

Our data and other sources indicate that airstrikes targeting Mosul peaked in the second quarter of 2017 with an average of 150 strikes per month.²¹⁷ However, airstrikes then dropped off rapidly in the final months of the battle ending in the fourth quarter of 2017 as the coalition diverted resources from Iraq to Syria, where the battle for Raqqa, described in more detail below, was intensifying.²¹⁸ This decline is clearly visible in Figure 3. The decrease in targeting of some dual-use categories in the final months of the battle, notably transportation infrastructure; residential buildings; and manufacturing, production, and construction, likely reflects not only the slowdown in military operations as ISIS lost ground but also the sharp reduction in the number of potential remaining targets: for example, once all five bridges were destroyed, there were none left to target and ISIS did not rebuild them.²¹⁹

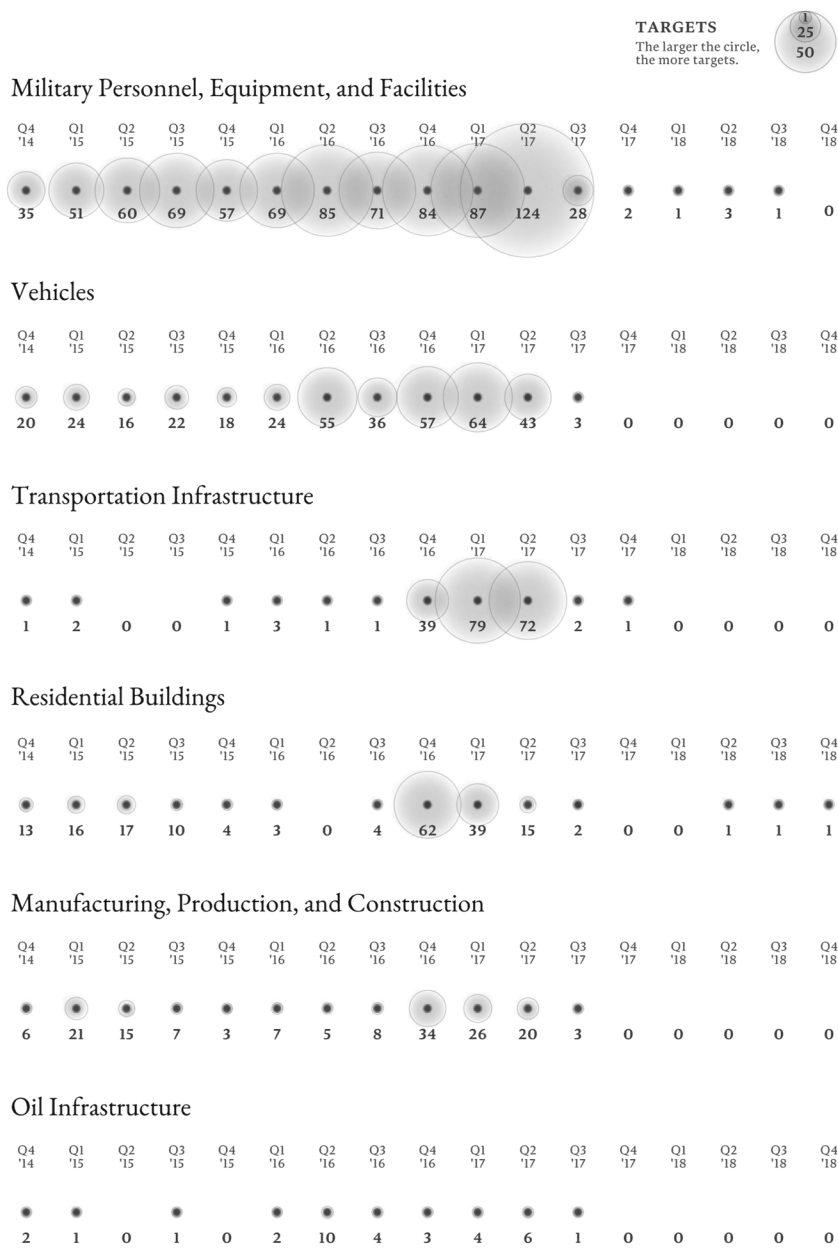
216. Thomas Gibbons-Neff, *As Fight in Mosul Slows, Last Bridge in the City Is Hit by an Airstrike*, WASH. POST (Dec. 28, 2016, 6:00 AM EST), <https://www.washingtonpost.com/news/checkpoint/wp/2016/12/28/as-fight-in-mosul-slows-last-bridge-in-the-city-is-hit-by-an-airstrike> [<https://perma.cc/NND4-ZPSA>].

217. Wasser et al., *supra* note 166, at 172, 406 (indicating that there were 455 total strikes in Mosul in the second quarter of 2017).

218. *Id.* at 185.

219. Tessa Fox, *Mosul's Damaged Bridges Frustrate Residents & Efforts to Rebuild*, AL JAZEERA (July 10, 2019), <https://www.aljazeera.com/economy/2019/7/10/mosuls-damaged-bridges-frustrate-residents-efforts-to-rebuild> [<https://perma.cc/44LP-4AEW>].

FIGURE 3. TARGETS IN MOSUL, IRAQ, AS DESCRIBED IN PRESS RELEASES



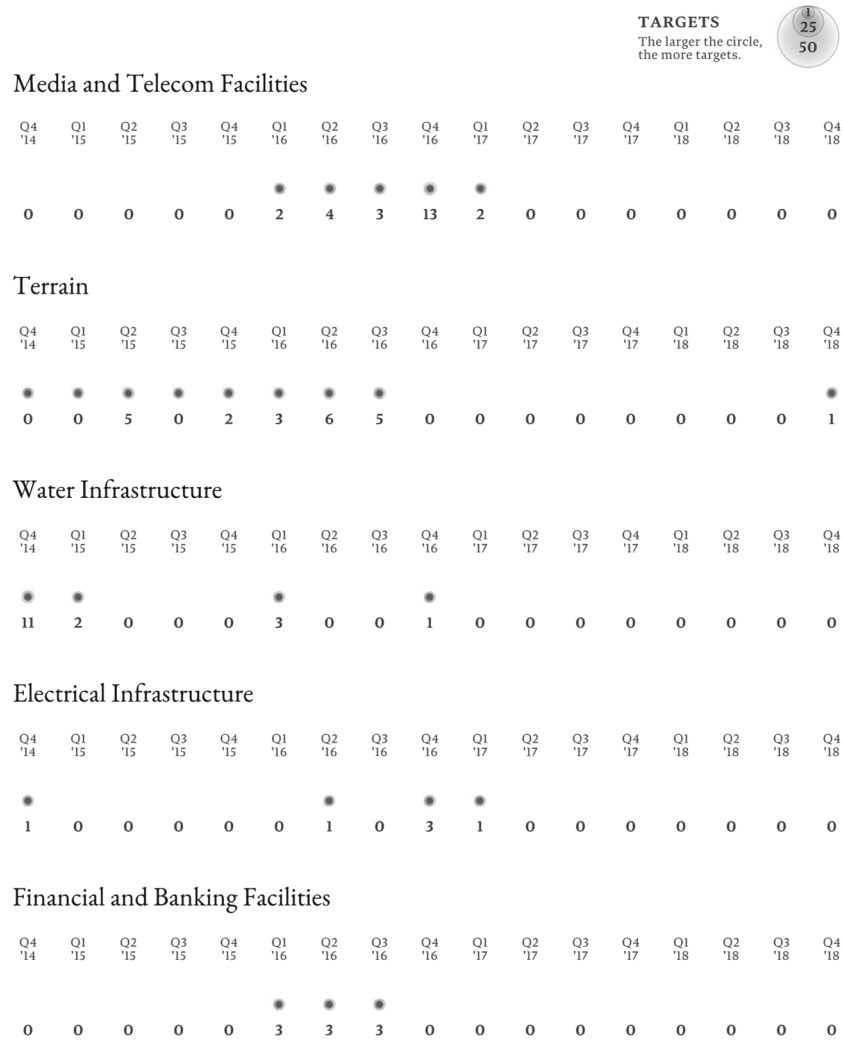


Figure 4 shows the targets in the Syrian district of Raqqa, including the city of Raqqa, the second most frequently targeted location in our dataset, as reflected in the press releases identifying strikes. Again, the categories shown in Figure 4 are ordered from most frequently targeted at the top (military personnel, equipment, and facilities) to least frequently targeted at the bottom (terrain).

After prevailing among several rebel groups competing for control of Raqqa in June 2014, ISIS controlled the city as its Syrian “capital” for more than three years until its recapture by coalition forces in October 2017.²²⁰ In contrast with Mosul, where coalition airpower supported well-equipped and capable elite Iraqi Counter-Terrorism Service forces, the coalition relied on weaker nonstate ground forces in Syria, primarily the Syrian Democratic Forces (SDF). The SDF had many fewer armored vehicles and heavy artillery weapons than Iraqi forces, relying heavily on light weapons and improvised civilian vehicles fitted with mounted guns.²²¹ As a result of these limitations, the SDF required more support from coalition airstrikes during the battle for Raqqa than did Iraqi forces in Mosul. Another important difference between the two battles was that the coalition had dropped leaflets on Raqqa encouraging civilians to flee before the battle began in June 2017.²²² In contrast, the coalition’s leaflets and other communications in Mosul advised civilians to shelter in place.²²³ The evacuation of civilians from Raqqa was a factor in the higher frequency of airstrikes there in comparison with Mosul, where concern for civilians trapped inside the city was

220. Anne Barnard & Hwaida Saad, *Raqqa, ISIS ‘Capital,’ Is Captured, U.S.-Backed Forces Say*, N.Y. TIMES (Oct. 17, 2017), <https://www.nytimes.com/2017/10/17/world/middleeast/isis-syria-raqqa.html> [<https://perma.cc/T36W-MJUN>].

221. See, e.g., Ed Nash, *Mobile and Armoured Forces of the Syrian Democratic Forces Against ISIS*, MIL. MATTERS (Aug. 27, 2021), <https://militarymatters.online/military-history/mobile-and-armoured-forces-of-the-syrian-democratic-forces-against-isis> [<https://perma.cc/TK94-CFXK>]; Dave Eubank, *Mission Report: Visiting Syria with Congressman Tom Garrett*, FREE BURMA RANGERS (Dec. 11, 2018), <https://www.freeburmarangers.org/2018/12/11/mission-report-visiting-syria-congressman-tom-garrett> [<https://perma.cc/LJR6-X7KW>] (describing a meeting with the Syrian Democratic Forces who “were armed with light machine guns and RPGs and had a few heavy machine guns but no larger weapon systems nor organic artillery” and said “[w]e need more air support”); Michael J. McNerney, Gabrielle Tarini, Nate Rosenblatt, Karen M. Sudkamp, Pauline Moore, Michelle Grisé, Benjamin J. Sacks & Larry Lewis, *Understanding Civilian Harm in Raqqa and Its Implications for Future Conflicts*, RAND CORP. 92 (Mar. 31, 2022), https://www.rand.org/content/dam/rand/pubs/research_reports/RR700/RR753-1/RAND_RRA753-1.pdf [<https://perma.cc/9LFY-2VQU>] (“[T]he SDF required more air support to compensate for its lack of organic fires and defenses.”).

222. McNerney et al., *supra* note 221, at 44.

223. Paul D. Shinkman, *Reports: Mosul Civilians Without Escape Route on Eve of ISIS Fight*, U.S. NEWS & WORLD REP. (Oct. 31, 2016), <https://www.usnews.com/news/world/articles/2016-10-31/reports-mosul-civilians-without-escape-route-on-eve-of-isis-fight> [<https://perma.cc/5RTQ-RC9A>].

a factor in the relatively more restrained pace of airstrikes – an average of 189 strikes per month in Mosul compared with 704 strikes per month in Raqqa.²²⁴ (Nonetheless, residential buildings were targeted more frequently in Mosul, where they were the third most targeted dual-use object, than in Raqqa, where they were the sixth most targeted dual-use object, according to the press releases.)

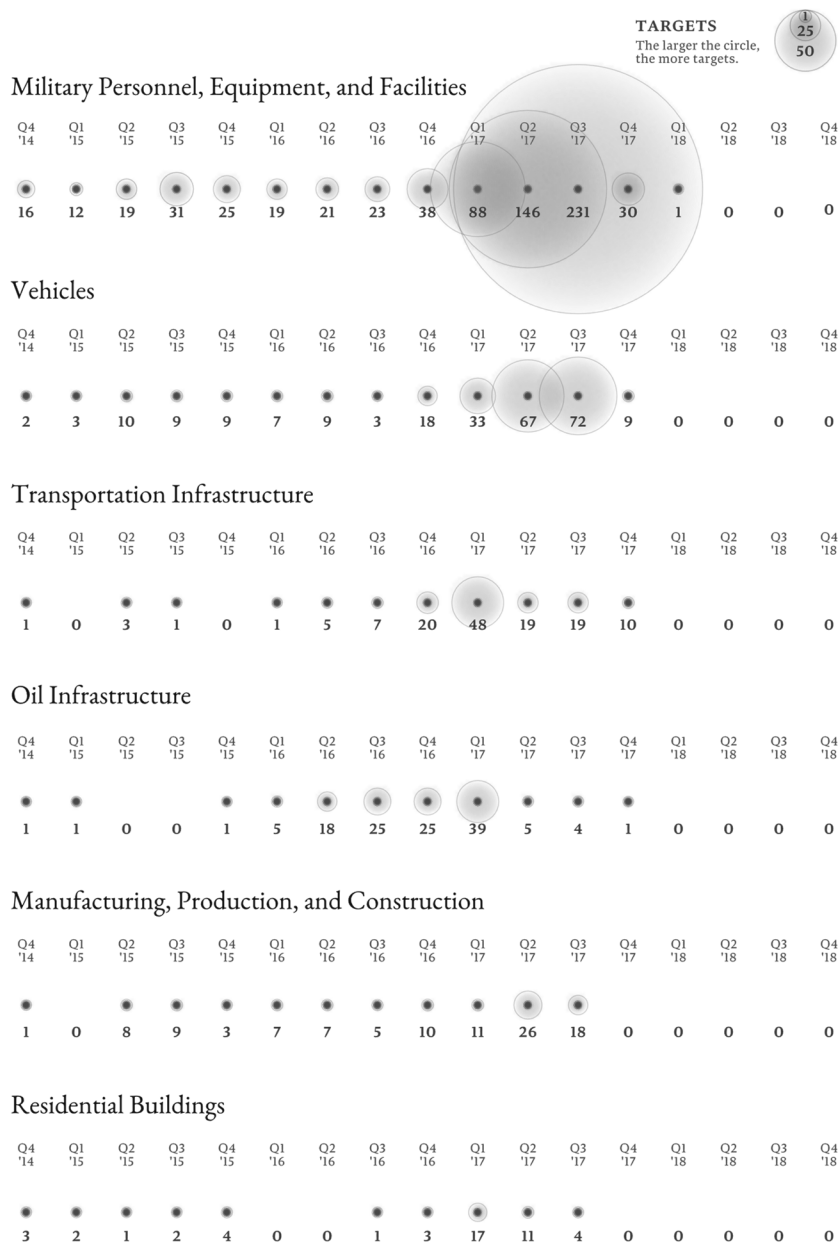
In Raqqa, transportation infrastructure was the second most common dual-use target after vehicles, followed by oil infrastructure and manufacturing, production, and construction. Although military personnel, equipment, and facilities were targeted much more frequently than any of the dual-use categories in both Raqqa and Mosul, the loss of less frequently targeted dual-use objects could be utterly devastating: the Tabqa Dam, which supplied access to clean drinking water and electricity to residents, was struck by coalition forces, but that strike was never explicitly identified in the daily strike releases.²²⁵ That and other strikes on water and electrical infrastructure left residents not only without basic necessities but also unable to continue the agriculture for which the region had been known. The fighting left the city in ruins. In 2022, thirty percent of the city remained destroyed.²²⁶

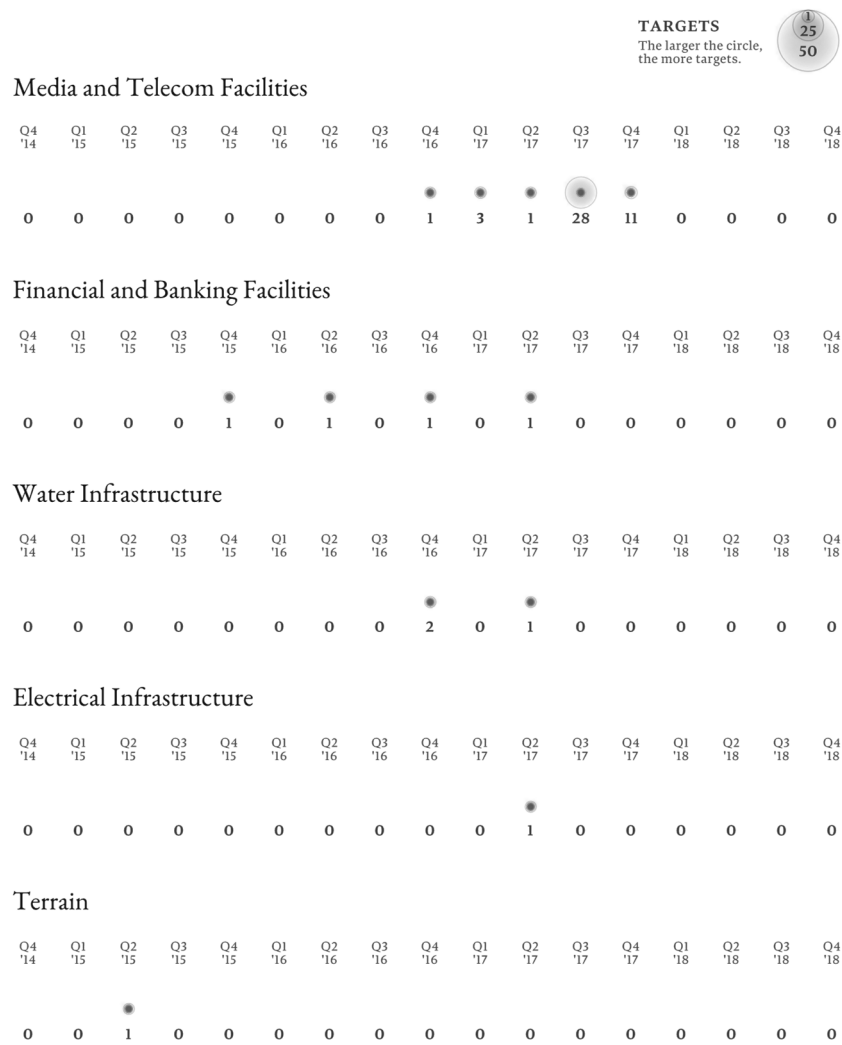
224. Wasser et al., *supra* note 166, at 103.

225. See *infra* text accompanying notes 227–245.

226. Samya Kullab, *In One-Time ISIS Capital of Raqqa, Poverty and Fear Drive Residents Out*, PBS NEWS (Feb. 22, 2022, 1:02 PM EST), <https://www.pbs.org/newshour/world/in-one-time-isis-capital-of-raqqa-poverty-and-fear-drive-residents-out> [<https://perma.cc/3NL2-D7LF>].

FIGURE 4. TARGETS IN RAQQA, SYRIA, AS DESCRIBED IN PRESS RELEASES





Across these different locations, a central finding holds: dual-use objects were, even by the U.S. military’s own public accounts, struck during coalition military operations. The precise mix of dual-use objects varied by location, based in part on which objects were available to be targeted and deemed by the coalition to be important to countering ISIS in that location. It is also clear that the full range of dual-use objects affected by these operations, and the impact of their destruction on the civilian population, is not accurately reflected in the press releases. For a more complete and accurate accounting, it is necessary to draw on a range of open sources and ground sources. It is to this more complete account that we now turn.

C. Dual-Use Objects in Practice

Here we assess the fourteen categories of dual-use targets in OIR by drawing on information from a variety of sources, including civilian-casualty reports, NGO reports, and ground reporting by one of the authors, Azmat Khan. This multifaceted analysis is essential. No other single source provides the nuanced information that is necessary to assess the true nature of the targets on the ground.

1. Water Infrastructure

On March 26, 2017, explosions tore through Syria’s largest dam, sparking fire in the control room, failure of crucial equipment, and the steady rise of its enormous reservoir.²²⁷ The Tabqa Dam and hydroelectric power plant sit on the Euphrates River above a valley where hundreds of thousands of people live. Local authorities instructed residents to flee, and panic spread downstream.²²⁸ ISIS militants had control of the dam, where they had operated in parts of towers, but civilians still worked there, and it functioned as the main source of water, energy, and irrigation throughout Raqqa and beyond.²²⁹ Now, coalition and partner Syrian forces were determined to retake it in their offensive to liberate the group’s declared capital, and they were keen to prevent ISIS from intentionally flooding nearby Syrian forces.²³⁰

227. Dave Philipps, Azmat Khan & Eric Schmitt, *A Dam in Syria Was on a ‘No-Strike’ List. The U.S. Bombed It Anyway.*, N.Y. TIMES (Jan. 20, 2022), <https://www.nytimes.com/2022/01/20/us/airstrike-us-isis-dam.html> [<https://perma.cc/7PPC-MZ2M>].

228. *Id.*

229. *See id.*

230. *See id.*

Two days later, as reports circulated that the dam had been damaged in coalition airstrikes, then-Lieutenant General Stephen J. Townsend called it “crazy reporting” and insisted that the dam had not been structurally compromised.²³¹ “The dam is not a coalition target,” he told reporters.²³² This claim seemed consistent with coalition policy, which identified protected “no-strike facilit[ies],” or NSFs, broken down by their level of sensitivity, with the most sensitive subset known as CAT1, or Category 1.²³³ Dams are in Category 1,²³⁴ requiring elaborate vetting before removal from the no-strike list.²³⁵ In the weeks before the explosions, “specialized engineers” in the Defense Intelligence Agency’s defense resources and infrastructure office issued a report warning against striking the dam.²³⁶

But as one of the authors reported for the *New York Times* in 2022, “members of a top secret U.S. Special Operations unit called Task Force 9 had struck the dam using some of the largest conventional bombs in the U.S. arsenal,” bypassing standard vetting by calling the attack an emergency “self-defense” strike — suggesting U.S. or partner forces were under fire.²³⁷ Coalition records about the strike did not mention heavy fire nor enemy forces attacking, and instead stated that the three targets at the dam were “terrain denial targets.”²³⁸ Three 2,000-pound bombs had penetrated several stories of the dam, setting a fire in the control room, damaging water pumps, short-circuiting electrical equipment, and causing water to rise.²³⁹

Disaster was only averted, according to reporting at the site of the airstrike, because of a secretly brokered pause in hostilities so that a team of emergency workers could get to the site and repair it.²⁴⁰ After successfully finishing the repair job, three civilian workers — a mechanical engineer, a technician, and a

231. *Department of Defense Briefing by Gen. Townsend via Telephone from Baghdad*, *supra* note 213.

232. *Id.*

233. Memorandum from Curtis M. Scaparrotti, Dir., Joint Staff, on No-Strike and the Collateral Damage Estimation Methodology, at B-1 to B-2 (Oct. 12, 2012), <https://int.nyt.com/data/documenttools/no-strike-collateral-damage-estimation/6632f2785aff5bba/full.pdf> [<https://perma.cc/TW6R-5J82>] (defining Category 1 targets).

234. *Id.* at B-2.

235. *Id.* at B-1 (describing Category 1 no-strike facilities as the “core of the [no-strike list]”); *see id.* at C-B-3 to C-B-5 (describing the complex process of removal from the no-strike list).

236. Philipps et al., *supra* note 227.

237. *See id.*

238. Memorandum on CIVCAS Allegation Closure Report, Allegation No. 1067, Raqqa, Syria, 26 March 2017, at 1 (Feb. 2018), <https://int.nyt.com/data/documenttools/nc-3-27-17-syria/bff38494ffb87814/full.pdf> [<https://perma.cc/7EAJ-5KUA>].

239. Philipps et al., *supra* note 227.

240. *See id.*

Syrian Red Crescent worker—piled into a van and left.²⁴¹ More than a mile away from the site, the car was struck in a coalition airstrike, killing all three, according to local interviews in Tabqa by one of the authors²⁴² as well as local sources tracked by Airwars.²⁴³ Were it not for those civilian responders, however, “the destruction would have been unimaginable,” a former director at the dam said.²⁴⁴ “The number of casualties would have exceeded the number of Syrians who have died throughout the war.”²⁴⁵

While dams are some of the most vetted targets, the Tabqa Dam attack demonstrates not only how military officials can exploit rules to bypass safeguards, but also the potentially disastrous and far-reaching effects on civilians, from flooding and loss of life to the destruction of farmland, environment, and hydroelectric power.

Though they tend to draw less attention than major dams in war zones, water-treatment plants and water-supply facilities are also considered Category 1 targets on the no-strike list, serving essential functions for local populations,²⁴⁶ and their damage can have lasting reverberating effects in war zones. On December 12, 2015, the coalition published a video of an airstrike depicting the destruction of what it characterized as an “ISIL vehicle borne improvised explosive devices (VBIED) factory.”²⁴⁷ The video, which depicted a building within a compound as it was struck followed by secondary explosions, made no mention of what the compound itself was: Qayyarah’s main water-treatment plant.²⁴⁸ While ISIS had indeed taken over the facility and stored explosives there, the treatment center still also functioned as critical local infrastructure.²⁴⁹ Visits to the site of the treatment center in 2016 and 2017 and interviews with locals revealed the extent of its damage and the subsequent effects on the local population.²⁵⁰

241. *See id.*

242. *See id.*

243. *Civilian Casualties Incident Code CS627*, AIRWARS, <https://airwars.org/civilian-casualties/cs627-march-27-2017> [<https://perma.cc/6TMR-ZEVG>] (describing the strike on the van on March 27, 2017, and the killing of the civilian workers).

244. Philipps et al., *supra* note 227.

245. *Id.*

246. Memorandum from Curtis M. Scaparrotti, *supra* note 233, at B-2.

247. *Dec 7: Coalition Strike Destroys ISIL VBIED Factory*, DEF. VISUALS INFO. DISTRIB. SERV. (Dec. 12, 2015), <https://www.dvidshub.net/video/442264/dec-7-coalition-strike-destroys-isil-vbied-factory> [<https://perma.cc/JV5U-GTQX>].

248. Azmat Khan, Ground Reporting in Qayyarah (Oct. 2016–May 2017) (unpublished reporting for Khan & Gopal, *supra* note 198) (on file with authors).

249. *Id.*

250. *Id.*

When first contacted about this strike site, the coalition denied hitting it, claiming that the nearest airstrike in coalition logs that day was more than 600 meters away.²⁵¹ When presented with the coalition's own videos of strikes contradicting the denials,²⁵² the coalition admitted that its airstrike logs only tracked one coordinate for a group of multiple hits.²⁵³ In fact, the coalition had struck within the water-sanitation compound three separate times, rendering the plant ineffective.²⁵⁴

Allegations of strikes damaging water-supply and water-treatment facilities were frequent in interviews with locals,²⁵⁵ media reports, and Airwars coverage,²⁵⁶ but coalition press releases, assessments, and records rarely mentioned that the target was within a critical piece of infrastructure. For example, claims that a January 2016 airstrike on the local water company in al-Jarnia, Raqqa, had killed several workers²⁵⁷ resulted in a credible civilian-casualty assessment of three killed.²⁵⁸ But the public press release described it as a strike on "an ISIS

251. Khan & Gopal, *supra* note 198.

252. See *Mar. 24 Coalition Conducts Strike on Daesh Controlled Bridge Near Qayyarah, Iraq*, DEF. VISUALS INFO. DISTRIB. SERV. (Apr. 3, 2016), <https://www.dvidshub.net/video/457080/mar-24-coalition-conducts-strike-daesh-controlled-bridge-near-qayyarah-iraq> [<https://perma.cc/Q454-CV3D>] (showing footage from a March 24, 2016 incident).

253. See Khan & Gopal, *supra* note 198.

254. Khan, *supra* note 248.

255. Azmat Khan, Ground Reporting in Qayyarah, Mosul, Shora, Raqqa, Hawija, and Ramadi (Oct. 2016-June 2021) (unpublished reporting for Khan, *supra* note 186) (on file with authors).

256. See CIVCAS Cell Initial Assessment, Allegation # 766, at 1 (June 21, 2017), <https://int.nyt.com/data/documenttools/nc-12-5-16-syria/eb3a09a2f5a40355/full.pdf> [<https://perma.cc/6JAY-MT4N>] (describing a December 5, 2016 incident); *Civilian Casualties Incident Code CS880*, AIRWARS, <https://airwars.org/civilian-casualties/cs880-may-28-2017> [<https://perma.cc/RT4D-HBWY>] (describing a May 28, 2017 incident); *Civilian Casualties Incident Code CS1537*, AIRWARS, <https://airwars.org/civilian-casualties/cs1537-september-28-2017> [<https://perma.cc/BV3G-EZ8F>] (describing a September 28, 2017 incident); *Civilian Casualties Incident Code CS561*, AIRWARS, <https://airwars.org/civilian-casualties/cs561-march-9-2017> [<https://perma.cc/3UPT-FURX>] (describing a March 9, 2017 incident); *Civilian Casualties Incident Code CS403*, AIRWARS, <https://airwars.org/civilian-casualties/cs403-december-5-2016> [<https://perma.cc/YEY9-MH3A>] (describing a December 5, 2016 incident); *Civilian Casualties Incident Code CS162*, AIRWARS, <https://airwars.org/civilian-casualties/cs162-january-5-2016> [<https://perma.cc/3GNS-UW9X>] (describing a January 5, 2016 incident).

257. *Civilian Casualties Incident Code CS403*, *supra* note 256 (describing a December 5, 2016 incident).

258. CIVCAS Tracker, Allegation Number 633, at 1 (Nov. 14, 2018), <https://int.nyt.com/data/documenttools/c-1-5-16-syria/5fdf23b50e31bodb/full.pdf> [<https://perma.cc/4CFQ-2QAX>] (describing a January 5, 2016 incident).

headquarters building,” not the water facility.²⁵⁹ The civilian-casualty assessment confirms that photos and videos are consistent with the strike site and states that the expected casualty estimate was considered proportional to the military advantage anticipated.²⁶⁰ But it gives no details about whether the coalition was aware the target was within a water facility or aware of the process through which that facility was removed from a no-strike list.²⁶¹

By the time offensives to retake key territories from ISIS had begun in areas such as west Mosul and Raqqa, the destruction of water-supply and water-treatment facilities was commonplace,²⁶² and local residents were often forced to look for well water or water tanks, which are Category 2 sensitive targets on no-strike lists.²⁶³ But demand was high, and civilians would often wait in long lines, which locals often reported were hit in airstrikes. In a joint report in 2019,²⁶⁴ Amnesty International and Airwars investigated numerous allegations of such strikes on wells²⁶⁵ and water tankers,²⁶⁶ particularly on the ground in Raqqa. “Wells were the only source of drinking water because the Coalition’s bombardments had

259. Press Release, U.S. Cent. Command, Combined Joint Task Force—Operation Inherent Resolve Monthly Civilian Casualty Report (July 7, 2017), <https://www.centcom.mil/MEDIA/PRESS-RELEASES/Press-Release-View/Article/1239870/combined-joint-task-force-operation-inherent-resolve-monthly-civilian-casualty> [<https://perma.cc/LNV9-DYH7>].

260. CIVCAS Tracker, Allegation Number 633, *supra* note 258, at 2.

261. *Id.* at 1-2.

262. See, e.g., “War of Annihilation”: Devastating Toll on Civilians, Raqqa-Syria, AMNESTY INT’L 44 (June 5, 2018), <https://www.amnesty.org.uk/files/reports/War%20of%20annihilation%20report.pdf> [<https://perma.cc/5PJP-KB94>] (detailing deadly airstrikes on water points during the siege of Raqqa).

263. Memorandum from Curtis M. Scaparrotti, *supra* note 233, at B-5.

264. *War in Raqqa: Rhetoric Versus Reality*, AMNESTY INT’L, <https://raqqa.amnesty.org> [<https://perma.cc/7KJ4-ZP95>]; *At Least 1,600 Civilians Died in US-Led Coalition Actions at Raqqa, Major New Study Finds*, AIRWARS (Apr. 25, 2019), <https://airwars.org/news/raqqa-amnesty-airwars> [<https://perma.cc/C9WQ-FMCZ>].

265. See, e.g., *Civilian Casualties Incident Code CS1072*, AIRWARS, <https://airwars.org/civilian-casualties/cs1072-june-24-2017> [<https://perma.cc/QGE7-YYVC>] (describing a June 24, 2017 incident); *Civilian Casualties Incident Code CS1618*, AIRWARS, <https://airwars.org/civilian-casualties/cs1618-october-10-2017> [<https://perma.cc/537H-X3VX>] (describing an October 10, 2017 incident); *Civilian Casualties Incident Code CS1576*, AIRWARS, <https://airwars.org/civilian-casualties/cs1576-october-4-2017> [<https://perma.cc/B9Z6-CN9X>] (describing an October 4, 2017 incident).

266. See, e.g., *Civilian Casualties Incident Code CS1068*, AIRWARS, <https://airwars.org/civilian-casualties/cs1068-june-23-2017> [<https://perma.cc/J3GX-RATM>] (describing a June 23, 2017 incident); *Civilian Casualties Incident Code CS563*, AIRWARS, <https://airwars.org/civilian-casualties/cs563-march-10-2017> [<https://perma.cc/A9JB-8DGU>] (describing a March 10, 2017 incident); CIVCAS Cell Initial Assessment, Allegation # 977, at 1-2 (Aug. 7, 2017), <https://int.nyt.com/data/documenttools/nc-3-10-17-syria/b46b20c0c4a9faa9/full.pdf> [<https://perma.cc/E4MM-QBLL>] (describing the same March 10, 2017 incident).

destroyed the water network pipes. But the Coalition often bombed residents assembled at wells to get water. Many residents were killed in such strikes,” a Raqqa resident whose two cousins had been killed in an airstrike while fetching well water told Amnesty.²⁶⁷ Another witness to a strike that killed as many as thirty-five civilians who were fetching water told Amnesty, “It was very dangerous to fetch water. The Coalition planes often bombed the people gathered at the wells. Didn’t they know that we had no other way of getting water? There was no running water in the city, only wells.”²⁶⁸ Families often reported civilian casualties after moving to locations where there was access to a water well,²⁶⁹ being affected by airstrikes while fetching water from a river,²⁷⁰ and at strikes on water crossings.²⁷¹

2. Medical Facilities

Hospitals and medical facilities are among the most controversial and sensitive targets, classified as Category 1²⁷² and protected whether civilian or military.²⁷³ ISIS often sought to exploit these rules, seizing control of hospitals, even

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267. *Civilian Casualties Incident Code CS1595*, AIRWARS, <https://airwars.org/civilian-casualties/cs1595-october-6-2017> [<https://perma.cc/6G8Q-G9RN>] (describing an October 6, 2017 incident).
268. *Civilian Casualties Incident Code CS1562a*, AIRWARS, <https://airwars.org/civilian-casualties/cs1562a-october-1-2017> [<https://perma.cc/Y3CF-2LUS>] (describing an October 1, 2017 incident).
269. See, e.g., *Civilian Casualties Incident Code CS1429b*, AIRWARS, <https://airwars.org/civilian-casualties/cs1429b-august-13-2017> [<https://perma.cc/J93E-6MBT>] (describing an incident from August 13 to August 18, 2017).
270. See, e.g., *Civilian Casualties Incident Code CS1091*, AIRWARS, <https://airwars.org/civilian-casualties/cs1091-june-26-2017> [<https://perma.cc/W3A7-54UE>] (describing a June 26, 2017 incident).
271. See, e.g., *Civilian Casualties Incident Code CS1662*, AIRWARS, <https://airwars.org/civilian-casualties/cs1662-rs2673-november-2-2017> [<https://perma.cc/SYC5-PYT3>] (describing a November 2, 2017 incident); *Civilian Casualties Incident Code CS1670*, AIRWARS, <https://airwars.org/civilian-casualties/cs1670-november-10-2017> [<https://perma.cc/DP69-GADC>] (describing a November 10, 2017 incident); *Civilian Casualties Incident Code CS1495*, AIRWARS, <https://airwars.org/civilian-casualties/cs1495-september-15-2017> [<https://perma.cc/K98H-TZSU>] (describing a September 15, 2017 incident).
272. Memorandum from Curtis M. Scaparrotti, *supra* note 233, at B-1, B-2.
273. See *id.* at B-2. Notably, Additional Protocol I provides that the protection due to hospitals may “cease only after a warning has been given setting, whenever appropriate, a reasonable time-limit, and after such warning has remained unheeded.” See Additional Protocol I art. 13(1), *supra* note 22. The United States and Israel are not parties to the Protocol. See *Protocol Additional to the Geneva Conventions of 12 August 1949, and Relating to the Protection of Victims of International Armed Conflicts (Protocol I)*, 8 June 1977., ICRC INT’L HUMANITARIAN L.

as they continued to serve civilians, while ensuring their fighters received priority treatment.²⁷⁴

In cases where the coalition would hit a major hospital, records indicate it had made an assessment that the target no longer functioned as a hospital and cited an alternative use. For example, for a February 2017 airstrike that hit Mosul's Ibn Senna Hospital medical complex (formerly known as al-Jamhuri Hospital), the coalition identified the target not as a hospital but as a “former hospital” that functioned as an ISIS headquarters and propaganda center.²⁷⁵ It said that “ISIS did not use the building for any medical purposes”²⁷⁶ and that it had four reports that “civilians had left the facility” the previous month.²⁷⁷ Even so, in the week before the bombing, according to assessment records, the coalition captured still images of “the presence of children interacting with the facility,” but the strike was authorized to be carried out at night to “mitigate” for potential civilians in the vicinity.²⁷⁸ In poststrike surveillance video, the coalition spotted children being carried out of the rubble of the partially collapsed building.²⁷⁹ It also reviewed video released by ISIS's media wing, Amaq, “depicting medical staff carrying away dead bodies from beneath rubble and images of two injured children lying on what appear to be hospital beds.”²⁸⁰ Ultimately, the coalition admitted four civilians were killed and six were injured, and a “process and procedure [for after-action review]” was directed by the command.²⁸¹ The public press release announcing the incident made no mention of the hospital or medical complex, describing it as a “strike on an ISIS headquarters building.”²⁸²

DATABASES, <https://ihl-databases.icrc.org/en/ihl-treaties/api-1977/state-parties> [<https://perma.cc/U3BW-QPSV>].

274. Riyadh Lafta, Valeria Cetorelli & Gilbert Burnham, *Health and Health Seeking in Mosul During ISIS Control and Liberation: Results From a 40-Cluster Household Survey*, 13 DISASTER MED. & PUB. HEALTH PREPAREDNESS 758, 759–66 (2019).

275. Memorandum on CIVCAS Credibility Assessment Report (CCAR) for Strike [redacted] (Allegation 345) 1 (Apr. 25, 2017), <https://int.nyt.com/data/documenttools/c-2-18-17-iraq/b7249994dc5fca11/full.pdf> [<https://perma.cc/67C2-JKWT>] (describing a February 18, 2017 incident).

276. Press Release, CJTF-OIR Public Affairs, Coalition Forces Strike Five-Story Facility in Mosul (Feb. 18, 2017), <https://www.inherentresolve.mil/NEWSROOM/JOJTF-Releases/Article/1088363/coalition-forces-strike-five-story-facility-in-mosul> [<https://perma.cc/CT2V-7LUU>].

277. Memorandum on CIVCAS Credibility Assessment Report (CCAR) for Strike [redacted] (Allegation 345), *supra* note 277, at 2.

278. *See id.* at 2–3.

279. *Id.* at 1.

280. *Id.*

281. *Id.* at 4, 6.

282. Press Release, *supra* note 259.

In a December 2016 airstrike on al-Salam Hospital in East Mosul, the coalition issued a public release describing the circumstances that preceded the strike, and it again described the hospital as used by ISIS “as a base of operations and command and control headquarters.”²⁸³ As Iraqi forces were attempting to retake the hospital complex from ISIS forces, they reported coming under “heavy and sustained machine gun and rocket propelled grenade fire” from fighters in one of the hospital-complex buildings, resulting in the coalition conducting a “precision strike” on the ISIS fighters.²⁸⁴ HRW spoke to local residents who reported that al-Salam hospital was still operational.²⁸⁵ When asked how certain the coalition was that it no longer functioned as a hospital with patients, a coalition spokesperson told press that “it’s very difficult to ascertain with full and total fidelity” but that the coalition would review the intelligence and had not yet seen civilian casualties.²⁸⁶ The coalition has not published a subsequent assessment, nor has it assessed claims that the strike resulted in the deaths of local partner forces.²⁸⁷

While the coalition would sometimes publicize strikes that hit major hospitals, this was not the case for smaller healthcare and medical facilities. In many cases, it appears that the coalition was not aware that a target may have also functioned as a medical facility, in part due to the changing nature of health care during fighting. There are a number of cases in which it was alleged that a makeshift or emergency medical facility was hit, which the coalition appeared to be unaware of or made no subsequent effort to confirm.

As liberation battles intensified in cities such as Mosul or Raqqa, civilians often could not visit major hospitals for various reasons: destruction in fighting, prioritization of service for ISIS fighters, safety and access issues amid shifting frontlines, and affordability, among others.²⁸⁸ As a result, civilians often turned to field hospitals, private clinics, makeshift healthcare facilities, and healthcare

283. Press Release, CJTF-OIR Pub. Affs., Coalition Strikes Mosul Hospital (Dec. 7, 2016), <https://www.inherentresolve.mil/NEWSROOM/News-Releases/Article/1023491/coalition-strikes-mosul-hospital> [<https://perma.cc/5L7H-2MT3>].

284. *Id.*

285. Belkis Wille, ‘Precision Strike’ on Iraqi Hospital Should Be Investigated, HUM. RTS. WATCH (Dec. 8, 2016), <https://www.hrw.org/news/2016/12/08/precision-strike-iraqi-hospital-should-be-investigated> [<https://perma.cc/Q7KF-KTPW>].

286. Department of Defense Press Briefing by Col. Dorrian via Teleconference from Baghdad, Iraq, U.S. DEP’T DEF. (Dec. 8, 2016), <https://www.defense.gov/News/Transcripts/Transcript/Article/1025099/departement-of-defense-press-briefing-by-col-dorrian-via-teleconference-from-bag> [<https://perma.cc/3HBH-GHKU>].

287. Civilian Casualties Incident Code CI362, AIRWARS, <https://airwars.org/civilian-casualties/ci362-december-6-2016> [<https://perma.cc/YBM5-S7JL>] (describing a December 6, 2016 incident).

288. See Lafta et al., *supra* note 274, at 758–60.

workers in their own neighborhoods.²⁸⁹ In west Mosul, where civilians were under siege for several months, neighborhood homes were often turned into make-shift medical facilities known as *tobabas*, which would be used to treat ISIS fighters and civilians alike.²⁹⁰

For example, in Mansura, Syria, in May 2017, the coalition targeted what it identified as “ISIS fighters engaging partner forces from a fighting position”²⁹¹ but which local sources in Syria identified as a home-turned-field hospital.²⁹² While “prior to the strike” the coalition “observed [two children] in an adjacent building,” they were considered “beyond the area of collateral effects.”²⁹³ After the strike, a third child, “unobserved prior to the strike, was observed being carried away from the strike zone.”²⁹⁴ The coalition records acknowledge that some local sources had reported the target as a “home which had been turned into a field hospital” in which at least seven were killed, but the assessment does not assess the veracity of that claim.²⁹⁵

Similarly, after a March 2017 airstrike in west Mosul was reported to have hit an emergency hospital,²⁹⁶ the subsequent civilian-casualty assessment determined that while there were strikes in the alleged neighborhood during the time period in question, the allegation was dismissed because those strikes did “not fall on an emergency hospital” as “the buildings were checked against MIDB [Modernized Integrated Database] to confirm the buildings’ identified purposes.”²⁹⁷ The assessment makes no mention of an effort to ascertain whether the MIDB contained an accurate or updated list of hospitals, particularly those

289. See *id.* at 760.

290. Azmat Khan, Ground Reporting in Mosul (May 2021-June 2021) (unpublished reporting for Khan, *supra* note 186) (on file with authors).

291. Press Release, CJTF-OIR, Combined Joint Task Force – Operation Inherent Resolve Monthly Civilian Casualty Report (Sept. 1, 2017), <https://web.archive.org/web/20170901163913/http://www.inherentresolve.mil/News/Article/1297778/combined-joint-task-force-operation-inherent-resolve-monthly-civilian-casualty> [<https://perma.cc/HYK6-KT6D>].

292. *Civilian Casualties Incident Code CS789*, AIRWARS, <https://airwars.org/civilian-casualties/cs789-may-9-2017> [<https://perma.cc/9FJN-F8NU>] (describing a May 9, 2017 incident).

293. Memorandum on CIVCAS Credibility Assessment Report (CCAR) for Allegation 560, Mayadin, Syria, 26 June 2017, *supra* note 211, at 1 (describing a May 9, 2017 incident).

294. *Id.*

295. *Id.*

296. *Civilian Casualties Incident Code CI541*, AIRWARS, <https://airwars.org/civilian-casualties/ci541-march-14-2017> [<https://perma.cc/4UFV-Z6PB>] (describing a March 14, 2017 incident).

297. CIVCAS Cell Initial Assessment, Allegation # 994, at 2 (Sept. 17, 2017), <https://int.nyt.com/data/documenttools/nc-3-14-17-iraq/7526de6e4240324d/full.pdf> [<https://perma.cc/8BJT-RWWS>] (describing a March 14, 2017 incident).

that were makeshift or emergency given the intense pace of the battle to liberate west Mosul at the time.

While the assessment notes strikes in the area in question, the public press release incorrectly stated that the allegation was noncredible because “it was assessed that no Coalition strikes were conducted in the geographical area that correspond to the report of civilian casualties.”²⁹⁸ However, there is extensive documentation of how unreliable coalition strike-log locations could be, with actual strike locations sometimes as far as five miles from the location in the strike log.²⁹⁹ In coalition civilian-casualty assessments, at times officers themselves admitted the searched strike logs were “not accurate and shouldn’t be used to identify strikes.”³⁰⁰

3. *Electrical Infrastructure*

ISIS frequently took over electrical facilities and stored weapons in portions of them, such as in Mosul’s electricity department, a sprawling complex in a residential neighborhood in the Aden district of East Mosul.³⁰¹

On April 20, 2015, the coalition struck eighteen weapons, causing tremendous explosions throughout the complex and engulfing the residential street.³⁰²

298. Press Release, CJTF-OIR Pub. Affs., U.S. Cent. Command, CJTF-OIR Monthly Civilian Casualty Report (Oct. 27, 2017), <https://www.centcom.mil/MEDIA/NEWS-ARTICLES/News-Article-View/Article/1355408/cjtf-oir-monthly-civilian-casualty-report> [<https://perma.cc/5TFA-YW7R>].

299. Azmat Khan, Haley Willis, Christoph Koettl, Christiaan Triebert & Lila Hassan, *Documents Reveal Basic Flaws in Pentagon Dismissals of Civilian Casualty Claims*, N.Y. TIMES (Jan. 6, 2022), <https://www.nytimes.com/2021/12/31/us/pentagon-airstrikes-syria-iraq.html> [<https://perma.cc/A43Y-285Q>] (“[T]he former assessment officer said [military] records could be inaccurate Those concerns were confirmed by The Times’s own ground reporting”); see also Khan, *supra* note 186 (finding “numerous instances in which the logs were incomplete or inaccurate”); Khan, *supra* note 189 (“[F]air claims by survivors of strikes have often been rejected on the basis that the military had no record of a strike in that area.”); Khan & Gopal, *supra* note 198 (“[T]he Air Force analysts said it was unlikely that the coalition had struck Qaiyara’s water-sanitation facility Yet we discovered a video — uploaded by the coalition itself — showing a direct strike on that very facility.”).

300. CIVCAS Tracker, Allegation Number 488, at 4 (Nov. 12, 2018), <https://int.nyt.com/data/documenttools/c-6-25-17-syria/14cd6054fc579a8a/full.pdf> [<https://perma.cc/G35U-8EGM>] (describing a May 25, 2017 incident).

301. See Khan & Gopal, *supra* note 198 (describing the facility as “occupying several blocks of the Aden neighborhood in eastern Mosul”).

302. Memorandum on Civilian Casualty Assessment Report for Strike Number [redacted] Occurring on 20 April 2015 in Vicinity of Adan, East of Mosul, Iraq 1-3 (Oct. 25, 2016), <https://int.nyt.com/data/documenttools/nc-4-20-15-iraq/dc5d1f764a876b57/full.pdf> [<https://perma.cc/6V83-JNEV>] (describing an April 20, 2015 incident).

Dozens of residents rushed out of their homes to help the wounded when, about forty minutes later, the complex was struck again.³⁰³ Muthana Ahmed Tuaama found his brother at the end of the street. “I carried him,” he told the *New York Times*.³⁰⁴ “‘You see those puddles of water,’ he said. ‘It was just like that, but full of blood.’”³⁰⁵ At least eighteen civilians were killed and a dozen more injured, according to reporting on the ground.³⁰⁶ A coalition battle-damage assessment identified “potentially large fires,”³⁰⁷ eleven buildings “functionally destroyed,” all targeted buildings “reduced to rubble,” and the “entire facility” “confirmed to have severe functional damage.”³⁰⁸

Twice the coalition rejected claims of civilian casualties.³⁰⁹ Years later, it admitted the attack had killed eighteen civilians, calling it a strike on an ISIS improvised-explosive-device factory in the public press release.³¹⁰ The civilian-casualty assessment later provided to one of the authors revealed that the coalition had classified the target as “single use,” with no civilian function, while noting that it had formerly functioned as a storage warehouse for the Mosul electricity department.³¹¹ Prior to the release of the assessment as a result of a legal battle, the coalition’s public releases about the strike made no mention of the Mosul electricity department.³¹²

Other electrical infrastructure was frequently hit in airstrikes, although it was rarely publicly identified as such. For example, when the coalition admitted eight civilians had been killed and twenty injured in an April 2016 strike on the

303. See *id.* at 2 (“[T]he third strike occurred [a redacted amount of time] after the second”); Azmat Khan, Ground Reporting in Mosul (Apr. 2015) (on file with authors).

304. Khan & Gopal, *supra* note 198.

305. *Id.*

306. *Id.*

307. CAOC CIVCAS Credibility Inquiry 20 Apr 2015 (U) (May 12, 2015) (on file with authors) (describing an April 20, 2015 incident).

308. Memorandum on CIVCAS Credibility Assessment Report (CCAR) for Allegation 2001, Adan Neighborhood, Mosul, Iraq 20 APR 2015, at 3 (Feb. 17, 2018) (on file with authors) (describing an April 20, 2015 incident).

309. *Civilian Casualties Incident Code CIO60*, AIRWARS (Jan. 18, 2022), <https://airwars.org/civilian-casualties/cio60-april-20-2015> [<https://perma.cc/V2Y8-BBZ6>] (describing an April 20, 2015 incident); see also Khan, *supra* note 186 (“[T]he allegation [of killing civilians in the April 2015 strike] was rejected because of ‘discrepancies in eyewitness accounts.’”).

310. Press Release, *supra* note 19.

311. See Memorandum on CIVCAS Credibility Assessment Report (CCAR) for Allegation 2001, Adan Neighborhood, Mosul, Iraq 20 APR 2015, *supra* note 308, at 3.

312. See *Press Releases*, U.S. CENT. COMMAND, <https://www.centcom.mil/MEDIA/PRESS-RELEASES> [<https://perma.cc/2NBX-9VX6>] (containing no pre-2018 release that mentions the strike).

electricity hub for the al-Hadbah apartment complex in western Mosul,³¹³ the public press release identified it merely as a strike on an “ISIS facility.”³¹⁴ However, the civilian-casualty assessment report obtained through the lawsuit acknowledged “the targets struck provided power to the apartment complex,” which the coalition assessed as only housing ISIS “leaders and their families,” claiming that civilian occupants had been “forced out.”³¹⁵ Interviews with locals found that some civilian families had remained in their apartments and that three workers who had been in the structure were killed.³¹⁶

4. Prison and Detention Facilities

In early May 2017, coalition forces watched a vehicle pull up to a square building near Mayadin, Syria.³¹⁷ Six men exited the car, three of whom, according to military records, “appeared to be hostages,” their heads down and faces covered as they walked into the building in a single-file line.³¹⁸ The building was assessed to have “sensitive functionality” as an ISIS “detention facility/prison” and was placed on a no-strike list.³¹⁹ The following month, the building’s protected status was removed on the basis that “the facility was performing a military function for ISIS.”³²⁰ Five days later, the coalition targeted the building, completely destroying it.³²¹

In the days that followed, local news sources reported that in addition to killing between fifteen to twenty members of ISIS, more than forty civilians were killed, including civilian prisoners and five women that ISIS had taken as sex slaves.³²² The prison was reported to have two sections: one for civilians, and

313. CIVCAS Tracker, Allegation Number 651, at 3 (Nov. 14, 2018), <https://int.nyt.com/data/documenttools/c-4-19-16-iraq/84c6937dd8d727a6/full.pdf> [<https://perma.cc/ZTD3-BVBW>] (describing an April 19, 2016 incident).

314. Press Release, *supra* note 259.

315. CIVCAS Tracker, Allegation Number 651, *supra* note 313, at 3.

316. *E.g.*, Interview by Azmat Khan with Mohammed Khalid Abed & Eman Zaki Salah, family members of deceased, in Mosul, Iraq (June 21–22, 2021) (on file with authors).

317. Memorandum on CIVCAS Credibility Assessment Report (CCAR) for Allegation 560, Mayadin, Syria, 26 June 2017, *supra* note 211, at 2 (describing a June 26, 2017 incident).

318. *Id.*

319. *Id.* at 3.

320. *Id.*

321. *Id.* at 1.

322. *Civilian Casualties Incident Code CS1094*, AIRWARS (Jan. 18, 2022), <https://airwars.org/civilian-casualties/cs1094-june-26-2017> [<https://perma.cc/ZAU4-F5WX>] (describing a June 26, 2017 incident).

one for prisoners from ISIS’s own ranks.³²³ The prison reportedly also held fighters from groups that opposed ISIS, such as the Free Syrian Army.³²⁴ The reports triggered a civilian-casualty assessment, but the coalition only admitted to eight civilian deaths, likely the number anticipated by its prestrike estimate, which was based on an analysis of surveillance footage.³²⁵ The assessment did not seek to determine whether dozens more were killed as alleged. And despite claims of dozens of civilian prisoners held in the facility, the assessment described the target as assessed “to have been under the exclusive use and control of ISIS since at least April 2017 and was no longer serving a civilian function.”³²⁶

The United States classifies detention facilities and prisons as Category 1 sensitive targets.³²⁷ While ISIS’s prisons often held members from its own ranks who were being punished, they also often included civilian prisoners, hostages, and prisoners of war, and ISIS held prisoners in facilities with other uses as well.³²⁸ The records involving strikes on prisons or detention facilities make little reference to such civilian prisoners and characterize the targets as used exclusively by ISIS. While the coalition’s press release did identify the prison strike near Mayadin as targeting an “ISIS detention facility,”³²⁹ other targets involving prisons or alleged prisons were not described as such in public press releases.

323. *Ṭā’irāt al-Taḥāluf al-Dawlī tartakib majzarah jamā’iyyah jadīdah fī madīnat al-Mayādīn wa-taqtul 42 mu’taqalan ‘alā al-aqall ladā Tanẓīm al-Dawlah al-Islāmīyah* [International Coalition Aircraft Commit a New Mass Massacre in the City of Al-Mayadeen and Kill at Least 42 Detainees of the Islamic State], AL-MURŞAD AL-SŪRĪ LI-ḤUQŪQ AL-INSĀN [SYRIAN OBSERVATORY FOR HUM. RTS.] (June 27, 2017) (U.K), <https://archive.is/srFe5#selection-7411.0-7529.912> [<https://perma.cc/9L9X-RLS5>].

324. *Ṭayarān al-Taḥāluf yaqṣif sijnan li-Dā’ish fī al-Mayādīn . . . wa-istishhād akthar min sittīn shakṣan madaniyyan* [Coalition Aircraft Bombs ISIS Prison in Al-Mayadeen . . . More than Sixty Civilians Killed], DĪR AL-ZŪR 24 [DEIR EZZOR 24] (June 27, 2017) (Syria), <https://archive.is/RWvQO> [<https://perma.cc/FX9Z-9UU3>].

325. Memorandum on CIVCAS Credibility Assessment Report (CCAR) for Allegation 560, Mayadin, Syria, 26 June 2017, *supra* note 211, at 3.

326. *Id.* at 2. The characterization of the facility as used exclusively by ISIS is puzzling, given that civilians appear to have been detained there. *Id.* at 1.

327. See Memorandum from Curtis M. Scaparrotti, *supra* note 233, at B-1, B-2.

328. See, e.g., *Civilian Casualties Incident Code CS228*, AIRWARS (Jan. 18, 2022), <https://airwars.org/civilian-casualties/cs228-june-13-2016> [<https://perma.cc/3L8N-ZFFR>] (describing a June 13, 2016 incident).

329. Press Release, *supra* note 298 (“June 26, 2017, near Al Mayadin, Syria, via media report. During a Coalition strike that destroyed an ISIS detention facility, it was assessed that eight civilians were unintentionally killed.”).

In a January 2017 strike in Idlib, Syria, which was reported to have killed dozens of prisoners being held by the al-Qaeda-affiliated group al-Nusra,³³⁰ the coalition described the target as an “Al Qaida facility.”³³¹ A local activist told Airwars that while al-Nusra denied prisoners were being held in the headquarters, locals had recognized bodies in the attack belonging to those who had been detained or had been missing, such as Haytham, a ten-year-old boy from a village in Khan Sheikhoun who had reportedly been detained for theft.³³²

In many cases, it is unclear whether the coalition was aware that a target may have also functioned as an ISIS prison or detention facility. For example, after a March 2017 strike on what was assessed to be an ISIS headquarters at the Mosul train station, allegations emerged that more than thirty-three Iraqi police officers who had been captured and held there were also killed.³³³ The coalition conceded ten civilian deaths³³⁴ but determined that it was “not possible to assess the number of casualties as approaching thirty, or determine that they were captured police.”³³⁵

330. *Civilian Casualties Incident Code CS425*, AIRWARS (Jan. 18, 2022), <https://airwars.org/civilian-casualties/cs425-january-3-2017> [<https://perma.cc/77X8-V9G7>] (describing a January 3, 2017 incident).

331. Press Release, Operation Inherent Resolve, Combined Joint Task Force – Operation Inherent Resolve Monthly Civilian Casualty Report (Jan. 10, 2020), <https://web.archive.org/web/20200818142813/https://www.inherentresolve.mil/Releases/News-Releases/Article/2054088/combined-joint-task-force-operation-inherent-resolve-monthly-civilian-casualty> [<https://perma.cc/4CD8-QDRB>] (“January 3, 2017, in Sarmada, Syria, via media report. US aircraft conducted an airstrike against an Al Qaida facility. Regrettably, one civilian was unintentionally killed as a result of the strike.”).

332. See *Civilian Casualties Incident Code CS425*, *supra* note 330.

333. See Memorandum on CIVCAS Credibility Assessment Report (CCAR) – [redacted] (ISIS Staging Area and Weapons Cache, Mosul Train Station) (CJFLCC-OIR 28/17) 3-4 (Mar. 18, 2017), <https://int.nyt.com/data/documenttools/c-3-3-17-iraq/d111e8ba983dafc2/full.pdf> [<https://perma.cc/YE3S-Q3A9>] (describing the March 17, 2017 incident and allegations of civilian casualties).

334. Press Release, U.S. Cent. Command, Combined Joint Task Force Operation Inherent Resolve – Monthly Civilian Casualty Report (Apr. 30, 2017), <https://www.centcom.mil/MEDIA/PRESS-RELEASES/Press-Release-View/Article/1167729/combined-joint-task-force-operation-inherent-resolve-monthly-civilian-casualty> [<https://perma.cc/N58B-2CRD>] (“March 3, 2017, near Mosul, Iraq, via self-report: During a strike on an ISIS headquarters, it was assessed that 10 civilians were unintentionally killed.”).

335. Memorandum on CIVCAS Credibility Assessment Report (CCAR) – [redacted] (ISIS Staging Area and Weapons Cache, Mosul Train Station) (CJFLCC-OIR 28/17), *supra* note 333, at 4.

5. *Religious, Cultural, and Historical Sites*

On the evening of March 16, 2017, the Pentagon announced it had carried out a strike against a meeting of al-Qaeda in Syria, “killing several terrorists.”³³⁶ But in the immediate aftermath, graphic video and imagery emerged from local sources in Syria claiming that the Umar ibn al-Khaṭṭāb mosque near the village of al-Jinah had been struck that night as nearly 300 people were gathered there for a religious lecture and the nightly Isha’a prayer.³³⁷ Syrian civil-defense forces reported that thirty-eight bodies, including five children, had been pulled from the rubble.³³⁸ Mosques, cemeteries, and other religious, cultural, and historical institutions are also classified as Category 1 targets, requiring removal from the no-strike list before being targeted.³³⁹

At first, the Pentagon denied striking the mosque, claiming it targeted “a partially constructed community hall” near a mosque, and released a poststrike image of the targeted site.³⁴⁰ After Bellingcat, HRW, and Forensic Architecture published lengthy investigations demonstrating that the targeted building in the image was a mosque frequently used by local civilians, and found no evidence of

336. Press Release, U.S. Cent. Command, U.S. Forces Strike Al Qaeda in Syria (Mar. 17, 2017), <https://www.centcom.mil/MEDIA/PRESS-RELEASES/Press-Release-View/Article/1121747/us-forces-strike-al-qaeda-in-syria> [https://perma.cc/M47H-QENE].

337. Christiaan Triebert, *The Al-Jinah Mosque Complex Bombing—New Information and Timeline*, BELLINGCAT (Apr. 18, 2017), <https://www.bellingcat.com/news/mena/2017/04/18/al-jinah-new-info-and-timeline> [https://perma.cc/2CTT-2GU7].

338. *Id.*

339. See Memorandum from Curtis M. Scaparrotti, *supra* note 233, at B-1, B-2 (classifying “[r]eligious, cultural, historical institutions, cemeteries, and structures” as Category 1 no-strike facilities).

340. Louisa Loveluck, Thomas Gibbons-Neff & Missy Ryan, *Mounting Claims of Civilian Deaths After U.S. Targets al-Qaeda in Syria*, WASH. POST (Mar. 17, 2017), https://www.washingtonpost.com/world/mounting-claims-of-civilian-deaths-after-us-targets-al-qaeda-in-syria/2017/03/17/350d5838-0ae9-11e7-8884-96e6a6713f4b_story.html [https://perma.cc/9P48-WMX9]; see also Lisa Ferdinando, *Pentagon Spokesman: Dozens of Terrorists Believed Killed in U.S. Strike in Syria*, U.S. DEP’T DEF. (Mar. 17, 2017), <https://www.defense.gov/News/News-Stories/Article/Article/1122791/pentagon-spokesman-dozens-of-terrorists-believed-killed-in-us-strike-in-syria> [https://perma.cc/W75C-A9EL] (displaying the poststrike image).

al-Qaeda presence,³⁴¹ the Pentagon initiated an investigation.³⁴² While it continued to assert the meeting was between al-Qaeda members, the Pentagon did admit its prestrike analysis should have identified the target as part of a religious compound, information that some on the intelligence team were aware of but that did not result in the buildings being put on the no-strike list.³⁴³

“What we determined afterwards was that the building on the left of the image you have there in front of you was a small mosque in a complex in which a new larger mosque was under construction, more specifically the Omar al-Khatab mosque,” then-Brigadier General Paul Bontrager, deputy director of operations at U.S. Central Command, said in a briefing about the investigation.³⁴⁴ “None of the buildings were annotated on our no-strike list as category one facilities, which is a register of entities that must be carefully evaluated before an approval to strike.”³⁴⁵

The Pentagon admitted one civilian death, a person “smaller-in-stature” that it identified accompanying an adult “into the meeting site.”³⁴⁶ (Months later, a U.N.-appointed Commission for Inquiry for Syria concluded the strike killed thirty-eight civilians and “failed to take all feasible precautions to avoid or minimize incidental loss of civilian life, injury to civilians and damage to civilian objects, in violation of international law.”³⁴⁷)

While the coalition at times failed to identify mosques and other religious sites accurately, it frequently removed the protected status of mosques it assessed were being used for military purposes. For example, in June 2017, the coalition

341. See Triebert, *supra* note 337; *Attack on the Omar Ibn al-Khatab Mosque*, HUM. RTS. WATCH (Apr. 18, 2017), <https://www.hrw.org/report/2017/04/18/attack-omar-ibn-al-khatab-mosque/us-authorities-failure-take-adequate-precautions> [<https://perma.cc/CCE5-RH22>]; *Airstrikes on the Al-Jinah Mosque*, FORENSIC ARCHITECTURE (Apr. 17, 2017), <https://forensic-architecture.org/investigation/airstrikes-on-the-al-jinah-mosque> [<https://perma.cc/84U8-58Q8>].

342. See Airwars Staff, *Transcript of Pentagon's Al Jinah Investigation Media Briefing*, AIRWARS (June 27, 2017), <https://airwars.org/news/transcript-of-al-jinah-investigation-briefing> [<https://perma.cc/2GTG-67A5>] (discussing the command investigation into a U.S. airstrike that took place on March 16, 2017, near Aleppo, Syria).

343. *Id.*

344. *Id.*

345. *Id.*

346. *Id.*

347. Samuel Oakford, *UN Inquiry 'Gravely Concerned' About Syrian Civilians Killed by Coalition*, AIRWARS (Sept. 6, 2017), <https://airwars.org/news/un-inquiry> [<https://perma.cc/V2TN-YDF2>].

struck an “ISIS artillery position located inside a mosque.”³⁴⁸ While the public press release mentions the target was located in a mosque, the civilian-casualty assessment makes no mention of the mosque, nor does it describe how or whether its protected status was removed.³⁴⁹

At other times, the coalition waited until a targeted individual left the site of a protected religious site. For example, in February 2017, the coalition watched a senior ISIS leader attend the funeral of “7 of his associates.”³⁵⁰ Given the protected nature of the cemetery, the strike cell waited until he departed and stopped at a roadside structure before firing weapons, injuring two civilians who entered the target area after weapons were released.³⁵¹

6. Educational Facilities

When ISIS took over territory, it quickly banned traditional education but kept schools open, retraining civilian teachers and introducing a new curriculum designed to indoctrinate children, whom the group viewed as the future of a multigenerational state-building project.³⁵² Although the curriculum in these civilian schools was ideological and intended to recruit children into ISIS, it did not include military training, which ISIS conducted in separate training camps for children and adults.³⁵³ While these nonmilitary schools are classified as

348. Press Release, U.S. Cent. Command, CJTF—OIR Monthly Civilian Casualty Report (Sept. 29, 2017), <https://www.centcom.mil/MEDIA/NEWS-ARTICLES/News-Article-View/Article/1329201/cjtf-oir-monthly-civilian-casualty-report> [<https://perma.cc/DCA2-J9QY>] (“June 24, 2017, near Mosul, Iraq, via self-report: During a strike on an ISIS artillery position located inside a mosque, it was assessed that one civilian was unintentionally killed.”).

349. See Memorandum on CIVCAS Allegation Closure Report, Allegation No. 550, at 1 (Aug. 31, 2017), <https://int.nyt.com/data/documenttools/c-6-24-17-iraq/1a9b13c20b81846d/full.pdf> [<https://perma.cc/L39T-8FYE>] (providing no mention of the mosque).

350. Memorandum on CIVCAS Allegation Closure Report, Allegation No. 333, at 1 (Mar. 29, 2017), <https://int.nyt.com/data/documenttools/c-2-9-17-iraq/e9f35204a497f76f/full.pdf> [<https://perma.cc/6859-S5AQ>].

351. *Id.* at 1–2.

352. See Mara Revkin, ‘I Am Nothing Without a Weapon’: Understanding Child Recruitment and Use by Armed Groups in Syria and Iraq, in CRADLED BY CONFLICT: CHILD INVOLVEMENT WITH ARMED GROUPS IN CONTEMPORARY CONFLICT 103, 115 (Siobhan O’Neil & Kato Van Broeckhoven eds., 2018) (“When IS arrived in 2014, members forced teachers to undergo ‘sharia training’ courses and introduced new textbooks.”).

353. Omar Mohammed, *The Forever War: The Doctrine and Legacy of ISIS Child Soldiers*, PROGRAM ON EXTREMISM AT GEO. WASH. UNIV. 10–12 (Feb. 2023), https://extremism.gwu.edu/sites/g/files/zaxdzs5746/files/Mohammed_The-Forever-War_February-2023.pdf [<https://perma.cc/Y6JK-TBKY>] (describing ISIS’s schools and military training camps as two separate systems).

Category 1 targets, requiring removal from the no-strike list before targeting,³⁵⁴ the bombing of actively used nonmilitary schools was nonetheless common in the air campaign. Many allegations involved locations such as the University of Mosul, inside portions of which ISIS had positioned itself.³⁵⁵ As shown by the Badia school example,³⁵⁶ abandoned schools often were repurposed as makeshift housing for displaced persons.

7. Residential Buildings

On February 19, 2017, the coalition struck twelve parts of a three-story building in the al-Shifaa neighborhood of west Mosul, targeting what it believed to be an ISIS headquarters “coordinating multiple aspects of ISIS operations including a Sharia court and security and intelligence offices.”³⁵⁷ Prior to ISIS taking the city, the building’s “previous function” was as a cell-phone shop that also had “other commercial functions including a café,” according to the coalition.³⁵⁸ In fact, the building was the Tahir apartment complex, in a residential area where both ISIS members’ families and other civilians lived.³⁵⁹ Ground reporting by one of the authors found that at least twenty civilians who lived in the complex or were nearby were killed, including six family members of Yousef Hashim Ali, who lived in the complex.³⁶⁰ The coalition’s civilian-casualty assessment found the strike was authorized despite surveillance that showed displaced families throughout the facility and more than a dozen “collateral concerns” in the vicinity of the target, and that the prestrike pattern-of-life analysis was limited only to the exact part of the building where the ISIS facility was located and did not include areas within the radius of the twelve points of impact.³⁶¹

Residential buildings, including apartment complexes and homes, were frequently hit in airstrikes throughout the campaign, such as in the example above,

354. Memorandum from Curtis M. Scaparrotti, *supra* note 233, at B-2.

355. Muhammad Jambaz & Joshua Berlinger, *Airstrikes Targeting ISIS Hit Mosul University*, CNN (Mar. 21, 2016, 7:08 AM EDT), <https://www.cnn.com/2016/03/20/middleeast/mosul-iraq-airstrikes-isis/index.html> [<https://perma.cc/XBU2-SGN4>] (noting that the university was “considered a base for ISIS fighters”).

356. See *supra* text accompanying notes 11-19.

357. Memorandum on CIVCAS Credibility Assessment Report (CCAR) for Strike Number [redacted] (Allegation 347) 2 (Apr. 21, 2017), <https://int.nyt.com/data/documenttools/c-2-19-17-iraq/716dd276af68737e/full.pdf> [<https://perma.cc/DZC2-94QJ>].

358. *Id.*

359. Khan, *supra* note 189.

360. *Id.*

361. Memorandum on CIVCAS Credibility Assessment Report (CCAR) for Strike Number [redacted] (Allegation 347), *supra* note 357, at 2-4.

or in the al-Hadbah apartment complex in western Mosul.³⁶² Often, the targets were not categorized as residential buildings in prestrike intelligence, with reports dubbing them as exclusively used by ISIS or isolated as though separate from the residential building in which targets were located.³⁶³

In some areas, such as west Mosul’s Old City, thousands of residential buildings were damaged or destroyed in bombardment, leaving many civilians without homes to return to after the war’s end.³⁶⁴ Some researchers have described such widespread residential destruction in conflict as “domicide.”³⁶⁵

8. Oil Infrastructure

Strategic attacks on ISIS’s “oil enterprise” – a major means of the group’s financing – were a high priority for the coalition’s air campaign.³⁶⁶ Unlike the dual-use objects described above, oil-infrastructure targets were frequently identified as such in press releases.³⁶⁷ The coalition also published dozens of videos of strikes on oil refineries, fuel trucks and tankers, collection points, separation plants, and other equipment.³⁶⁸ One public video shows a coalition airstrike on

362. CIVCAS Tracker, Allegation Number 651, *supra* note 313, at 3.

363. Memorandum on CIVCAS Credibility Assessment Report (CCAR) for Strike Number [redacted] (Allegation 347), *supra* note 357, at 2; CIVCAS Tracker, Allegation Number 651, *supra* note 313, at 3.

364. Susannah George, *Liberation from Militants Leaves Devastation in Mosul*, AP NEWS (July 14, 2017, 3:21 PM EST), <https://apnews.com/article/collapse-of-the-caliphate-islamic-state-group-ap-top-news-middle-east-international-news-727cab6a7e8748dbao3dee331c179543> [<https://perma.cc/Z6GK-24VX>].

365. Becky Sullivan, *What Is ‘Domicide,’ and Why Has War in Gaza Brought New Attention to the Term?*, NPR (Feb. 9, 2024, 5:01 AM ET), <https://www.npr.org/2024/02/09/1229625376/domicide-israel-gaza-palestinians> [<https://perma.cc/FQS4-NQLS>].

366. Wasser et al., *supra* note 166, at 207-16.

367. See, e.g., Press Release, Combined Joint Task Force Operation Inherent Resolve, Military Strikes Continue Against ISIS Terrorists in Syria and Iraq (July 1, 2017), <https://www.inherentresolve.mil/Portals/14/Documents/Strike%20Releases/2017/07July/20170701%20Strike%20release%20-%20Final.pdf?ver=2017-07-01-081725-593> [<https://perma.cc/2D5Z-2BCH>] (noting strikes on “oil tanker trucks,” “oil storage tanks,” “an oil pipe,” and “well heads”); Press Release, Combined Joint Task Force Operation Inherent Resolve, Military Strikes Continue Against ISIS Terrorists in Syria and Iraq (June 6, 2017), <https://www.inherentresolve.mil/Portals/14/Documents/Strike%20Releases/2017/06June/20170606%20Strike%20Release%20-%20Final.pdf?ver=2017-06-06-071719-653> [<https://perma.cc/G6DQ-QJX8>] (noting strikes on “ISIS oil trucks,” “fuel separator tanks,” “ISIS well heads,” and “an ISIS oil well”).

368. See, e.g., *Coalition Airstrike on Oil Separation Plant*, DEF. VISUALS INFO. DISTRIB. SERV. (Jan. 9, 2016), <https://www.dvidshub.net/video/445618/coalition-airstrike-oil-separation-plan> [<https://perma.cc/Z4X4-N56L>]; *Coalition Airstrike Destroys ISIS Oil Production Equipment*

168 oil-tanker trucks in central Syria designed “to degrade Da’esh [ISIS] revenue and sources to fund terrorism.”³⁶⁹

The civilians most frequently killed in these incidents were oil-truck drivers and oil-refinery workers, despite the coalition often firing warning shots as mitigating measures. In the eleven credible civilian-casualty incidents involving oil targets, warning shots were fired in eight, including one incident in which a warning shot “failed to fire.”³⁷⁰ In some cases, drivers initially dispersed after the warning shots but later returned to their vehicles after weapons had already been released, such as a December 2016 strike that killed five drivers,³⁷¹ or were killed in subsequent secondary explosions after fleeing.³⁷² In other cases, drivers responded to warning shots by continuing to drive away from the scene.³⁷³ In such cases, it is unclear whether the drivers understood the truck was the target of the warning shots.³⁷⁴ Some reports note that the anticipated death of one civilian

Near Dayr Az Zawr, DEF. VISUALS INFO. DISTRIB. SERV. (July 29, 2017), <https://www.dvidshub.net/video/540733/coalition-airstrike-destroys-isis-oil-production-equipment-near-dayr-az-zawr> [<https://perma.cc/4K4J-D8SN>].

369. *Coalition Airstrike Destroys 168 Da’esh Oil Tanker Trucks in Central Syria*, DEF. VISUALS INFO. DISTRIB. SERV. (Dec. 9, 2016), <https://www.dvidshub.net/video/498819/coalition-airstrike-destroys-168-daesh-oil-tanker-trucks-central-syria> [<https://perma.cc/L5K6-PTR4>].

370. Memorandum on CIVCAS Allegation Closure Report, Allegation No. 674, at 2 (Jan. 15, 2018), <https://int.nyt.com/data/documenttools/c-10-16-16-syria/o6f1806e2a1f7fdc/full.pdf> [<https://perma.cc/SYD2-PRLK>] (describing a September 12, 2017 incident).

371. Memorandum on CIVCAS Credibility Assessment Report (CCAR) for Strike on 11 Dec, 2016, at 1 (Mar. 20, 2017), <https://int.nyt.com/data/documenttools/c-12-11-16-syria/ba8ff28coocddeao/full.pdf> [<https://perma.cc/ZN7D-FTTF>] (describing a December 11, 2016 incident).

372. Memorandum on CIVCAS Credibility Assessment Report (CCAR) for strike number [redacted] 1-2 (Jan. 25, 2017), <https://int.nyt.com/data/documenttools/c-1-7-17-syria/e9a6aa7f44b38bo8/full.pdf> [<https://perma.cc/E2KV-QYKC>] (describing a January 7, 2017 incident).

373. Memorandum on CIVCAS Allegation Closure Report, Allegation No. 568, at 1 (Jan. 21, 2017), <https://int.nyt.com/data/documenttools/c-6-28-17-syria/41b3523boa14a3o6/full.pdf> [<https://perma.cc/QRY8-CW7M>] (describing an 18-wheeler that was targeted after it did not respond to warning shots and explaining that there was “no positive indication that the driver exited the vehicle after the attack”); Press Release, *supra* note 291 (“One truck continued driving and was subsequently destroyed and its driver presumed killed.”).

374. See *supra* note 373.

driver per truck was seen as “not excessive”³⁷⁵ to the military advantage gained through “denying ISIS use and benefit of those trucks.”³⁷⁶

In one case, although a shed had been identified as a collateral concern in the vetting of a strike, “aircrew mistook the shed for a truck cab due to the similar size and shape” and “thus did not recognize it as a collateral concern.”³⁷⁷ The coalition took other mitigating measures, such as attacking a fuel station only at night, after concluding that ISIS would close it to civilians then.³⁷⁸

In only one of the eleven credible civilian-casualty incidents involving oil targets did the press release not identify the target to include oil infrastructure of some kind. In May 2015 in a village near Bayji, Iraq, the coalition targeted an airstrike against what it identified as six ISIS personnel, three weapons caches, and a “resupply vehicle.”³⁷⁹ After local reports emerged that six brothers from one family had been killed in a vehicle while distributing oil to other families,³⁸⁰ the coalition conducted a credibility assessment and conceded that it was “possible that the distribution of oil could have been misinterpreted as enemy in nature, due to a common ISIS [tactic, technique, and procedure] of selling and distributing oil [in order to] generate revenue from civilians.”³⁸¹ In the public release admitting to the six civilian casualties, the coalition makes no mention of the vehicle or oil and describes it as “a strike on an ISIS weapons cache.”³⁸²

375. Memorandum on CIVCAS Credibility Assessment Report (CCAR) for Strike Number [redacted] 2 (Dec. 23, 2016), <https://int.nyt.com/data/documenttools/c-11-27-16-syria/1bb0986213993ffa/full.pdf> [<https://perma.cc/NFD6-6Z34>] (describing a November 27, 2016 incident).

376. Memorandum on CIVCAS Allegation Closure Report, Allegation No. 668, at 2 (Oct. 14, 2017), <https://int.nyt.com/data/documenttools/c-10-9-16-syria/7adcddb4322a620d/full.pdf> [<https://perma.cc/MP2L-TS23>] (describing a May 26, 2017 incident).

377. Memorandum on CIVCAS Allegation Closure Report, Allegation No. 363, at 2 (Apr. 23, 2017), <https://int.nyt.com/data/documenttools/c-2-25-17-syria/ca0870ee287a90ed/full.pdf> [<https://perma.cc/PX3E-L5JP>] (describing a February 25, 2017 incident).

378. Memorandum on CIVCAS Credibility Assessment Report (CCAR) for 899, Raqqa, SY, 17 Feb 2017, at 2 (Sept. 22, 2017), <https://int.nyt.com/data/documenttools/c-2-17-17-syria/51f9618e1d407217/full.pdf> [<https://perma.cc/6GYQ-2WHC>] (describing a February 17, 2017 incident).

379. CIVCAS Tracker, Allegation Number 592, at 3 (Nov. 14, 2018), <https://int.nyt.com/data/documenttools/c-5-13-15-iraq/437a8a6b6adb3ee6/full.pdf> [<https://perma.cc/3HUU-XYPY>] (describing a May 13, 2015 incident).

380. *Civilian Casualties Incident Code CIO67*, AIRWARS, <https://airwars.org/civilian-casualties/cio67-may-13-2015> [<https://perma.cc/E8TH-MYHM>] (describing a May 13, 2015 incident).

381. CIVCAS Tracker, Allegation Number 592, *supra* note 379, at 3.

382. Press Release, *supra* note 259.

9. *Transportation Infrastructure*

Transportation-infrastructure objects were frequent targets in the anti-ISIS air campaign, and the coalition often published videos of such strikes.³⁸³ Targeting bridges in particular was perceived to be a means of denying ISIS terrain, preventing the movement of ISIS equipment and fighters,³⁸⁴ protecting security forces from car bombs,³⁸⁵ disrupting ISIS logistics routes,³⁸⁶ and limiting the group's "freedom of movement."³⁸⁷ While such strikes could thwart ISIS movement, they also had damaging effects on civilian populations. In west Mosul, the bombing and destruction of bridges helped ensure that civilians could not leave during the final months of the battle to retake it, trapping civilians with ISIS in a bloody last stand and later hindering reconstruction efforts.³⁸⁸

At times, the targeting of transportation infrastructure resulted in more directly attributable civilian deaths, often as a result of proximity to the target. For example, in a July 2015 strike on a bridge in Raqqa, a semitruck was on a secondary bridge near the targeted bridge and was hit, causing secondary explosions that killed a civilian nearby.³⁸⁹

383. See, e.g., *Coalition Airstrike Destroys DAESH Bridge*, DEF. VISUALS INFO. DISTRIB. SERV. (Nov. 24, 2015), <https://www.dvidshub.net/video/438531/coalition-airstrike-destroys-daesh-bridge> [<https://perma.cc/FA3U-ZMPX>] (filming a November 18, 2015 incident); *Airstrike on a Key Bridge Near Abu Kamal*, DEF. VISUALS INFO. DISTRIB. SERV. (Jan. 5, 2016), <https://www.dvidshub.net/video/445029/airstrike-key-bridge-near-abu-kamal> [<https://perma.cc/7FC4-K5ZU>] (filming a January 1, 2016 incident); *CJTF-OIR Airstrike on Da'ish-Controlled Bridge 25 Mar 15*, DEF. VISUALS INFO. DISTRIB. SERV. (Mar. 25, 2015), <https://www.dvidshub.net/video/396141/cjtf-oir-airstrike-daish-controlled-bridge-25-mar-15> [<https://perma.cc/GC79-VFWF>] (filming a March 25, 2015 incident).

384. *Jan. 10: Coalition Airstrike on Daesh Bridge Near Tal Afar*, DEF. VISUALS INFO. DISTRIB. SERV. (Jan. 14, 2016), <https://www.dvidshub.net/video/446120/jan-10-coalition-airstrike-daesh-bridge-near-tal-afar> [<https://perma.cc/C8MY-TGEJ>] (filming a January 10, 2016 incident).

385. *Coalition Airstrike Destroys DAESH Bridge*, *supra* note 383 (filming a November 18, 2015 incident).

386. *Feb. 21-22: Coalition Airstrike Compilation on Daesh Bridges and Culverts in Syria*, DEF. VISUALS INFO. DISTRIB. SERV. (Feb. 28, 2016), <https://www.dvidshub.net/video/451891/feb-21-22-coalition-airstrike-compilation-daesh-bridges-and-culverts-syria> [<https://perma.cc/W52D-FUBZ>] (filming a February 21-22, 2016 incident).

387. *Apr 2: Coalition Strikes Bridge Near the Town of Hit, Iraq*, DEF. VISUALS INFO. DISTRIB. SERV. (Apr. 15, 2016), <https://www.dvidshub.net/video/459249/apr-2-coalition-strikes-bridge-near-town-hit-iraq> [<https://perma.cc/L34K-BM97>] (filming an April 2, 2016 incident).

388. Fox, *supra* note 219.

389. CIVCAS Tracker, Allegation Number 87, at 2 (Nov. 14, 2017), <https://int.nyt.com/data/documenttools/c-7-11-15-syria/2091f6e7876boc46/full.pdf> [<https://perma.cc/G2GL-9W8T>] (describing a July 11, 2015 incident).

As liberation battles intensified, the destruction of bridges and other connection points also made boats more strategic targets. Particularly during the battles for Tabqa and Raqqa in Syria, boats on the Euphrates River were often targeted when they were identified as means for ISIS personnel to move. For example, a June 2017 strike on ISIS fighters on a boat moving to “reinforce” personnel on the north side of the Euphrates resulted in flames that reached a civilian boat twenty meters north of the target.³⁹⁰ (In an interview, a former high-level official in the air campaign described the liberation of Tabqa and Raqqa as a time when boats were frequent targets of Special Operations forces. These forces, he said, “declared every boat in the Euphrates to be hostile and should be targeted.”³⁹¹) The assessment does not state whether the second boat was identified as a collateral concern prior to targeting the first boat. Local sources reported that three civilians were killed as they tried to retrieve water from the river.³⁹² The public press release regarding the strike does not mention a boat, instead describing it as “a strike on an ISIS headquarters structure.”³⁹³

10. Media and Telecom Facilities

While the targeting of media and telecom infrastructure would ordinarily have extensive impact on civilians, ISIS banned the use of phones, internet, and other communications for civilians. The group took control of major communications hubs, such as cell towers, TV stations, and radio towers,³⁹⁴ which were struck by the coalition.³⁹⁵ At times, ISIS would repurpose those facilities as media centers for locals to watch ISIS propaganda videos on large screens, use them

390. CIVCAS Allegation Closure Report, Allegation No. 569, at 1 (Sept. 23, 2017), <https://int.nyt.com/data/documenttools/c-6-26-17-syria/29e4da976b240718/full.pdf> [<https://perma.cc/EVU2-V6LG>] (describing a June 2017 incident).

391. Interview by Azmat Khan with Former High-Level U.S. Military Official, Operation Inherent Resolve (Dec. 2017) (on file with authors).

392. *Civilian Casualties Incident Code CS1077*, AIRWARS, <https://airwars.org/civilian-casualties/cs1077-june-25-2017> [<https://perma.cc/W9LH-2WDW>] (describing a June 25, 2017 incident).

393. Press Release, *supra* note 348.

394. See, e.g., Charlie Winter, *ISIS’ Offline Propaganda Strategy*, BROOKINGS (Mar. 31, 2016), <https://www.brookings.edu/articles/isis-offline-propaganda-strategy> [<https://perma.cc/5NHV-4NCV>].

395. See, e.g., *ISIS’ Al-Bayan Radio Station in Mosul Is Bombed into Silence by Iraqi Jets*, NBC NEWS (Oct. 3, 2016, 10:53 AM EDT), <https://www.nbcnews.com/storyline/isis-terror/isis-al-bayan-radio-station-mosul-bombed-silence-iraqi-jets-n658521> [<https://perma.cc/9V4R-QQTP>].

to produce media materials, or use them to serve as other strategic-communications hubs.³⁹⁶

In June 2017, the coalition targeted several ISIS media operations in Mayadin, Syria, including an ISIS media-oversight facility, a communications center, a media headquarters, “a street-side kiosk” used as an ISIS media office, and a media site used to “broadcast propaganda” and footage of ISIS in battle.³⁹⁷ The sites were surrounded by commercial entities and civilian presence, and the coalition admitted that twelve civilians were killed in the strikes.³⁹⁸

11. Financial and Banking Facilities

On January 11, 2016, the coalition conducted an airstrike on what it believed to be an ISIS “cash and finance distribution center” in the al-Qadisiyya neighborhood of East Mosul, later publishing a video of the airstrike online.³⁹⁹ Known to locals as Zuhoor Bank, the facility had been taken over by ISIS but was still also used by civilians, according to locals.⁴⁰⁰ Footage taken after the strike shows rescue workers attempting to pull a civilian man from the rubble.⁴⁰¹ The man, confirmed through ground reporting to be Akram Jawad al-Naemi, who lived near the bank, was killed, and at least seven who lived or worked near the bank were injured.⁴⁰²

The strike was one of the first in what was known as Operation Point Blank, an effort to target ISIS cash reserves.⁴⁰³ From January 2016 to September 2017, the coalition struck at least thirty-six financial targets, the majority of which were located in Mosul.⁴⁰⁴ These included several strikes that killed civilians, including the above January 2016 strike in East Mosul,⁴⁰⁵ an April 2016 strike on an ISIS

396. See, e.g., Winter, *supra* note 394.

397. CIVCAS Tracker, Allegation Number 488, *supra* note 300, at 17, 22.

398. CIVCAS Allegation Closure Report, Allegation No. 569, *supra* note 390, at 5-7.

399. Jan. 11: Coalition Airstrike Destroys Daesh Finance Distribution Center Near Mosul, DEF. VISUAL INFO. DISTRIB. SERV. (Jan. 15, 2016), <https://www.dvidshub.net/video/446399/jan-11-coalition-airstrike-destroys-daesh-finance-distribution-center-near-mosul> [<https://perma.cc/V28J-YKVJ>] (filming a January 11, 2016 incident).

400. See Request #34 (Sept. 18, 2018), <https://int.nyt.com/data/documenttools/c-1-11-16-iraq/57d2270206e46471/full.pdf> [<https://perma.cc/5R78-3SUL>].

401. 1 Mo ZBS 11 1 2016, INTERNET ARCHIVE (Jan. 1, 2016), <https://archive.org/details/1MoZBS1> [<https://perma.cc/AEM4-C8A7>].

402. Ground Reporting by Azmat Khan in Mosul (May-June 2021) (unpublished reporting for Khan, *supra* note 186) (on file with authors).

403. Wasser et al., *supra* note 166, at 73.

404. *Id.* at 227.

405. See Request #34, *supra* note 400.

“bulk cash facility” in Mosul worth approximately \$150 million,⁴⁰⁶ and a July 2017 strike on an ISIS financial headquarters in Abu Kamal, Syria, where \$2 million was reportedly stored.⁴⁰⁷

Records related to these strikes provide little insight into whether the targets also had dual civilian use, such as ISIS’s *zakāt* offices, which simultaneously collected taxes and distributed charity to the poor.⁴⁰⁸

12. Manufacturing, Production, and Construction

In ISIS-held territories, auto-repair facilities and industrial neighborhoods frequently became places that ISIS took over and used to manufacture car bombs. Due to the high potential for secondary explosions, such strikes often could result in many civilian deaths. For example, a June 2015 strike on what was assessed to be a car-bomb factory in Hawija, Iraq,⁴⁰⁹ resulted in the destruction of nearly the entirety of Hawija’s industrial district, where displaced families were also living, and killed as many as seventy civilians, according to a coalition investigation.⁴¹⁰

Construction equipment was often targeted in airstrikes.⁴¹¹ For example, to disrupt the movement of car bombs, the coalition targeted a front-end loader in

406. Press Briefing by Maj. Gen. Gersten via Teleconference from Baghdad, Iraq, U.S. DEP’T DEF. (Apr. 26, 2016), <https://www.defense.gov/News/Transcripts/Transcript/Article/743229/departement-of-defense-press-briefing-by-maj-gen-gersten-via-teleconference-from> [https://perma.cc/D779-KA7F]; see also Memorandum on CIVCAS Assessment Report (05 Apr 16 – Mosul, Iraq) 1 (Apr. 20, 2016), <https://int.nyt.com/data/documenttools/c-4-5-16-iraq/a65ead1ba5363509/full.pdf> [https://perma.cc/B9N2-PCAK] (describing an April 5, 2016 incident).

407. Memorandum on CIVCAS Credibility Assessment Report (CCAR) for Allegation 1189, Abu Kamal, Syria, 29 Jul 2017, at 2 (Aug. 31, 2017), <https://int.nyt.com/data/documenttools/c-7-29-17-syria/ccfdcd19b745f96/full.pdf> [https://perma.cc/E5CG-BK56] (describing a July 29, 2017 incident).

408. See Revkin, *supra* note 27, at 142 (explaining that descriptions of targets involving financial services are often “too vague to help determine whether the object or institution was exclusively military or dual-use in nature”).

409. Exhibit 15, in Index of Exhibits, Al Hawijah ISIL VBIED Factory Strike, 02 June 2015, <https://int.nyt.com/data/documenttools/c-6-2-15-iraq/055d09f8f8b256a4/full.pdf> [https://perma.cc/UE5G-SQG3].

410. Khan, *supra* note 186.

411. Dan Lamothe, *The War on Bulldozers: U.S. Airstrikes Pounding Militant Construction Equipment*, WASH. POST. (Nov. 19, 2014, 3:27 PM EST), <https://www.washingtonpost.com/news/checkpoint/wp/2014/11/19/the-war-on-bulldozers-u-s-airstrikes-pound-militant-construction-equipment> [https://perma.cc/XNC3-NZ82] (referring to airstrikes on “an array of construction equipment controlled by militants”); Thomas Gibbons-Neff & Mustafa

East Mosul in December 2016 because it was “repairing obstacles and road cratering generated by Coalition airstrikes.”⁴¹² Following the strike, a man and child on the opposite end of the highway fell to the ground. “The adult male sat up seconds later, the child did not,” according to a civilian-casualty assessment.⁴¹³ The child and the driver of the loader were assessed to have been casualties of the strike.⁴¹⁴

After an April 2017 strike on a front-end loader “constructing a defensive fighting position” on the outskirts of Mosul, coalition forces watched as a woman “picked up an object” about four meters from the destroyed loader into her arms and ran down the street.⁴¹⁵ Later, she put it down. “At this stage, the object can be identified as a child, clearly limp,” the civilian-casualty assessment states.⁴¹⁶ “She then picks the child up again and walks more slowly down the street. At this time, the feed zooms out.”⁴¹⁷

ISIS took over many storage facilities as well. While such targets were often assessed to have exclusive use by ISIS, some continued to play essential civilian functions. For example, in an April 2017 strike near Tal Afar, Iraq, coalition forces targeted what they believed to be an ISIS weapons factory whose “pre-ISIS functionality” was known to be “a wheat mill.”⁴¹⁸ Three civilians who may have been inside the building were identified as killed.⁴¹⁹ According to the assessment, a “source post-strike claimed that the facility was not only used by ISIS for military purposes but that the ISIS Agricultural Bureau also used the facility to

Salim, *Bulldozers Have Become More Crucial—and More Vulnerable—in the Fight Against the Islamic State*, WASH. POST (May 29, 2017, 7:50 PM EDT), https://www.washingtonpost.com/world/middle_east/bulldozers-have-become-more-crucial--and-more-vulnerable--in-the-fight-against-the-islamic-state/2017/05/29/0e6caf3a-409a-11e7-b29f-f40ffcd2dbb_story.html [https://perma.cc/JE77-JXRP].

412. Memorandum on CIVCAS Credibility Assessment Report (CCAR) for [redacted] (CJFLCC-OIR CCAR 039/16) 1 (Jan. 9, 2016), <https://int.nyt.com/data/documenttools/c-12-9-16-iraq/ed80eda93485cdf5/full.pdf> [https://perma.cc/E8ER-CLX9] (describing a December 10, 2016 incident).

413. *Id.* at 2.

414. *Id.* at 1-2.

415. Memorandum on CIVCAS Credibility Assessment Report (CCAR) - [redacted] Strike at 22 [redacted] April 2017 at [redacted] (CJFLCC-OIR 68/17) 1-2 (Apr. 29, 2017), <https://int.nyt.com/data/documenttools/c-4-22-17-iraq/fab0a8d11a2a17d/full.pdf> [https://perma.cc/MED4-6CBX] (describing an April 22, 2017 incident).

416. *Id.* at 2.

417. *Id.*

418. Memorandum on CIVCAS Allegation Closure Report, Allegation No. 415, at 1-2 (Apr. 26, 2017), <https://int.nyt.com/data/documenttools/c-4-8-17-iraq/9foe3842579a0195/full.pdf> [https://perma.cc/P4HJ-RFZX] (describing an April 8, 2017 incident).

419. *Id.* at 2.

distribute rations to civilians. This is consistent with the target’s known pre-ISIS functionality as a wheat mill.”⁴²⁰

13. *Vehicles*

Coalition strikes frequently targeted vehicles—including not just cars, but also boats, semitrucks, pickup trucks, tractor-trailer trucks, vans, and more. Such targets appeared more than 3,000 times in the press releases, which often described the targets with a modifier, such as “ISIS vehicle” or similar. But the targets were not otherwise specifically identified as military vehicles.⁴²¹ In many cases, chances are good that these were vehicles that coalition forces believed were used for military purposes by ISIS but which were otherwise ordinary vehicles commonly used by civilians (and perhaps sometimes also still used by civilians). The vehicles were often located in areas that were used by civilians as well. When there were confirmed civilian casualties, they were usually civilians not in the targeted vehicles but those nearby who were harmed in the blast. For example, a “U.S. airstrike on a convoy of Islamic State vehicles . . . injured at least one civilian.”⁴²² Although the civilian death was not initially acknowledged, the coalition issued a press statement on January 29, 2016, stating, “On July 27, 2015, near Ash Sharqat, Iraq, during strikes against ISIL vehicles, it was assessed one civilian was injured.”⁴²³ The precise cause of that civilian death—whether the civilian was in the vehicle or simply nearby—is not clear from what has been disclosed.

14. *Terrain*

The coalition targeted what it often simply identified as “terrain” more than 300 times—according to entries in coalition press releases—usually for the stated purpose of denying that terrain to ISIS. In addition to “terrain,” the press releases

420. *Id.*

421. We classified vehicles that are clearly single-use military vehicles (e.g., armored vehicles, tactical vehicles, or tanks) as military personnel, equipment, and facilities.

422. *Civilian Casualties: Airwars Assessment CIO87*, AIRWARS, <https://airwars.org/civilian-casualties/cio87-july-27-2015> [<https://perma.cc/GRG8-8KHM>] (describing a July 27, 2015 incident).

423. Press Release, U.S. Cent. Command, Jan. 29: U.S. Cent. Command Releases Results of Iraq and Syria Civilian Cas. Assessments (Jan. 29, 2016), <https://www.centcom.mil/MEDIA/PRESS-RELEASES/Press-Release-View/Article/904489/jan-29-us-central-command-releases-results-of-iraq-and-syria-civilian-casualty> [<https://perma.cc/85UG-AB4M>].

referred to “caves,”⁴²⁴ “cave entrance[s],”⁴²⁵ “land features,”⁴²⁶ and “terrain features.”⁴²⁷ At first glance, “terrain denial” may strike an observer as a clear military objective. And in many cases it is. Yet the terrain often refers to land or land features that are not inherently military in character. They are simply places where ISIS forces are located or believed to be located. Civilians may be colocated with ISIS forces, sharing that “terrain” with them. Moreover, the term “terrain denial” can mask a range of underlying targets. The strike on the Tabqa Dam and hydroelectric power plant described above, for example, was described as “terrain denial.”⁴²⁸ Yet the potential impact of the strike could have been catastrophic – not just because of the loss of the power plant, but also because of the flooding that could have resulted from the dam’s destruction.⁴²⁹

* * *

This Part has demonstrated that the U.S. military regularly targeted a range of objects used by both militants and civilians in Iraq and Syria from 2014 to 2018. We can see as much in the U.S. military’s own press releases and civilian-casualty reports. But when we look beyond these sources, we see that the targeting of dual-use objects is even more expansive than these official documents would suggest: many of the targets characterized as purely military objectives are in fact heavily used by civilians. The targeting of those objects, moreover, led to significant civilian harm. Most immediately, there were often civilians present

424. Press Release, U.S. Cent. Command, June 4: Military Airstrikes Continue Against ISIL Terrorists in Syria and Iraq (June 4, 2016), <https://www.centcom.mil/MEDIA/PRESS-RELEASES/Press-Release-View/Article/904619/june-4-military-airstrikes-continue-against-isil-terrorists-in-syria-and-iraq> [<https://perma.cc/5KG8-6BSF>].

425. Press Release, U.S. Cent. Command, June 7: Military Airstrikes Continue Against ISIL Terrorists in Syria and Iraq (June 7, 2016), <https://www.centcom.mil/MEDIA/PRESS-RELEASES/Press-Release-View/Article/904621/june-7-military-airstrikes-continue-against-isil-terrorists-in-syria-and-iraq> [<https://perma.cc/4US3-R6FS>].

426. Press Release, U.S. Cent. Command, Aug. 16: Military Airstrikes Continue Against ISIL Terrorists in Syria and Iraq (Aug. 16, 2015), <https://www.centcom.mil/MEDIA/PRESS-RELEASES/Press-Release-View/Article/904135/aug-16-military-airstrikes-continue-against-isil-terrorists-in-syria-and-iraq> [<https://perma.cc/N3EA-QGS2>].

427. Press Release, U.S. Cent. Command, Aug. 14: Military Airstrikes Continue Against ISIL Terrorists in Syria and Iraq (Aug. 14, 2015), <https://www.centcom.mil/MEDIA/PRESS-RELEASES/Press-Release-View/Article/904137/aug-14-military-airstrikes-continue-against-isil-terrorists-in-syria-and-iraq> [<https://perma.cc/GCF4-G3SN>].

428. See *supra* text accompanying notes 228–243.

429. The strike on the Tabqa Dam may have violated the prohibition on targeting works and installations containing dangerous forces. This principle is codified in Additional Protocol I art. 56, *supra* note 22; and Additional Protocol II art. 15, *supra* note 112. It is also considered a norm of customary international law. See *Rule 42. Works and Installations Containing Dangerous Forces*, ICRC INT’L HUMANITARIAN L. DATABASES,, <https://ihl-databases.icrc.org/en/customary-ihl/v1/rule42> [<https://perma.cc/MKN8-6VCW>].

at these dual-use targets who were injured and killed. And the loss of some of those objects had long-term consequences for the welfare of civilian populations. In short, the targeting of dual-use objects, by blurring the line between civilian and military, has had lasting consequences for civilians in conflict areas. The next Part turns to a consideration of reforms.

III. OPPORTUNITIES FOR REFORM

The eroding distinction between military objectives and civilians and civilian objects represented by the rise of dual-use objects has undermined the critical protections for civilians in war. Here we propose two sets of reforms that would go a significant distance toward restoring these protections. First, we call on the United States to collect better information about the objects that it is targeting so that it knows when objects are dual-use and important to civilians’ critical needs. As the events described in Section II.C make clear, the U.S. military is too often unaware of the civilian uses of the objects it targets. And it rarely understands fully how destroying those objects will affect the civilian population. Second, we advocate several legal reforms that would help restore critical protections for civilians in war.

While our central focus has been on the United States, these recommendations are not limited to the United States alone. As we showed in Part I, the United States has been a leader in targeting dual-use objects in the postwar era. It thus has a responsibility to be a leader in addressing the harms that have resulted. Moreover, the United States is uniquely positioned to shift customary international law by influencing state practice. The United States has engaged in counterterrorism training programs in more than seventy nations around the world.⁴³⁰ Those countries literally learn the rules from the United States. The United States’s approach to targeting also influences other states indirectly, helping to shape customary international law and thus setting expectations for the actions of states around the globe, whether or not it partners with them. In short, the United States’s policies and practices inevitably become the policies and practices of the world. This influence has meant that the United States has played a critical role in eroding protections for civilians, but that same influence puts the United States in a position to revive them. Unfortunately, the Trump Administration has signaled its intention to reverse the progress that the country has

430. Stephanie Savell, *United States Counterterrorism Operations Under the Biden Administration, 2021-2023*, WATSON INST. FOR INT’L & PUB. AFFS.: BROWN UNIV. 7 (Nov. 2023), https://watson.brown.edu/costsofwar/files/cow/imce/papers/2023/US-CounterterrorismOperations_2021-2023.pdf [<https://perma.cc/U247-HB2M>].

made in recent years to mitigate civilian harm.⁴³¹ If that occurs, then greater responsibility will fall on other states and on international organizations to chart the path ahead.

A. The Need for Better Information About Dual-Use Objects

The empirical analysis in Part II was made possible only by access to information obtained through lawsuits and ground reporting. Comparing those more detailed sources to the thin information made public in press releases makes clear how little public information there is about the targeting of dual-use objects—and the attendant costs.

This paucity of information is not only true when it comes to publicly released information. It is true of nonpublic U.S. government information as well. The civilian-casualty reports, which are not generally made public and were obtained as a result of a FOIA lawsuit against DOD, make clear that the government often lacks basic information about the civilian use of the objects it targets—and the impact on civilians that will result. During the period analyzed in Part II, the government's system only required tracking civilian casualties, understood as injury and death as a direct result of the effects of munitions or military operations. It generally did not incorporate harm to civilians from the loss of important dual-use objects or the indirect longer-term effects of that loss—what some scholars have described as “reverberating effects” or “cumulative harm,” discussed below.⁴³² For example, DOD did not track deaths resulting from a lack of clean drinking water due to damage to water-treatment facilities directly caused by a U.S. strike. Assessments of harm often failed to include loss of civilian use of dual-use objects, including critical civilian infrastructure.⁴³³ That failure meant that the U.S. government could not know the true impact of its targeting decisions.

That is in part by design. When collecting information, the U.S. military focuses on information it regards as essential to the war effort. That means that information collection is enemy-centric. Information on civilians and civilian harm, meanwhile, has traditionally been viewed largely through the lens of legal compliance. The narrow U.S. interpretation of the law has not incentivized collecting more information about civilians and civilian harm; if anything, the

431. See Alex Horton, Meg Kelly & Dan Lamothe, *Pentagon Moves to Gut Operations Focused on Reducing Civilian Harm*, WASH. POST (Mar. 4, 2025), <https://www.washingtonpost.com/national-security/2025/03/04/trump-hegseth-pentagon-firings-civilian-harm> [<https://perma.cc/D5CB-LCNT>].

432. See *infra* Section III.B.

433. This discussion is informed by an email from a former military operational legal advisor and current DOD employee to Oona A. Hathaway on June 3, 2024.

opposite is true. It is clear that if anything is going to change with regard to dual-use targeting, the necessary first step is to collect better information about the objects that are targeted and the long-term costs for civilians of destroying those objects. This in turn likely requires reaffirming and reinforcing not only the necessity of collecting such information in order to make informed targeting decisions but also the importance of such information to the long-term success of the war effort.

DOD has recently acknowledged the lack of adequate information when it comes to civilian-harm mitigation, and it has pledged to take proactive steps to address these problems. The DOD Civilian Harm Mitigation and Response Action Plan (CHMR-AP) is a positive step forward.⁴³⁴ The CHMR-AP and DOD Instruction 3000.17 on CHMR direct the combatant commands to establish Civilian Harm Assessment Cells (CHACs) to institutionalize and standardize post-strike assessment, investigating, tracking, and reporting of civilian-harm incidents, and also to support data analysis for operational- and institutional-level learning.⁴³⁵ Unfortunately, DOD Instruction 3000.17 adopts a narrow interpretation of civilian harm that reproduces some of the blind spots that have long plagued the civilian-harm-mitigation process;⁴³⁶ it should be revisited.

The new initiative has led to the creation of Civilian Environment Teams (CETs), which will be made up of “intelligence professionals; experts in human terrain, civilian infrastructure, and urban systems; and civil engineers.”⁴³⁷ These CETs, together with CHMR Red Teams, have the potential to help prevent, rather than simply mitigate, incidents of civilian harm. To further that end, it will be essential that CETs incorporate an understanding of dual-use objects and how

434. See generally *Civilian Harm Mitigation and Response Action Plan (CHMR-AP)*, U.S. DEP’T OF DEF. (Aug. 25, 2022) [hereinafter *CHMR-AP*], <https://media.defense.gov/2022/Aug/25/2003064740/-1/-1/1/CIVILIAN-HARM-MITIGATION-AND-RESPONSE-ACTION-PLAN.PDF> [<https://perma.cc/SH4T-SZH6>] (laying out a plan for the mitigation of civilian harm in wartime); Off. of the Under Sec’y of Def. for Pol’y, *DoD Instruction 3000.17: Civilian Harm and Mitigation Response*, U.S. DEP’T OF DEF. (Dec. 21, 2023) [hereinafter *DoD Instruction 3000.17*], <https://www.esd.whs.mil/Portals/54/Documents/DD/issuances/dodi/300017p.pdf> [<https://perma.cc/U58S-7UEL>] (providing additional guidance on implementing the previously released Civilian Harm Mitigation and Response Action Plan (CHMR-AP)).

435. See *CHMR-AP*, *supra* note 434, at 20–23; *DoD Instruction 3000.17*, *supra* note 434, at 23.

436. See *DoD Instruction 3000.17*, *supra* note 434, at 49. The definition adds a broader set of indirect effects in its definition, but only “[a]s a matter of DOD policy.” *Id.* While a step in the right direction, this has the effect of reserving the right to ignore these harms.

437. Dan E. Stigall & Anna Williams, *An Improved Approach to Civilian Harm Mitigation and Response: The Civilian Harm Mitigation and Response Action Plan (CHMR-AP)*, LIEBER INST. W. POINT: ARTICLES WAR (Aug. 25, 2022), <https://lieber.westpoint.edu/dod-issues-civilian-harm-mitigation-response-action-plan> [<https://perma.cc/LZ8R-R5EN>].

they are used by the civilian population when developing an understanding of the “civilian environment.”

There should also be reforms to ensure much better transparency regarding targeting of dual-use objects. Our deep dive into DOD’s reporting practices revealed several concerning shortcomings. The descriptions in press releases are, for example, incomplete. Information about the actual use of targeted objects is often not disclosed – and may not even be collected by the U.S. government unless there is an outside allegation of civilian casualties. Even then, the military largely relies on information collected from battle-damage assessments, often relying on videotapes not intended for the purpose of assessing civilian harm. Our recommendation for better information and greater transparency is consistent with CHMR-AP’s call to “[d]evelop standardized civilian harm operational reporting and data management processes to improve how DoD collects, shares, and learns from data related to civilian harm.”⁴³⁸

In order to improve information about dual-use objects that are critical to civilian well-being, DOD needs to expand the sources of information from which it draws. That should include directly and indirectly obtaining information on the ground about the areas to be targeted, using the variety of new technologies now available for information-gathering purposes. NGOs and reporters, including one of the authors of this Article, have done significant ground reporting in the areas that have been the subject of U.S. military operations. That ground reporting provides insight into how dual-use objects are used by the civilian population – information that would be important for the U.S. government to know when making targeting decisions. There are other tools for gathering information on the ground as well. For example, large-scale household surveys conducted by researchers, including one of the authors of this Article, have been used to estimate aggregate levels of harm to civilians and structures in a particular city or neighborhood.⁴³⁹

While the U.S. military may not be able to collect its own information on the ground easily without endangering its personnel or civilians who might face retaliation for sharing information with them, there is already a wealth of publicly available survey and satellite data collected by researchers, U.N. agencies, and other international and local human-rights and humanitarian organizations that

438. See *CHMR-AP*, *supra* note 434, at 17 (referring to CHMR-AP Objective 6).

439. See Krick et al., *supra* note 106, at 14 (using survey data and interviews, among other sources of information, to document civilian harm). A household survey in Mosul collected even more granular data on the prevalence of deaths and injuries caused by different types of weapons, including airstrikes, explosions from ground munitions, and bullets. See generally Riyadh Lafta, Maha A. Al-Nuaimi & Gilbert Burnham, *Injury and Death During the ISIS Occupation of Mosul and Its Liberation: Results From a 40-Cluster Household Survey*, 15 *PLOS MEDICINE* art. no. e1002567 (2018) (presenting the results from this survey).

can be analyzed. Historically, the U.S. government has conducted extensive public-opinion polling in countries where it has engaged in wars, including Vietnam⁴⁴⁰ and Iraq,⁴⁴¹ and the modern practice of relying largely on information obtained from aerial surveillance is relatively new, driven by recent technological advances in autonomous drones and artificial intelligence (AI).⁴⁴² While operating from the air offers the advantage of reducing risk to U.S. forces, it also limits the U.S. military’s ability to conduct accurate after-action reports of civilian harm. In 2014, the Pentagon’s press secretary acknowledged the difficulty of investigating reports of civilian harm in Syria: “[W]e don’t have anybody on the ground going to these sites It gets hard to disprove a negative when . . . you’re mainly looking at it from the air.”⁴⁴³

The U.S. military could make better use of open-source information to track dual-use objects that are critical to civilian well-being. The variety and specificity of open-source information available today is vastly greater than it was even a few years ago. Independent researchers, such as Bellingcat,⁴⁴⁴ and university-based groups have developed tools and techniques for detailed open-source reports in conflict zones.⁴⁴⁵ Using satellite data and other open-source information, researchers, including two of the authors of this Article, have provided detailed information on the impact of conflict on everything from electrical

440. THOMAS C. THAYER, *WAR WITHOUT FRONTS: THE AMERICAN EXPERIENCE IN VIETNAM* 173 (1985) (describing surveys of Vietnamese civilians conducted during the Vietnam War by the Joint U.S. Public Affairs Office).

441. James Dobbins, Seth G. Jones, Benjamin Runkle & Siddharth Mohandas, *Occupying Iraq: A History of the Coalition Provisional Authority*, RAND CORP. 96 (2009), https://www.rand.org/content/dam/rand/pubs/monographs/2009/RAND_MG847.pdf [<https://perma.cc/5KEJ-EY5D>] (describing surveys of Iraqi civilians commissioned by the U.S. Department of State).

442. See Anthony King, *Digital Targeting: Artificial Intelligence, Data, and Military Intelligence*, 9 J. GLOB. SEC. STUD. art. no. ogaec009, at 3 (2024).

443. See *Department of Defense Press Briefing by Rear Adm. Kirby in the Pentagon Briefing Room*, U.S. DEP’T DEF. (Sept. 25, 2014), <https://www.defense.gov/News/Transcripts/Transcript/Article/606932/departments-of-defense-press-briefing-by-rear-adm-kirby-in-the-pentagon-briefing> [<https://perma.cc/3DMU-ZZDG>].

444. BELLINGCAT, <https://www.bellingcat.com> [<https://perma.cc/3YRA-ESCD>].

445. See, e.g., *Berkeley Protocol on Digital Open Source Investigations*, HUM. RTS. CTR. AT THE U.C. BERKELEY SCH. OF L. AND OFF. OF THE UNITED NATIONS HIGH COMM’R FOR HUM. RTS., at vi (2022), <https://humanrights.berkeley.edu/wp-content/uploads/2024/02/Berkeley-Protocol.pdf> [<https://perma.cc/R8RL-2348>] (identifying “international standards for conducting online research into alleged violations of international human rights law and international humanitarian and criminal law”).

infrastructure⁴⁴⁶ to medical facilities,⁴⁴⁷ the deportation of children,⁴⁴⁸ places of worship,⁴⁴⁹ and the civilian population of Mosul.⁴⁵⁰ Those reports are so detailed and reliable that some have been used as the source for criminal arrest warrants in the International Criminal Court.⁴⁵¹ If independent researchers can collect such detailed information from open sources, the U.S. government should be able to do the same.

It is not enough, however, for the U.S. government simply to collect information on the nature of the dual-use objects potentially subject to targeting by U.S. forces. It should also track the reverberating effects of the destruction of dual-use objects — effects that impede the restoration and maintenance of peace. This would entail developing models to generate estimates of the impact of the long-term deprivation of access to the dual-use object, whether it is a bridge, a water-treatment plant, an electrical plant, or some other object that is important to the civilian population. Failing to track this harm means that the U.S. military does not fully understand the impact of military operations on the civilian population. It also disables the military from learning from past experiences and

446. See, e.g., *Bombardment of Ukraine's Power Generation and Transmission Infrastructure, 1 October 2022 to 30 April 2023: A Remote Assessment*, UKR. CONFLICT OBSERVATORY (Feb. 29, 2024), <https://hub.conflictobservatory.org/portal/apps/sites/#/home/pages/power-1> [<https://perma.cc/D3LK-GM57>].

447. See, e.g., Danielle N. Poole, Daniel Andersen, Nathaniel A. Raymond, Jack Parham, Caitlin Howarth, Oona A. Hathaway, Kaveh Khoshnood & Yale Humanitarian Rsch. Lab, *The Effect of Conflict on Medical Facilities in Mariupol, Ukraine: A Quasi-Experimental Study*, 5 PLOS GLOB. PUB. HEALTH art. no. e0003950, at 5-10 (2025).

448. See, e.g., *Belarus' Collaboration with Russia in the Systematic Deportation of Ukraine's Children*, UKR. CONFLICT OBSERVATORY (Nov. 16, 2023), <https://hub.conflictobservatory.org/portal/apps/sites/#/home/pages/belarus-children-deportation> [<https://perma.cc/NV4P-VJVE>].

449. See, e.g., *Rapid Report: Damage to Odesa Transfiguration Cathedral*, 23 July 2023, UKR. CONFLICT OBSERVATORY (Aug. 4, 2023), <https://hub.conflictobservatory.org/portal/apps/sites/#/home/pages/heritage-2> [<https://perma.cc/VDH8-96XA>].

450. See Krick et al., *supra* note 106, at 14 (analyzing imagery of 19,888 battle-affected structures in Mosul from the U.N. Satellite Centre).

451. See, e.g., Lindsay Freeman, *Ukraine Symposium—Accountability for Cyber War Crimes*, LIEBER INST. W. POINT: ARTICLES WAR (Apr. 14, 2023), <https://lieber.westpoint.edu/accountability-cyber-war-crimes> [<https://perma.cc/88BJ-XMZN>] (describing the Berkeley Law Human Rights Center's article 15 communication with the International Criminal Court Prosecutor on cyber war crimes in Ukraine); Colin Poitras, *International Criminal Court Indicts Senior Military Officials from Russia for Targeted Strikes on Ukraine's Power Infrastructure*, YALE SCH. PUB. HEALTH (Mar. 5, 2024), <https://ysph.yale.edu/news-article/international-criminal-court-indicts-senior-military-officials-from-russia-for-targeted-strikes-on-ukraines-power-infrastructure> [<https://perma.cc/AR4P-VAJL>] (explaining that arrest warrants were issued by the International Criminal Court just days after the Yale School of Public Health's Humanitarian Research Lab released its report on systematic damage to Ukraine's power generation and transmission facilities).

using that accumulated knowledge as part of the planning process going forward. Knowing how past operations have caused reverberating effects would allow the U.S. military to make plans in the future that are better at mitigating these risks and to plan to respond and address those harms if they do occur.

The current leadership at the Pentagon has shown little interest in investing in such improvements. Even more concerning, it has signaled that it is poised to backtrack on some of the most promising reforms adopted in the last several years to mitigate the harm to civilians caused by U.S. military operations.⁴⁵²

B. Legal Reforms

International humanitarian law attempts to construct a bright line between civilians and civilian objects on the one hand and military objectives on the other. But the reality is that this line is increasingly blurred. The United States has been targeting many objects that it considers legitimate military objectives because they “by their nature, location, purpose, or use, make an effective contribution to military action” and their “total or partial destruction, capture, or neutralization . . . offers a definite military advantage.”⁴⁵³ And yet these same objects are often heavily used by civilians. Particularly in modern urban warfare against nonstate actor groups, combatants and civilians rely on many of the same buildings, roads, bridges, infrastructure, manufacturing facilities, and financial institutions to make it through their daily lives in a difficult environment. Destroying those objects means putting civilians that use them or live and work in or near them at risk. And even as eliminating these objects makes it harder for a nonstate actor to fight, it also makes it difficult or impossible for civilians to live their lives as well.

Here we consider three specific opportunities for states and the ICRC to clarify the law to better protect civilians in conflicts where dual-use objects increasingly abound. First, they should clarify that when a dual-use object is targeted, not only are anticipated civilian deaths to be considered in the proportionality assessment, but so too is the harm caused by loss of use of that object by civilians. Second, they should clarify that objects that do not have a direct connection to a war-fighting capability, but are merely war-sustaining, are not lawful military objectives. Third, we argue that states should incorporate “reverberating effects” and “cumulative harm” into their proportionality analysis. Civilian-casualty assessments do not capture the harm to civilians from the loss of access to dual-

452. Claire Finkelstein, *The Pentagon Is About to Make a Big Mistake on Civilian Harm Mitigation*, WAR ON ROCKS (Mar. 5, 2025), <https://warontherocks.com/2025/03/the-pentagon-is-about-to-make-a-big-mistake-on-civilian-harm-mitigation> [<https://perma.cc/BB7J-PMNP>].

453. Additional Protocol I art. 52(2), *supra* note 22.

use objects—to the bridges, the hospitals, the homes, the sources of livelihood, and more. Accounting for reverberating effects and cumulative effects would allow the legal framework to provide more meaningful protection to civilians in times of war. While we believe that these proposals are already the best reading of the law, there is sufficient public disagreement—especially by influential states, most notably the United States—that clarification of these legal obligations is critical to better protecting civilians.

1. *Proportionality and Dual-Use Objects*

Customary international law is clear that dual-use objects that create a *direct* military advantage satisfy the “effective contribution to military action” prong of Article 52(2)’s military-objective test.⁴⁵⁴ However, even if a dual-use object is a military objective, the principle of proportionality still applies.⁴⁵⁵ The principle of proportionality prohibits attacks where the anticipated civilian harm would be excessive in relation to the anticipated concrete and direct military advantage.⁴⁵⁶ Specifically, Additional Protocol I prohibits attacks that “cause incidental loss of civilian life, injury to civilians, damage to civilian objects, or a combination thereof which would be excessive in relation to the concrete and direct military advantage anticipated.”⁴⁵⁷ Hence if a belligerent intends to strike a power plant that supplies both military and civilian populations, it must consider the risk that civilian employees at the site will be killed or injured. In addition, it must be established that the object’s “total or partial destruction, capture or neutralization, in the circumstances ruling at the time, offers a definite military advantage.”⁴⁵⁸

States disagree, however, over whether the damage to the object itself must factor into the proportionality analysis, if an object has both military and civilian uses. The accepted articulation of proportionality requires belligerents to consider the potential “loss of civilian life, injury to civilians, [and] *damage to civilian objects*.”⁴⁵⁹ As noted earlier, both the United States and Israel maintain that because a dual-use object must meet the criteria to be a military objective before it can be attacked, it is then, by definition, not a civilian object.⁴⁶⁰ Because it is not a civilian object, damage to the structure is irrelevant to the proportionality

454. HENCKAERTS & DOSWALD-BECK, *supra* note 93, at 29–32.

455. The principle of precautions applies as well. See Additional Protocol I art. 57, *supra* note 22.

456. HENCKAERTS & DOSWALD-BECK, *supra* note 93, at 46.

457. Additional Protocol I art. 51(5)(b), *supra* note 22.

458. *Id.* art. 52(2).

459. *Id.* art. 51(5)(b) (emphasis added).

460. See *supra* note 134 and accompanying text.

calculus.⁴⁶¹ Critics of this position point out that this would allow commanders to ignore the important civilian functions of targets when a target serves even a minimal military purpose.⁴⁶² They argue that belligerents should consider the civilian use of a dual-use object in the proportionality analysis.⁴⁶³

The difference between the two positions can be significant. In Israel’s war in Gaza, for instance, Israel’s position that any military use of a building renders the entire building a legitimate military objective even if very little of it serves a military purpose has led to utter devastation. This includes situations where tunnels lie below residential buildings. When an Israeli attack in the Jabalya refugee camp destroyed an entire residential block, the IDF explained that it was targeting a senior Hamas figure in the tunnels below the camp: “[W]e struck it and it was taken out and dozens of Hamas operatives were killed with [a senior Hamas figure].”⁴⁶⁴ He continued, “Of course, it’s sad and regrettable that civilians are killed, but it is a legitimate military target.”⁴⁶⁵

One critical step toward addressing the dangers posed by targeting dual-use objects would be to clarify how to take account of the civilian uses of objects that also have military uses. In modern warfare, which is often waged in dense urban environments, limited military use of an otherwise-civilian object should not strip a civilian object of all protection. Rather, the proportionality analysis ought to take account not only of the civilians whose lives are at risk in the operation, but also the loss of the civilian object—whether a hospital, apartment building, bridge, water-treatment plant, electrical plant, or something else. Doing so would go some distance toward adequately accounting for the actual harm done to civilians by targeting these objects—and it would provide some measure of additional protection to civilians who are colocated with those objects as well as those who depend on them for their well-being.

To operationalize this obligation, states and the ICRC should clarify that when a dual-use object is targeted, not only are anticipated civilian deaths to be considered in the proportionality assessment, but so too is the harm caused by loss of use of that object by civilians. For instance, if one apartment in a building

461. See *supra* note 141 and accompanying text.

462. Laurent Gisel, *The Principle of Proportionality in the Rules Governing the Conduct of Hostilities Under International Humanitarian Law*, INT’L COMM. OF THE RED CROSS AND UNIVERSITÉ LAVAL 39 (2016), https://www.icrc.org/sites/default/files/document/file_list/4358_002_expert_meeting_report_web_1_o.pdf [<https://perma.cc/8SAB-BW2H>].

463. *Id.*

464. Louisa Loveluck, Susannah George & Michael Birnbaum, *As Gaza Death Toll Soars, Secrecy Shrouds Israel’s Targeting Process*, WASH. POST (Nov. 5, 2023, 5:15 PM EST), <https://www.washingtonpost.com/world/2023/11/05/israel-strike-targets-gaza-civilians-hamas> [<https://perma.cc/W92D-RVWB>].

465. *Id.*

is being used for weapons storage, the majority of the building that is used simply to provide housing to families should count on the civilian side of the ledger when assessing whether the strike is proportionate.⁴⁶⁶

2. War-Sustaining Objects

A second opportunity for clarifying the law concerns the legality of targeting “war-sustaining objects.” States generally agree that industries directly related to the war effort, such as those producing arms or supplying petroleum to military vehicles, are military objectives that may be targeted.⁴⁶⁷ But there is disagreement about whether a belligerent may target an industry that indirectly contributes to military activities by providing financial support.⁴⁶⁸ An important step would be to clarify that industries that indirectly contribute to military activities must not be targeted. That would include, for example, the oil industry (except fuel stored and used specifically for military purposes), financial institutions used by civilians and militants alike, and other manufacturing or business activities that are critical to the local economy.

This approach is consistent with a close reading of the text of Additional Protocol I. Article 52 requires that an object make an “effective contribution to military action” in order to be a military objective.⁴⁶⁹ This requires a *direct connection* between the object and war-fighting capability.⁴⁷⁰ Merely indirectly supporting the war effort through financial support or otherwise is not sufficient. As others have argued, expanding the scope of targetable objects to include “war-

466. In addition to the requirements of proportionality, the duty of precaution applies to the object insofar as it serves critical civilian needs. That duty requires, too, that the least destructive means necessary to achieve the military objective be used. See Additional Protocol I art. 57, *supra* note 22. For example, if part of a large hospital complex is used by militants, attacking forces would be obligated to take precautions not to destroy more of the complex than reasonably required to achieve the military objective sought. They would also be obligated to take into account the impact of the loss of the hospital and hospital services on the civilian population in making the proportionality analysis.

467. See Ryan Goodman, *The Obama Administration and Targeting ‘War-Sustaining’ Objects in Non-international Armed Conflict*, 110 AM. J. INT’L L. 663, 664 (2016).

468. See *id.* at 671–73.

469. Additional Protocol I art. 52(2), *supra* note 22.

470. *Excerpts of the Report*, *supra* note 21, at 222 (“[T]he drafters wanted to exclude indirect contributions and possible advantages.”); see also *id.* at 224 (“The expression ‘concrete and direct’ [in Additional Protocol I, art. 51(5)(b)] was intended to show that the advantage concerned should be substantial and relatively immediate, and that an advantage which is hardly perceptible or which would only appear in the long term should be disregarded.”).

sustaining” industries and infrastructure leads to “a very steep and slippery slope” with the potential to cause “considerable humanitarian suffering.”⁴⁷¹

The United States does not share this view. It has instead adopted a permissive approach to targeting war-sustaining objects. DOD’s *Law of War Manual* takes the position that war-sustaining targets that provide financial contributions to an adversary are legitimate military objectives.⁴⁷² The *Manual* specifically includes as lawful military objectives “economic objects associated with military operations or with war-supporting or war-sustaining industries.”⁴⁷³ Economic objects that have been found to be war-sustaining military objectives include electric power stations, oil-refining and oil-distribution facilities, and banks and financial institutions.⁴⁷⁴

Some states share the U.S. position on war-sustaining objects. Ecuador’s 1989 naval manual states that “military objectives are combatants and those objects which . . . effectively contribute to the enemy’s war-fighting or war-sustaining capability.”⁴⁷⁵ In 2005, the Eritrea-Ethiopia Claims Commission upheld the lawfulness of an attack against a power station because “it was of economic importance to Eritrea” and “the infliction of economic losses from attacks against military objectives is a lawful means of achieving a definite military advantage.”⁴⁷⁶ Until 2017, New Zealand’s *Manual of Armed Forces Law* stated that “[e]conomic targets that indirectly but effectively support enemy operations may also be attacked to gain a definite military advantage.”⁴⁷⁷ However, the latest version has excised that paragraph and makes no mention of attacking economic

471. Kenneth Watkin, *Sustaining the War Effort: Targeting Islamic State Oil Facilities*, JUST SEC. (Oct. 3, 2014), <https://www.justsecurity.org/15890/sustaining-war-effort-targeting-islamic-state-oil-facilities> [<https://perma.cc/4NPT-7FAZ>].

472. DOD *Law of War Manual*, *supra* note 21, § 5.6.6.2.

473. *Id.* § 5.6.8.

474. *Id.* § 5.6.8.5; Jennifer O’Connor, Gen. Couns., Dep’t of Def., Remarks at New York University School of Law: Applying the Law of Targeting to the Modern Battlefield (Nov. 28, 2016), <https://dod.defense.gov/Portals/1/Documents/pubs/Applying-the-Law-of-Targeting-to-the-Modern-Battlefield.pdf> [<https://perma.cc/SG2A-6245>] (explaining that authorization was given to target a site that “used to be a civilian bank before ISIL turned it into a cash storage site”); Goodman, *supra* note 467, at 664; Revkin, *supra* note 27, at 133.

475. ARMADA DEL ECUADOR ACADEMIA DE GUERRA NAVAL [ARMADA OF ECUADOR NAVAL WAR ACADEMY], ASPECTOS IMPORTANTES DEL DERECHO INTERNACIONAL MARÍTIMO QUE DEBEN TENER PRESENTE LOS COMANDANTES DE LOS BUQUES [IMPORTANT ASPECTS OF INTERNATIONAL MARITIME LAW THAT MUST BE CONSIDERED BY SHIP COMMANDERS] § 8.1.1 (1989).

476. Partial Award, Western Front, Aerial Bombardment and Related Claims, Eritrea’s Claims (Eri. v. Eth.), 26 R.I.A.A. 291, 291, 293, 295, 299–304, 334–35, 347 (Eri.-Eth. Claims Comm’n 2005).

477. N.Z. DEF. FORCE, DM 112, INTERIM LAW OF ARMED CONFLICT MANUAL ¶ 516(5) (1992).

targets.⁴⁷⁸ In recent years, French, Russian, and British leaders all made public statements justifying attacks on ISIS-controlled oil infrastructure on the grounds that oil sales were helping finance the terrorist organization.⁴⁷⁹

A few scholars have similarly defended this permissive approach. A well-known treatise on the law of war maintains that “‘effective contribution to military action’ . . . does not require a direct connection with combat operations.”⁴⁸⁰ It looks to the Union’s destruction of raw cotton during the Civil War for support:

[T]he test of effective contribution to military action . . . would again justify the destruction of raw cotton by the Union during the American Civil War, not because raw cotton had any value as an implement of war but because ‘in the circumstances ruling at the time’ it was the Confederacy’s chief export and thus an ultimate source of all Confederate weapons and military supplies.⁴⁸¹

While serving as DOD Special Counsel, Ryan Goodman likewise argued that, while targeting war-sustaining objects had been “long regarded as off-limits,” there was significant state practice of it.⁴⁸²

Most states and experts, however, reject the U.S.-led position and maintain that “war-sustaining” objects do not fit within the definition of military objectives and therefore should not be attacked. The ICRC maintains that Article 52’s “drafters wanted to exclude indirect contributions and possible advantages. Without these restrictions, the limitation of lawful attacks to ‘military’ objectives could be too easily undermined and the principle of distinction rendered void.”⁴⁸³ And when the United States pushed allies to begin targeting poppy production in Afghanistan because narcotics profits were funding the insurgency,

478. 4 N.Z. DEF. FORCE, MANUAL OF ARMED FORCES LAW: LAW OF ARMED CONFLICT (2d ed. 2017), <https://www.nzdf.mil.nz/assets/Uploads/DocumentLibrary/DM-69-2ed-vol4.pdf> [<https://perma.cc/CGM7-B37U>].

479. See *supra* notes 145-147; see also O’Connor, *supra* note 474, at 8-9 (citing targeting of war-sustaining objects by the United Kingdom, Russia, and France in Syria in justifying the United States’s own targeting of such objects).

480. MICHAEL BOTHE, KARL JOSEF PARTSCH & WALDEMAR A. SOLF, NEW RULES FOR VICTIMS OF ARMED CONFLICTS: COMMENTARY ON THE TWO 1977 PROTOCOLS ADDITIONAL TO THE GENEVA CONVENTIONS OF 1949, at 365 (2d ed. 2013).

481. *Id.* at 366 n.15 (quoting Burrus M. Carnahan, *Protecting Civilians Under the Draft Geneva Protocol: A Preliminary Inquiry*, 18 A.F. L. REV., no. 4, 1976, at 32, 47-48).

482. Goodman, *supra* note 467, at 663, 671-77.

483. *Excerpts of the Report*, *supra* note 21, at 222.

several NATO countries opposed the move as a violation of their laws, which prohibit violations of international humanitarian law.⁴⁸⁴

Groups of experts drafting manuals on the rules governing conflicts at sea,⁴⁸⁵ in the air,⁴⁸⁶ and in cyberspace⁴⁸⁷ have all considered and rejected the legality of targeting war-sustaining objects. Scholars have also largely rejected the U.S. view.⁴⁸⁸ Critics of the U.S. position point to the absence of a limiting principle and suggest that the logic of indirect contribution would allow a belligerent to target all economic activity that contributes to an adversary's tax base.⁴⁸⁹ Accepting war-sustaining targets as military objectives might therefore cause a

484. See Shanker, *supra* note 161.

485. INT'L INST. OF HUMANITARIAN L., SAN REMO MANUAL ON INTERNATIONAL LAW APPLICABLE TO ARMED CONFLICTS AT SEA 161 (Louise Doswald-Beck ed., 2010).

486. DRAFTING COMM. OF THE GRP. OF EXPERTS, COMMENTARY TO THE HPCR MANUAL ON INTERNATIONAL LAW APPLICABLE TO AIR AND MISSILE WARFARE 121 (2013) (“There is a controversy as to whether ‘war-sustaining’ economic objects qualify as military objectives. . . . The majority of the Group of Experts took the position that the connection between revenues from such exports and military action is too remote.”).

487. NATO COOP. CYBER DEF. CTR. OF EXCELLENCE, TALLINN MANUAL 2.0 ON THE INTERNATIONAL LAW APPLICABLE TO CYBER OPERATIONS 441 (Michael N. Schmitt ed., 2017) (“Advocates of this approach . . . argue that it is lawful to launch cyber attacks against the enemy State’s oil export industry if the war effort depends on revenue from oil sales. . . . A majority of the International Group of Experts rejected this approach on the ground that the connection between war-sustaining activities and military action is too remote.”).

488. See, e.g., David Turns, *Targets*, in RESEARCH HANDBOOK ON INTERNATIONAL CONFLICT AND SECURITY LAW 342, 366 (Nigel D. White & Christian Henderson eds., 2013) (“Consistent American usage . . . notwithstanding, however, the view that ‘war sustaining’ or purely economic targets are legitimate military objectives has not found acceptance in the military doctrine and practice of other states”); Kenneth W. Watkin, *Coalition Operations: A Canadian Perspective*, 84 INT’L L. STUD. 251, 255 (2008) (explaining that Canada would likely not accept the U.S. interpretation of military objects to include “attacks on exports that may be the source of financial resources for a belligerent”); AGNIESZKA JACHEC-NEALE, THE CONCEPT OF MILITARY OBJECTIVES IN INTERNATIONAL LAW AND TARGETING PRACTICE 92, 109 (2014) (noting uncertainties and challenges with the U.S. approach); Emily Chertoff & Zachary Manfredi, *Deadly Ambiguity: IHL’s Prohibition on Targeting Civilian Objects and the Risks of Decentered Interpretation*, 53 TEX. INT’L L.J. 239, 265 (2018).

489. See DINSTEIN, *supra* note 93, at 109 (stating that the U.S. interpretation “goes too far”); Christine Byron, *International Humanitarian Law and Bombing Campaigns: Legitimate Military Objectives and Excessive Collateral Damage*, 13 Y.B. INT’L HUMANITARIAN L. 175, 188 (2010) (“[I]f the expression ‘contribution to military action’ was interpreted so broadly as to cover any type of contribution to the war effort, then the principle of distinction would become totally illusory.”).

“regress[ion] to . . . ‘total war’” where “the entire civilian infrastructure is considered a legitimate target.”⁴⁹⁰

Advocates of the U.S. point of view respond that the requirement that the destruction of a military objective must “offer a ‘definite military advantage’” serves as a sufficient limiting principle.⁴⁹¹ This requirement, they maintain, limits states to targeting sources of economic support that cannot be easily substituted and can be confidently traced to an enemy’s military action. In this way, the definite-military-advantage prong may prevent the conclusion that any economic activity that expands an adversary’s tax base constitutes a valid military objective.⁴⁹²

We can see from the evidence presented in Part II, however, that whatever limits the requirement that the destruction of the objective must offer a definite military advantage may provide in theory, reality shows that civilians are harmed by U.S. targeting of war-sustaining objects. U.S. targeting of oil infrastructure; financial and banking facilities; and manufacturing, production, and construction has crippled not just ISIS but entire communities, leaving behind civilians struggling to survive. The impact can, moreover, be self-defeating, as desperate communities are often vulnerable to extremist messaging. In short, the U.S. interpretation of “effective contribution to military action” to include indirect contributions to the military effort by war-sustaining objects both is out of step with the broader international community’s interpretation of the law and unnecessarily puts civilians at risk. The United States and the few states that share its interpretation should therefore adopt the majority position that an “effective contribution” requires a *direct* contribution.

3. “Reverberating Effects” and “Cumulative Harm”

States and the ICRC should make clear that it is necessary to account for “reverberating effects” and “cumulative harm” in targeting decisions. Reverberating effects are indirect effects on the economy, environment, “essential

490. Beth Van Schaack, *Targeting Tankers Under the Law of War (Part 1)*, JUST SEC. (Dec. 2, 2015), <https://www.justsecurity.org/28064/targeting-tankers-law-war-part-1> [<https://perma.cc/8NLN-NWF8>]; see also Watkin, *supra* note 471 (exploring the potential consequences of adopting “war-sustaining” approaches).

491. Goodman, *supra* note 467, at 677 (quoting Additional Protocol I art. 52(2), *supra* note 22).

492. *Id.*

services,” or critical infrastructure.⁴⁹³ “Cumulative harm”⁴⁹⁴ describes the aggregation of such indirect effects over time, including broader structural consequences of war, such as “infrastructure collapse, socio-economic decline and societal trauma.”⁴⁹⁵ While both concepts deal with the broader impacts of military operations on civilians, they differ in their temporal scope and proximity of causation. Whereas “reverberating effects” is generally used to describe the *secondary* and *indirect* effects of a *single* or limited set of attacks, “cumulative harm” is used to describe the accumulation of *direct* and *indirect* effects of *numerous* attacks over time. Both, we argue, should be considered in targeting decisions. Doing so, it is clear, would mean much more restrained targeting of dual-use objects, given the indirect and long-term impact of the destruction of such objects.

Taking account of reverberating effects and cumulative effects recognizes that harm is not fixed in time. Destruction of a dual-use object not only affects civilians in the immediate aftermath of a strike but also has longer-term implications for civilian life, even after the eventual cessation of hostilities. These longer-term considerations include the substantial costs of rebuilding civilian infrastructure and essential services as well as the potential environmental consequences for public health and agriculture. Such considerations should affect decisions about not only what is targeted but how. For example, NATO in Serbia and the United States during the Gulf War in Iraq used fiber-optic bombs that were designed to incapacitate dual-use targets temporarily rather than permanently, in recognition of the need to preserve their underlying civilian functions.⁴⁹⁶

Reverberating effects can be particularly harmful when there is an attack on critical infrastructure – a frequent occurrence, as we explained in Part II. For example, the destruction of an electrical power plant will cut off electricity for

493. See Isabel Robinson & Ellen Nohle, *Proportionality and Precautions in Attack: The Reverberating Effects of Using Explosive Weapons in Populated Areas*, 98 INT’L REV. RED CROSS 107, 118, 124–25, 127, 130 (2016); Michael N. Schmitt, *The Principle of Discrimination in 21st Century Warfare*, 2 YALE HUM. RTS. & DEV. L.J. 143, 168 (1999); *International Humanitarian Law and the Challenges of Contemporary Armed Conflicts*, INT’L COMM. OF THE RED CROSS 52–53 (Oct. 2015), https://www.icrc.org/sites/default/files/document/file_list/32ic-report-on-ihl-and-challenges-of-armed-conflicts.pdf [<https://perma.cc/4GUD-JDFF>].

494. Noam Lubell & Amichai Cohen, *Strategic Proportionality: Limitations on the Use of Force in Modern Armed Conflicts*, 96 INT’L L. STUD. 160, 177, 194 (2020).

495. *Essex to Lead Global Project Aimed at Reducing Civilian Harm in War*, UNIV. ESSEX (June 15, 2023), <https://www.essex.ac.uk/news/2023/06/15/tackling-civilian-harm-during-war> [<https://perma.cc/56LJ-8TJ5>].

496. See Jamie McIntyre, *Sources: Secret Carbon Fiber Bombs Kill Power in Serbia*, CNN (May 3, 1999, 11:09 PM EDT), <https://web.archive.org/web/20230620171643/http://www.cnn.com/US/9905/03/secret.weapon> [<https://perma.cc/NU27-NZYP>] (“[S]ources said similar weapons were used against power grids in Iraq during the 1991 Persian Gulf War.”); *Off Target: The Conduct of the War and Civilian Casualties in Iraq*, *supra* note 123, at 42–44.

critical civilian infrastructure – such as hospitals, water-treatment facilities, and communications equipment – with sometimes devastating public-health consequences.⁴⁹⁷ Similarly, destruction of a bridge used by combatants may confine the enemy, but it may also prevent civilians from traveling to work, attending school, or acquiring food and medical supplies, worsening the conflict’s humanitarian effects as a result. Recently in Sudan, the director-general of the World Health Organization (WHO) predicted that, “[o]n top of the deaths and injuries caused by the conflict itself, WHO expects there will be many more deaths due to outbreaks, lack of access to food and water, and disruptions to essential health services, including immunization.”⁴⁹⁸ While these consequences are not the direct result of an attack, they are nevertheless a reasonably foreseeable result of striking certain dual-use targets. The stakes are high: casualties indirectly caused by reverberating effects can outnumber casualties directly caused by armed conflict.⁴⁹⁹

Proportionality must include those (and only those) reverberating effects that are “reasonably foreseeable.”⁵⁰⁰ This entails an affirmative “obligation to do everything feasible to obtain information that will allow for a meaningful assessment of the foreseeable incidental effects on civilians and civilian objects.”⁵⁰¹ The ICRC and the Norwegian Red Cross have also taken the position that the targeting of essential services – including water, sanitation, schools, and electricity –

497. See, e.g., Alberto Costi, *Reverberating Effects in Armed Conflict: An Environmental Analysis*, 39 ARIZ. J. INT’L & COMPAR. L. 317, 319 (2022); Henry Shue & David Wippman, *Limiting Attacks on Dual-Use Facilities Performing Indispensable Civilian Functions*, 35 CORNELL INT’L L.J. 559, 568, 572 (2002).

498. *Sudan: Explosive Weapons Harming Civilians*, HUM. RTS. WATCH (May 4, 2023, 12:00 AM EDT), <https://www.hrw.org/news/2023/05/04/sudan-explosive-weapons-harming-civilians> [<https://perma.cc/662D-9S5K>] (quoting Dr. Tedros Adhanom Ghebreyesus, the director-general of the World Health Organization).

499. See, e.g., Clark Orr, *Reverberating Effects and International Law*, CTR. FOR CIVILIANS CONFLICT (Sept. 28, 2021), <https://civiliansinconflict.org/blog/reverberating-effects-and-international-law> [<https://perma.cc/2VHM-XLB5>].

500. Robinson & Nohle, *supra* note 493, at 109, 113, 121; see also AMICHAH COHEN & DAVID ZLOTOGORSKI, *PROPORTIONALITY IN INTERNATIONAL HUMANITARIAN LAW: CONSEQUENCES, PRECAUTIONS, AND PROCEDURES* 85 (2021) (adopting a similar view of reverberating effects); JEROEN VAN DEN BOOGAARD, *PROPORTIONALITY IN INTERNATIONAL HUMANITARIAN LAW: REFOCUSING THE BALANCE IN PRACTICE* 148 (2023) (noting that this position “is now well settled”).

501. *International Humanitarian Law and the Challenges of Contemporary Armed Conflicts*, *supra* note 493, at 52.

has reverberating effects that can compromise international-humanitarian-law compliance.⁵⁰²

A number of states have recognized the legal obligation to consider reverberating effects.⁵⁰³ For example, the Final Declaration of the Third Review Conference on the Convention on Certain Conventional Weapons frames “the foreseeable effects of explosive remnants of war on civilian populations as a factor to be considered in applying the international humanitarian law rules on proportionality in attack.”⁵⁰⁴ More significantly, a 2022 political declaration on explosive weapons in populated areas endorsed by eighty-eight countries as of May 2025 – including the United States – establishes that signatories will

[e]nsure that our armed forces, including in their policies and practices, take into account the direct and indirect effects on civilians and civilian objects which can reasonably be foreseen in the planning of military operations and the execution of attacks in populated areas, and conduct damage assessments, to the degree feasible, and identify lessons learned.⁵⁰⁵

The ICTY similarly took account of reverberating effects. The Trial Chamber judgement in *Prosecutor v. Prlić* found that the reverberating effects of the destruction of the Old Bridge in Mostar rendered the attack disproportionate, even

502. Norwegian Red Cross, *Keeping the Lights On and the Taps Running: Protecting and Facilitating Safer Access for Essential Service Providers in Armed Conflict*, INT’L COMM. OF THE RED CROSS 20 (Oct. 10, 2024), https://www.rodekors.no/globalassets/_rapporter/krig-i-byer/keeping-the-lights-on_report-2024-web.pdf [<https://perma.cc/8CW3-T8GB>] (“In assessing the expected incidental civilian harm when applying the rules of proportionality and precautions in attack, both the direct and indirect (or reverberating) effects must be taken into account, insofar as they are reasonably foreseeable in the circumstances.”). Scholars affiliated with the ICRC have also argued for including in the proportionality analysis effects that are reasonably foreseeable given all the circumstances. See Robinson & Nohle, *supra* note 493, at 109, 120.

503. *Id.* at 115.

504. 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 Document, Part II: Final Declaration*, at 4, U.N. Doc. CCW/CONF.III/11 (Part II) (Nov. 17, 2006).

505. *Political Declaration on Strengthening the Protection of Civilians from the Humanitarian Consequences Arising from the Use of Explosive Weapons in Populated Areas*, EXPLOSIVE WEAPONS IN POPULATED AREAS § 3.4, https://cms.ewipa.org/uploads/political_declaration_on_ewipa_en_175fb28c49.pdf [<https://perma.cc/5NC8-CYNH>]; see *List of Endorsing States, as of 1 May 2025*, EXPLOSIVE WEAPONS IN POPULATED AREAS (May 1, 2025), https://assets.gov.ie/static/documents/Updated_list_of_endorsing_states_1_May_2025.pdf [<https://perma.cc/457V-8QXC>]; Bonnie Docherty, *Over 80 Countries Committed to Curb Use of Explosive Weapons, Now Comes the Hard Part*, JUST SEC. (Nov. 23, 2022), <https://www.justsecurity.org/84240/80-countries-committed-to-curb-use-of-explosive-weapons> [<https://perma.cc/3S3B-D69K>].

though the bridge was a legitimate military objective.⁵⁰⁶ The opinion noted that the destruction of the bridge placed Muslim residents on one side of the river “in virtually total isolation, making it impossible for them to get food and medical supplies resulting in a serious deterioration of the humanitarian situation for the population living there.”⁵⁰⁷

The Final Report to the Prosecutor regarding the NATO bombing campaign in Yugoslavia alluded to the risks of conducting strikes without concern for reverberating effects. The Report commented, “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.”⁵⁰⁸ Still, the Report acknowledged that “the principle of proportionality is more easily stated than applied in practice,” precisely because of the difficulties discussed below.⁵⁰⁹

In 2021, NATO specifically incorporated reverberating effects into its Allied Command Operations Handbook on Protection of Civilians, stating that the “targeting process” should be mindful of “first, second and third order effects.”⁵¹⁰ Among the secondary effects, it listed “[i]nadequate access to food and water,” “[d]amaged infrastructure, affecting transportation routes, electricity, water and telecommunications access,” “[l]ack of access to medical attention,” and “[d]isruption in financial services,” to name just a few.⁵¹¹ Among tertiary effects, it listed “[w]eakened government and judicial services,” “sluggish and

506. See *Prosecutor v. Prlić*, Case No. IT-04-74-T, Judgement (Volume 3 of 6), ¶¶ 1582-84 (Int’l Crim. Trib. for the Former Yugoslavia May 29, 2013), <https://ucr.irmct.org/LegalRef/CMSDocStore/Public/English/Judgement/NotIndexable/IT-04-74/JUD251R2000462230.pdf> [<https://perma.cc/A22L-UEM5>].

507. *Id.* ¶ 1583. The Appeals Chamber overturned the conviction, finding the attack was justified by military necessity. *Prosecutor v. Prlić*, Case No. IT-04-74-A, Judgement (Volume I), ¶ 411 (Int’l Crim. Trib. for the Former Yugoslavia Nov. 29, 2017), <https://ucr.irmct.org/LegalRef/CMSDocStore/Public/English/Judgement/NotIndexable/IT-04-74-A/JUD276R0000516276.pdf> [<https://perma.cc/JVU9-YENL>]. But see Maurice Cotter, *Military Necessity, Proportionality, and Dual-Use Objects at the ICTY: A Close Reading of the Prlić et al. Proceedings on the Destruction of the Old Bridge of Mostar*, 23 J. CONFLICT & SEC. L. 283, 302 (2018) (criticizing the Appeals Chamber’s failure to engage adequately with the principle of proportionality and the role of reverberating effects).

508. *Final Report to the Prosecutor by the Committee Established to Review the NATO Bombing Campaign Against the Federal Republic of Yugoslavia*, *supra* note 128, ¶ 18.

509. *Id.* ¶ 19.

510. *Protection of Civilians: ACO Handbook*, NATO-OTAN 25 (2021), <https://shape.nato.int/resources/3/website/ACO-Protection-of-Civilians-Handbook.pdf> [<https://perma.cc/N2WA-C527>].

511. *Id.*

dysfunctional infrastructure,” “[m]arket disruption, reduced economic activity,” “[c]ycles of violence,” and the “[s]pread of infectious diseases.”⁵¹²

The United States, a member of NATO, has nonetheless resisted incorporating reverberating effects into its targeting calculus. The DOD *Law of War Manual* only includes “immediate or direct harms [to civilians] foreseeably resulting from the attack.”⁵¹³ The *Manual* excludes reverberating effects because of “the difficulty in accurately predicting the myriad of remote harms from the attack (including the possibility of unrelated or intervening actions that might prevent or exacerbate such harms).”⁵¹⁴ The *Manual* presents “the economic harm that the death of an enemy combatant would cause to his or her family, or the loss of jobs due to the destruction of a tank factory” as examples of excessively remote harms that the attacker need not consider.⁵¹⁵

The United States does not exclude all indirect effects from the proportionality calculus. The *Manual* characterizes the “loss of power at a connected hospital” after the destruction of a power plant as harm that should be included in the proportionality calculus.⁵¹⁶ Similarly, the U.S. methodology for estimating collateral damage notes that “[s]pecial consideration must be given to the secondary and tertiary effects of engaging” targets such as “hydroelectric dams” because of the “significant danger of . . . widespread and long-term lethal negative effects on civilians.”⁵¹⁷ The CHMR-AP, moreover, calls on the U.S. military to take into consideration “second- and third-order effects” on the civilian environment.⁵¹⁸

Critics of including reverberating effects in the proportionality analysis point to practical difficulties.⁵¹⁹ They express concern with “overburdening the

512. *Id.*

513. *DOD Law of War Manual*, *supra* note 21, § 5.12.1.3.

514. *Id.*

515. *Id.*

516. *Id.*

517. Memorandum from Curtis M. Scaparrotti, *supra* note 233, at D-A-34.

518. See *CHMR-AP*, *supra* note 434, at 13. While DOD does not accept a legal obligation to mitigate reverberating effects, DOD Instruction 3000.17 calls for mitigating such effects as a matter of policy. *DoD Instruction 3000.17*, *supra* note 434, at 49. Importantly, the CHMR-AP makes clear that the recommendations go beyond what DOD thinks is required as a matter of law. *CHMR-AP*, *supra* note 434, at 3 n.1 (“Nothing in this plan is intended to suggest that existing DoD policies or practices are legally deficient or that the actions to be implemented pursuant to this plan are legally required, including under the law of war.”). This effectively reserves the right to ignore the guidance. It can also hamper the development of the law.

519. *Explosive Weapons in Populated Areas: Humanitarian, Legal, Technical and Military Aspects*, INT’L COMM. OF THE RED CROSS 23 (June 2015), <https://www.icrc.org/sites/default/files/external/doc/en/assets/files/publications/icrc-002-4244.pdf> [<https://perma.cc/2ZJZ-6WGU>]; see also Ian Henderson & Kate Reece, *Proportionality Under International*

commander with requirements that are too stringent.”⁵²⁰ Foreseeing reverberating effects, they argue, might require technical expertise – from fields like public health or engineering – that may be infeasible for the “reasonable military commander” to acquire.⁵²¹ During the heat of battle, the “level of information and expertise required to adequately predict reverberating effects” may prove “too onerous for conflict parties.”⁵²² They contend that “[t]here are limits to what can reasonably be expected of commanders while prosecuting an armed conflict.”⁵²³ Consider a commander weighing whether to strike a power plant used by enemy combatants but that also supplies electricity to a local hospital. The commander probably does not know, for example, whether the hospital has backup generators or fuel, how many patients are admitted in the hospital, or how many patients are in urgent situations.⁵²⁴

These information-gathering challenges are real. And yet they do not offer an adequate argument against taking into account reverberating effects. Information from previous conflicts – for example, the reverberating effects of striking electricity infrastructure during the Gulf War – makes reverberating effects in current and future conflicts more foreseeable and predictable.⁵²⁵ Empirical research has found correlations between the destruction and contamination of water infrastructure by explosive ordinances and increased rates of infectious diseases including dysentery and cholera in Iraq, Yemen, and Gaza,⁵²⁶ particularly in the context of urban-services infrastructure.⁵²⁷ The reasonably foreseeable

Humanitarian Law: The “Reasonable Military Commander” Standard and Reverberating Effects, 51 VAND. J. TRANSNAT’L L. 835, 853–54 (2018) (noting the possibility of avoiding reverberating effects through remedial action, which makes it difficult to account for reverberating effects ex ante). But see Emanuela-Chiara Gillard, *Proportionality in the Conduct of Hostilities: The Incidental Harm Side of the Assessment*, CHATHAM HOUSE 13 (Dec. 2018), <https://www.chathamhouse.org/sites/default/files/publications/research/2018-12-10-proportionality-conduct-hostilities-incident-harm-gillard-final.pdf> [<https://perma.cc/Q4FV-C5FS>] (criticizing the slipperiness of “remoteness” as deployed in the reverberating-effects literature).

520. Gisel, *supra* note 462, at 46.

521. *Id.* at 49, 53.

522. Costi, *supra* note 497, at 351.

523. Henderson & Reece, *supra* note 519, at 854; see also Costi, *supra* note 497, at 339 (arguing that legal and scholarly discussions of reverberating effects fail to account for real-life battlefield scenarios).

524. See Gisel, *supra* note 462, at 48; Costi, *supra* note 497, at 351.

525. Gisel, *supra* note 462, at 48.

526. Michael Talhami & Mark Zeitoun, *The Impact of Attacks on Urban Services II: Reverberating Effects of Damage to Water and Wastewater Systems on Infectious Disease*, 102 INT’L REV. RED CROSS 1293, 1315 (2020).

527. See Mark Zeitoun & Michael Talhami, *The Impact of Explosive Weapons on Urban Services: Direct and Reverberating Effects Across Space and Time*, 98 INT’L REV. RED CROSS 53, 54–55 (2016).

effects are not prohibitively difficult to predict or quantify.⁵²⁸ Moreover, many of these targeting decisions are not made in the heat of the moment but are instead the result of a deliberative targeting process that allows time to make careful judgments. Even in those situations where there is a need to respond quickly, proper intelligence preparation of the operating environment can allow for better and more informed targeting decisions that fully account for the likely effects on civilians.

If anything, concerns about the absence of information are an argument for developing tools and techniques for reasonably estimating those foreseeable reverberating effects. After all, existing military tools include sophisticated modeling of the impact of different kinds of munitions on different forms of targets, allowing military planners to pick a munition that will destroy the intended target without, for example, collapsing the buildings around it. With the rise of AI, these modeling tools will only become more sophisticated and more easily within reach. Leading military powers like the United States should develop best practices for estimating the indirect effects of dual-use targets and incorporating those costs into determinations of whether and when a given strike is permissible. Indeed, the reforms that have begun with the CHMR-AP should, if executed in ways called for above,⁵²⁹ provide precisely the information that would be needed for these assessments.

Individual states, including the United States, should take account of reverberating effects and cumulative harm in their targeting decisions. To encourage and assist that process, the ICRC could more clearly explain when and how these effects can and should be included in targeting decisions.

Once again, these steps are not inconsistent with military effectiveness. Reducing unnecessary civilian harm is not only the morally right thing to do, but it is also in the best interests of the military effort. Social-science research makes clear that the legitimacy of the military effort is critical for conflict resolution and peacebuilding.⁵³⁰ Moreover, greater awareness of the long-term consequences of targeting decisions for civilians could spur development of more effective reversible weapons. For example, a graphite bomb is a nonlethal weapon that can disable an electrical grid, causing short circuits that disrupt the electrical supply

528. The U.S. government makes similarly complex damage assessments in other contexts. See, e.g., Zachary Liscow & Cass R. Sunstein, *Efficiency vs. Welfare in Benefit-Cost Analysis: The Case of Government Funding*, 15 J. BENEFIT-COST ANALYSIS 224, 244 (2024) (explaining benefit-cost analysis for government regulation, including the process used by the Federal Emergency Management Agency to provide grants to mitigate harms in advance of natural disasters); *Benefit-Cost Analysis*, FEMA, <https://www.fema.gov/grants/tools/benefit-cost-analysis> [<https://perma.cc/NT9G-HSTM>].

529. See *supra* Section III.A.

530. See, e.g., Krick et al., *supra* note 106, at 29-30.

without destroying the physical infrastructure.⁵³¹ Because there has been little incentive to build these tools, that innovation has stalled. But taking into account reverberating effects and cumulative harm in targeting could encourage innovation that might reduce the worst harm to civilians. That, in turn, could reduce the resources that need to be invested to restore peace and civil governance. Making it possible for civilians living in areas of conflict to rebuild and recover once the fighting ends is critical to establishing the conditions for lasting peace and security.

CONCLUSION

Modern international humanitarian law was designed to protect civilians. And yet the rise of dual-use objects in war over the last several decades has eroded, and threatens to erode further, the critical distinctions between civilians and combatants, and between civilian objects and military objectives. This erosion has placed civilians and the critical infrastructure on which they rely directly at risk as wars rage on.

This problem will not go away on its own. If anything, technological changes are likely to make the problem much worse. Scholars are actively debating, for example, whether data qualifies as a targetable “object” subject to international humanitarian law.⁵³² Emerging AI, cyber, and space technologies are, by their nature, dual-use. Military cyber operations, for example, take place on a communication infrastructure—including cables, servers, and information networks—that serve critical civilian needs as well. As two scholars put it, “It is worrying that almost everything in cyberspace has huge military potential, and the issue of dual-use objects plays a more important role in targeting than ever.”⁵³³ The rise of the Internet of Things has resulted in a much greater reliance on cyber

531. Grigore Eduard Jeler & Daniel Roman, *The Graphite Bomb: An Overview of Its Basic Military Applications*, 14 REV. A.F. ACAD., no. 1, 2016, at 13, 14; McIntyre, *supra* note 496 (quoting Pentagon officials explaining that graphite bombs were used “to limit damage to power plants which take a lot of time and money to rebuild”).

532. See Tim McCormack, *International Humanitarian Law and the Targeting of Data*, 94 INT’L L. STUD. 222, 227 (2018) (summarizing different views on this question). A minority of states, including Germany, France, and Costa Rica, have endorsed the view that at least some types of data do constitute objects subject to international humanitarian law. Michael N. Schmitt, *A Policy Approach for Addressing the “Cyber Attacks” and “Data as an Object” Debates*, LIEBER INST. W. POINT: ARTICLES WAR (Sept. 19, 2024), <https://lieber.westpoint.edu/policy-approach-addressing-cyber-attacks-data-object-debates> [<https://perma.cc/M59T-H5Y4>].

533. Zhixiong Huang & Yaohui Ying, *The Application of the Principle of Distinction in the Cyber Context: A Chinese Perspective*, 102 INT’L REV. RED CROSS 335, 356 (2020).

infrastructure in nearly every facet of daily life;⁵³⁴ the rise of the Internet of Bodies extends that reliance to the human body.⁵³⁵

Although the use of AI for military purposes is newer, the same problem is already emerging. Indeed, Israel has been using AI to find targets in Gaza.⁵³⁶ The technology now being used for military purposes was first developed for civilian purposes, such as identifying customers for consumer products. This technology can be relatively easily repurposed to identify persons who are believed to be members of Hamas. (An investigation by the Israeli *+972 Magazine* and *Local Call* reported that it is highly inaccurate.⁵³⁷) Indeed, the U.S. federal government has recognized the dual-use nature of AI and has issued an executive order calling for the “[s]afe, [s]ecure, and [t]rustworthy [d]evelopment and [u]se of [a]rtificial [i]ntelligence.”⁵³⁸ That order addresses a range of uses of AI, including to protect national security.⁵³⁹

Space is another realm in which military and civilian technologies are difficult to disentangle. The private company SpaceX has become a significant player in the war in Ukraine because its satellite-based internet service Starlink has been critical to Ukraine’s military defense.⁵⁴⁰ The company has become so important that when Elon Musk withheld satellite service, he thwarted a Ukrainian attack on a Russian naval fleet.⁵⁴¹ Meanwhile, the Pentagon has been working to prevent Russia from using Starlink in the conflict.⁵⁴² The issue is not limited to

534. See *Securing the Internet of Things (IoT)*, CYBERSECURITY & INFRASTRUCTURE SEC. AGENCY (Feb. 1, 2021), <https://www.cisa.gov/news-events/news/securing-internet-things-iot> [<https://perma.cc/87S9-645F>].

535. See Andrea M. Matwyshyn, *The Internet of Bodies*, 61 WM. & MARY L. REV. 77, 81-82 (2019).

536. See Geoff Brumfiel, *Israel Is Using an AI System to Find Targets in Gaza. Experts Say It’s Just the Start*, NPR (Dec. 14, 2023, 4:58 AM ET), <https://www.npr.org/2023/12/14/1218643254/israel-is-using-an-ai-system-to-find-targets-in-gaza-experts-say-its-just-the-st> [<https://perma.cc/MPW3-5W4G>].

537. Yuval Abraham, “A Mass Assassination Factory”: *Inside Israel’s Calculated Bombing of Gaza*, *+972 MAG.* (Nov. 30, 2023), <https://www.972mag.com/mass-assassination-factory-israel-calculated-bombing-gaza> [<https://perma.cc/SH96-Q7RS>].

538. Exec. Order No. 14,110, 3 C.F.R. 657, 657 (2024). This Executive Order was among the orders rescinded by President Trump on his first day in office. See Exec. Order No. 14,148, 90 Fed. Reg. 8237, 8240 (Jan. 28, 2025).

539. See generally Exec. Order No. 14,110, 3 C.F.R. 657 (2024) (addressing national-security uses for artificial intelligence throughout).

540. See Michael Marrow, *Pentagon Working with Ukraine, SpaceX to Prevent Russian Exploitation of Starlink*, *BREAKING DEF.* (Apr. 10, 2024, 5:35 PM), <https://breakingdefense.com/2024/04/pentagon-working-with-ukraine-spacex-to-prevent-russian-exploitation-of-starlink> [<https://perma.cc/3KZU-6XGE>].

541. *Id.*

542. *Id.*

Ukraine. Around the world, civilian users depend on the same satellites relied on by military forces, and there is emerging uncertainty about the extent to which military uses of commercial satellites can be lawfully targeted.⁵⁴³

All of this goes to show that the issue of dual-use objects in war, far from disappearing, is only growing as civilians and militaries rely on the same technological infrastructures to carry out their daily activities. This makes it all the more critical that we find a way to ensure that dual-use objects on which civilians depend, and which are crucial for eventual postwar reconstruction, enjoy more effective protections in war.

543. Kari A. Bingen, Kaitlyn Johnson & Zhanna Malekos Smith, *Russia Threatens to Target Commercial Satellites*, CTR. FOR STRATEGIC & INT'L STUD. (Nov. 10, 2022), <https://www.csis.org/analysis/russia-threatens-target-commercial-satellites> [<https://perma.cc/3CGV-A5XS>]; Jennifer A. Cannon, *Targeting Dual-Use Satellites: Lessons Learned from Terrestrial Warfare*, 2 AIR & SPACE OPERATIONS REV., no. 2, 2023, at 37, 49–50 (discussing the implications of the targeting of dual-use objects for satellites); Charles James Dunlap, *The Law of War and “Dual Use” Commercial Satellites* (Duke L. Sch. Pub. L. & Legal Theory Series, Paper No. 2023-54, 2023), <https://ssrn.com/abstract=4566133> [<https://perma.cc/2J3D-36LS>] (same).