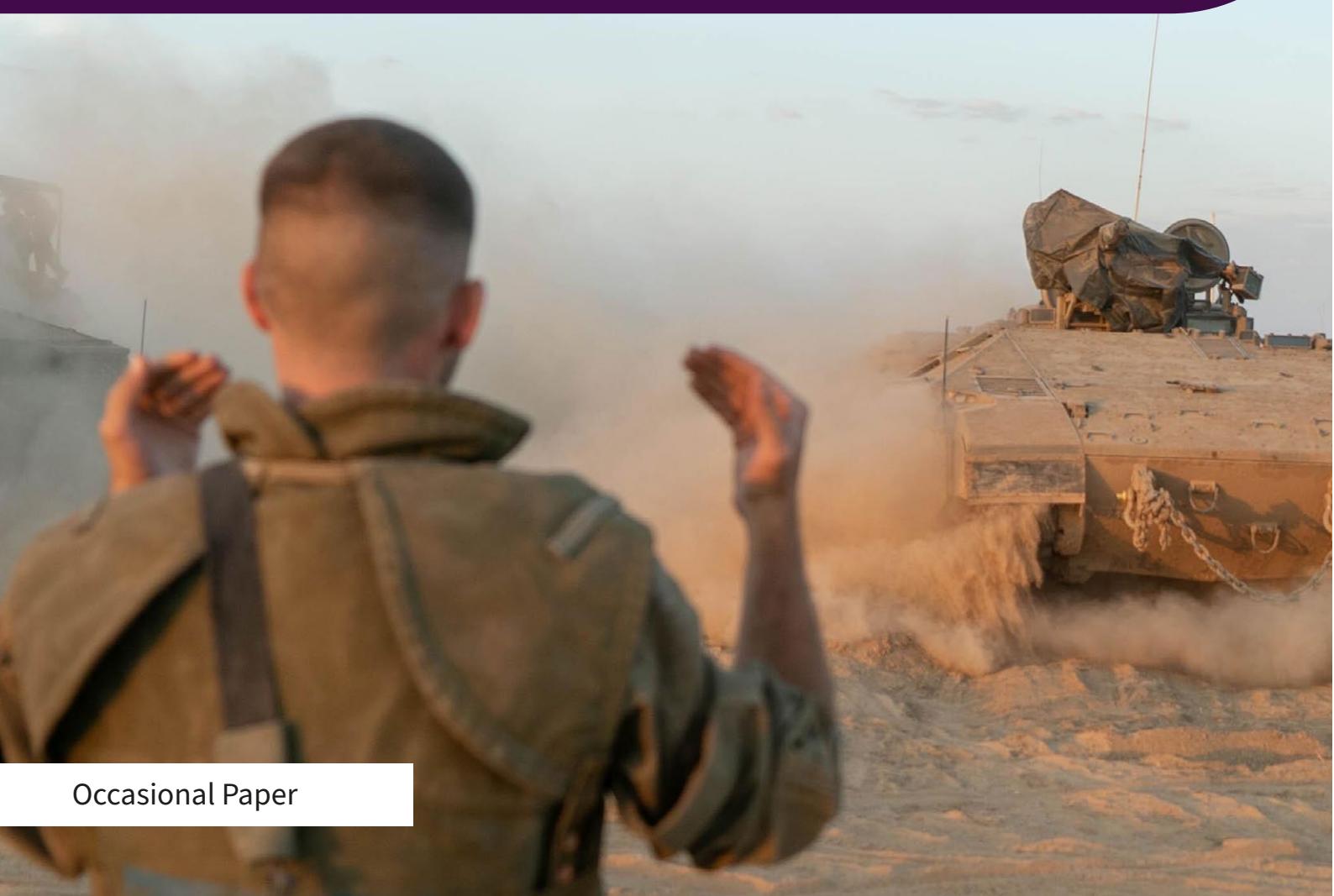


Occasional Paper

Tactical Lessons from Israel Defense Forces Operations in Gaza, 2023

Jack Watling and Nick Reynolds



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Executive Summary

The Israel Defense Forces' (IDF) operations in Gaza, beginning in October 2023, provide valuable lessons for the conduct of urban operations. While there are many aspects of the fighting specific to Gaza, other lessons are more widely applicable. This paper seeks to identify lessons relevant to the British Army, based on analysis of IDF operations in autumn 2023. The paper is a study of military tactics and does not address the wider operational and strategic situation.

As regards dismounted close combat in an urban environment, the IDF found that the risk of fratricide owing to cross-boundary fires meant that units should have non-contiguous unit boundaries for units advancing along the same axis. Thus, IDF units would have a movement corridor, and a fires corridor allocated on each side. Given the very narrow frontages of manoeuvre, it was found necessary to have combined arms elements in intimate support down to platoon level.

The IDF had persistent challenges with rubblisation, both because it created obstructions for movement and degraded the ability to describe the terrain and thus coordinate and control fire. The IDF has concluded that specific training is necessary for what it is terming 'devastated terrain warfare'. Specific drills for talking soldiers onto target when looking at irregular terrain must be practised.

It was also found that adopting a sequential approach to surface and sub-surface operations ceded initiative to the enemy and reduced tempo as units mounted deliberate clearance operations in their rear area. Instead, the IDF found that it was more effective to carry out simultaneous surface and sub-surface operations. This required careful battlespace management as movement below ground did not always correlate with unit boundaries above ground. In general, the IDF did not find that there was much of a requirement to deliberately clear high-rise buildings, as there was limited tactical value in being above the second floor.

Operations in Gaza have highlighted the criticality of organic lethality at echelon. Hamas tactics have evolved over the course of the fighting, but each iteration saw different groupings of fighters endeavour to rapidly engage isolated IDF units before disengaging. In practice, these tactics did not perform well because Hamas was not able to concentrate sufficient firepower. It therefore often failed to inflict significant damage, while the IDF were generally able to suppress attackers and thereafter deliberately target them. For the British Army the lesson is clear: organic lethality must be increased in close combat echelons.

The ability to responsively employ precision fires in close proximity to friendly forces, allowing higher echelons to increase the lethality of close combat forces, has become critically dependent on access to the electromagnetic spectrum (EMS). The IDF found that once units had UAS (unmanned aircraft systems) organic to their formations, there was a significant challenge to identifying friend or foe. Once the enemy was also employing UAS, friendly electronic protection saturated the spectrum, interfering with digitised command and control. This has produced a requirement for reversionary methods to be available, and for improved EMS battlespace management.

The IDF ultimately suppressed Hamas's capacity to concentrate forces because of its access to air-delivered effects. It is worth noting that buildings do not offer significant protection against air-delivered munitions because of the weight of ordnance that can be dropped with precision. The lesson for the British Army is that urban defence must be premised on effective air defence covering the urban space.

The application of air-delivered fires to bypass the physical protection offered by urban terrain creates significant challenges for discrimination. First, there is the question of what cannot be seen in terms of concealed civilians. Second, in conventional and unconventional conflict, combatants are increasingly blending in with the civilian population in a manner that makes discrimination difficult. The IDF have struggled with this problem and it has been exacerbated by the IDF ceding critical elements of the information environment, such as casualty estimates, to entities associated with Hamas.

The humanitarian situation in Gaza has been disastrous. Much of this relates to issues of getting aid into the Strip, which, other than ensuring the efficiency of searching cargos at scale, is a political rather than tactical military problem and therefore falls outside the scope of this paper. The transferable lessons for the British Army lie in the challenges the IDF have had in distributing aid. On the one hand, Hamas has sought to gain control over aid distribution to re-establish control of the territory. This is antithetical to Israel's war aims. Yet the IDF closely supervising distribution is a recipe for clashes at aid points. The IDF has not found a system that assures adequate supply and distribution of aid while also preventing Hamas from exerting control along the process. This dynamic challenge bears careful study, as meeting humanitarian obligations is an essential part of urban operations, but when required at scale can rapidly unhinge the tempo and capacity of a formation.

There are many more lessons identified in this paper that bear scrutiny. There are also likely to be further lessons that emerge from later stages of IDF operations in Gaza.

Introduction

The spectre of urban operations has been an enduring concern among professional militaries.¹ In 2017, the liberation of Mosul was perceived as simultaneously demonstrating how difficult such operations are and providing an effective model for how Western militaries could project power into urban spaces while transferring the risk onto partner forces; in that case, the Iraqi security forces.² The war in Ukraine has resurrected appreciation of the need to be able to conduct complex offensive action into urban terrain, for while the conditions for an urban operation are set in surrounding rural areas, translating tactical success into operational success is often dependent on the ability to enter and successfully seize towns and cities.³ Given repeated warnings from British defence figures that today is a ‘pre-war’ period,⁴ any opportunity to learn lessons about the contemporary battlefield that could improve the readiness of the British Army deserves study.

When Hamas launched an armed attack on Israel on 7 October 2023, massacring civilians and taking over 250 hostages, the Israel Defense Forces (IDF) did not have the option of transferring the risk onto a partner force.⁵ Faced with the simultaneous – and more severe – threat from Hezbollah on Israel’s northern border,⁶ the IDF elected to conduct a rapid combined arms assault into dense urban terrain, which had been extensively prepared by Hamas to support protracted defensive operations. Moreover, the assault was in terrain inhabited by a large civilian population hostile to the IDF’s presence and under intense international scrutiny. Given that the IDF is a modern military, drawing on a

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1. David Kilcullen, *Out of the Mountains: The Coming Age of the Urban Guerrilla* (Oxford: Oxford University Press, 2015); Lester W Grau, ‘Russian Urban Tactics: Lessons from the Battle of Grozny’, National Defense University Strategic Forum, 10 January 2001, <<https://apps.dtic.mil/sti/pdfs/ADA394517.pdf>>, accessed 24 May 2024; Alec Whaleman, *Storming the City: U.S. Military Performance in Urban Warfare from World War II to Vietnam* (Denton, TX: University of North Texas Press, 2015).
 2. Amos C Fox, ‘The Mosul Study Group and the Lessons of the Battle of Mosul’, Land Warfare Paper 130, Association of the United States Army, February 2020, <<https://www.usa.org/sites/default/files/publications/LWP-130-The-Mosul-Study-Group-and-the-Lessons-of-the-Battle-of-Mosul.pdf>>, accessed 31 March 2024.
 3. *The Economist*, ‘Armies and Re-Learning how to Fight in Cities’, 17 August 2022.
 4. See, for example, Grant Shapps, ‘Defending Britain from a More Dangerous World’, speech at Lancaster House, London, 5 January 2024, <<https://www.gov.uk/government/speeches/defending-britain-from-a-more-dangerous-world>>, accessed 25 May 2024.
 5. Daniel Byman et al., ‘Hamas’s October 7 Attack: Visualizing the Data’, Center for Strategic and International Studies (CSIS), 19 December 2023, <<https://www.csis.org/analysis/hamas-october-7-attack-visualizing-data>>, accessed 31 March 2024.
 6. For current capabilities, see Seth G Jones et al., ‘The Coming Conflict with Hezbollah’, CSIS, 21 March 2024, <<https://www.csis.org/analysis/coming-conflict-hezbollah>>, accessed 31 March 2024; for context of relationships, see Jack Watling, ‘Iran’s Objectives and Capabilities: Deterrence and Subversion’, *RUSI Occasional Papers* (February 2019).

range of emerging capabilities, its operations are worthy of study to identify lessons relevant to the British Army.

This paper examines IDF operations – tactics, force structure, capabilities and operational design – during the initial operation in Gaza City in autumn 2023. The paper is intended to highlight tactical lessons that have wider applicability and to discuss the problems that have driven tactical adaptation in the field.

It is important to emphasise what this paper does not attempt to do. It is not an assessment of the likely efficacy of the IDF's operational design or strategic goals. Nor does it make recommendations about how the conflict may conclude. Rather, it is a study of military tactics. The paper does not assess the ethical or political debate surrounding aspects of Israeli operations, except insofar as the challenges confronted by the IDF would also pose tactical challenges to the British Army under comparable conditions. These questions, while highly important and the subject of ongoing debate, are best addressed separately. The paper is also limited to discussion of operations in 2023 in Gaza City and does not extensively cover subsequent operations in Khan Younis or Rafah.

The evidence base for this paper draws on author interviews with strategic-, operational- and tactical-level IDF commanders and analysts from a range of units that have operated in the Gaza Strip during the war. This includes interviews with Israel's Southern and Northern Commands, with personnel from divisional and brigade staffs and at the battalion level. The IDF have also established lessons learned cells in all their formations, and with battalions assigning an officer to provide observations to the brigades from the beginning of their ground operations. These were analysed at the divisional and regional command echelon, and where contradictory information arose, were investigated. The authors spent time with the lessons learned officers and saw samples of their data. Of the 44 core interviews with IDF personnel, most interviewees ranked between OF4 and OF7. The authors directly observed some of the processes described. The authors also engaged with IDF personnel prior to the conflict and observed IDF training, including for urban operations. In addition to this primary evidence collection, the authors have collated and analysed a significant body of combat footage and reports on the conflict written by both journalists and academics and have maintained contact with some humanitarian personnel working on and in Gaza.

There are significant limitations to the evidence collected, and the extent to which it can be used. Hamas commanders were not accessible for interview. The authors did not endeavour to interview diplomatic and UN staffs, whose work does not cover military operations. There is also a significant body of evidence collected that cannot be made public or exploited in this paper because its publication would breach operational security. Where this arose, the authors

did not address these subjects. The exact details of Israeli intelligence processes and adaptations following the failure to anticipate the attack on 7 October are sensitive, and it was decided to omit discussion of this topic, rather than address it in a manner that was self-evidently inadequate. Another area that is not substantially addressed is the efforts to recover Israeli hostages. While they have had a significant impact on the conduct of the war, these operations are also sensitive, and lessons relating to hostage rescue cannot be adequately covered at this time with the information that is releasable.

The paper has seven chapters. Chapter I is a brief overview of the context within which the IDF formulated its operational plan and the scheme of manoeuvre for the first operation against Gaza City. It is not intended to be a detailed narrative of the war. The subsequent chapters each cover lessons relating to warfighting functions: mounted and dismounted close combat; combat engineering; subterranean operations; fires; information operations; and humanitarian support operations. The paper concludes with considerations of the relevance of the identified lessons and specifically how they relate to emerging concepts in the British Army.

I. Operational Context: 7 October to 24 November 2023

Hamas initiated its ground invasion of Israel on 7 October 2023 with a carefully synchronised breakthrough of Israel's border defences. Although combat groups of the Izz ad-Din al-Qassam Brigades (the military wing of Hamas) had been instructed to train and equip for the assault and capture of Israeli villages and IDF outposts for some time, these small-scale exercises by individual Hamas units had become somewhat routine. The planning for 7 October had been carried out by a small group, with instructions to individual Hamas units given in isolation, so that only upon assembly were its fighters given briefs on their specific objectives and an indication of the scale of the operation.⁷ These briefs were detailed, covering the location of IDF defensive positions and command posts, the layout of military installations and kibbutzim, and in some cases, the working and sleeping quarters of IDF commanders and local officials.⁸ The original breaching force also operated with effective communications discipline, with very little use of mobile phones or other communications systems until they were engaged by the IDF.

The breaching of the border saw Hamas coordinate the blinding of surveillance and reconnaissance capabilities using UAVs,⁹ snipers and anti-tank guided missiles (ATGMs) to destroy the cameras and communications antennae along the Gaza border. This simultaneously prevented IDF command posts from receiving information and stopped their transmission of instructions to subordinates.¹⁰ Breaches of the border fence were then executed at 50 points using bulldozers, frame charges and explosive Bangalore torpedoes.¹¹ In addition, six fan-powered parachutes flew to three points inside Israel, while seven fast

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7. The authors reviewed tactical planning material, including schemes of manoeuvre, intelligence briefs on targets, and instructions for contingencies, distributed to Hamas fighters and captured by the IDF.
 8. *Ibid.*
 9. Mia Jankowitz, ‘How Hamas Likely Used Rudimentary Drones to “Blind and Deafen” Israel’s Border and Pave the Way for its Onslaught’, *Business Insider*, October 2023, <<https://www.businessinsider.com/hamas-drones-take-out-comms-towers-ambush-israel-2023-10>>, accessed 25 May 2024.
 10. Author interviews with IDF personnel from Southern Command, Israel, March 2024.
 11. Review of tracks from ISR from 7 October, accompanied by observations from OF7 at a divisional headquarters, Israel, March 2024.

boats attempted a maritime insertion along the Israeli coast.¹² The assault force was spearheaded by up to 2,000 Hamas fighters and participants from other armed groups in Gaza. The initial assault force was divided into combat groups, each of which was given specific objectives with prepared intelligence on the location of individual Israeli commanders and garrisons. The headquarters of IDF units and police forces were directly attacked.¹³ As the raid occurred during a national holiday in Israel, the IDF were left with very little situational awareness, without their communications infrastructure to coordinate a response, and with a lack of mobile reserves. Hamas teams also seized and held road junctions, impeding IDF movement.¹⁴

In terms of setting the initial conditions for the conflict, it is important to note that Hamas fighters deviated significantly from their own plan during its execution.¹⁵ Following behind the Izz ad-Din al-Qassam Brigade fighters were around 1,000 Gazans, who – seeing the breaches in the fences – followed the assault force onto Israeli territory, and were the source of a significant proportion of the social media posts and videos from 7 October. Discipline among Hamas fighters at this point appears to have broken down. The original planning documents showed that Hamas had intended to fortify the positions it had seized and use hostages to complicate the IDF's retaking of these positions. Hamas had brought rations and medical and combat equipment for extended operations. The chaotic massacre that unfolded diverted efforts to prepare for a deliberate defence. In some respects, the devastation created chaos that complicated efforts to bring the immediate situation under control on 7 October. At the same time, Hamas's lack of prepared fighting positions made the IDF's reclamation battle for the seized territory far easier over the following days.

IDF forces mobilised extremely quickly. In the initial 24 hours, this was to a large extent a process of self-mobilisation, whereby reservists and soldiers on leave rushed to the area near the Gaza border without clear chains of command established, or unit boundaries drawn. This resulted in losses of personnel and equipment. A good example is an IDF CH-53 helicopter, piloted by a former member of the aviation unit, which picked up a unit of paratroopers and flew them directly into the combat zone without deconfliction. The troops were

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12. Author review of ISR tracks from 7 October, accompanied by observations from OF7 at a divisional headquarters, Israel, March 2024.
 13. See, for example, *i24 News*, 'Sderot Police Officer Recounts October 7 Hamas Attack', *YouTube*, 30 November 2023, <https://www.youtube.com/watch?v=LFhbD1im_xI>, accessed 25 May 2024; Alexander Cardia, Dmitriy Khavin and David Blumenfeld, "Everyone Died": How Gunmen Killed Dozens in Sderot', *New York Times*, 10 October 2023.
 14. Overview of Hamas activity, collated by the IDF, briefed to the authors in Israel, March 2024.
 15. Author review of the aforementioned plans distributed to Hamas units, in conjunction with the locations where these fighters were actually confronted. The comparison shows that they did not follow through on the later phases of the operation.

inserted, but the helicopter was destroyed.¹⁶ The deployment of this unit was not part of any higher-level plan but was implemented by commanders and reservists at unit level. Despite this intermingling of troops from units across Israel creating an extremely chaotic battlespace, it also seriously disrupted Hamas fighters' freedom of manoeuvre in and around the locations they had seized.¹⁷ Command and control (C2) of the IDF's initial response was also complicated by the fact that Hamas had destroyed many of the antennae supporting military C2 systems around Gaza, while the capture of a large quantity of Israeli communications equipment forced the IDF to distribute new encryption keys for its military communications before they could be used. This meant that the IDF had to revert to civilian communications for the initial 48 hours of the war, with a corresponding lack of operational security.¹⁸

IDF mobilisation became more deliberate within 48 hours as reservists were called up, assembled and moved to assembly areas. The appearance of formed units with their command echelon in the battle area enabled an increasingly deliberate series of reclamation battles to take occupied positions.¹⁹ The IDF had largely regained control of the ground within 72 hours, with clearance operations for a further three days eliminating surviving pockets of resistance. Some infiltrators remained on Israeli territory for up to three weeks but were not operationally significant beyond the first five days.²⁰

In response to the 7 October attack, the Israeli cabinet declared war on Hamas.²¹ Given that the Israeli government had seemingly not anticipated any such attack,²² a precise formulation of Israeli war aims took some time to coalesce, and some tenets of the implementation remain subject to debate.²³ Nevertheless, within the first five days IDF commanders were planning against three core military objectives:²⁴

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16. *Times of Israel*, 'Helicopter Carrying Israeli Troops to South After Hamas Assault Was Hit by Explosive', 15 October 2023, <<https://www.timesofisrael.com/helicopter-carrying-israeli-troops-to-south-after-hamas-assault-was-hit-by-explosive/>>, accessed 25 May 2024.
 17. Author interviews with IDF officers and personnel who participated in fighting on 7 October, Israel, March 2024.
 18. Author interviews with IDF officers in Southern Command and personnel from Unit 8200, Israel, March 2024.
 19. Author interviews with IDF officers and personnel who participated in fighting on 7 October, Israel, March 2024.
 20. *Ibid.*
 21. Andrew Raine et al., 'October 7, 2023: Israel Says it is "At War" After Hamas Surprise Attack', CNN, 9 November 2023.
 22. One of the authors had numerous discussions with members of the Israeli intelligence community and IDF planners in September 2023, and a threat approximate to 7 October in scope or character did not arise during a survey of paths to war.
 23. Indeed, key elements of how objectives are defined or to be pursued remain subjects of debate within the Israeli cabinet. See Gabriel Gavin, 'Rift in Israel's War Cabinet over Postwar Gaza Plan', *Politico*, 19 May 2024, <<https://www.politico.eu/article/israel-war-cabinet-netanyahu-gaza-palestine/>>, accessed 25 May 2024.
 24. Author interviews with two Israeli OF7 and OF4–5 Plans Officers, IDF headquarters, Israel, March 2024.

1. The destruction of Hamas's military infrastructure and capabilities to a point where they no longer threatened Israel.
2. The recovery of hostages.
3. The removal of Hamas as the de facto government in Gaza in order to deny Hamas the ability to regenerate its combat power.²⁵

These objectives, authorised by the Israeli cabinet, became the basis for operational planning as soon as the IDF had regained control of Israeli territory. Other objectives that were more political in character were articulated at various points by Israeli ministers.

IDF officers concluded that a ground invasion would be necessary to remove Hamas from control of the Gaza Strip. The IDF had previously conducted incursions into the Gaza Strip, as during Operation *Protective Edge* in 2014.²⁶ However, the aims of the incursions between 2008 and 2023 were far less ambitious in terms of the amount of terrain that had to be manoeuvred through. The IDF had plans for the full occupation of Gaza, which had been rehearsed in command post exercises.²⁷ Nevertheless, the number of troops assessed to be necessary meant that these plans could not be fully exercised without a call up of reserves.²⁸ The scale of the operation envisaged in 2023 meant that there was a requirement for a deliberate force build-up and an extended period of planning.

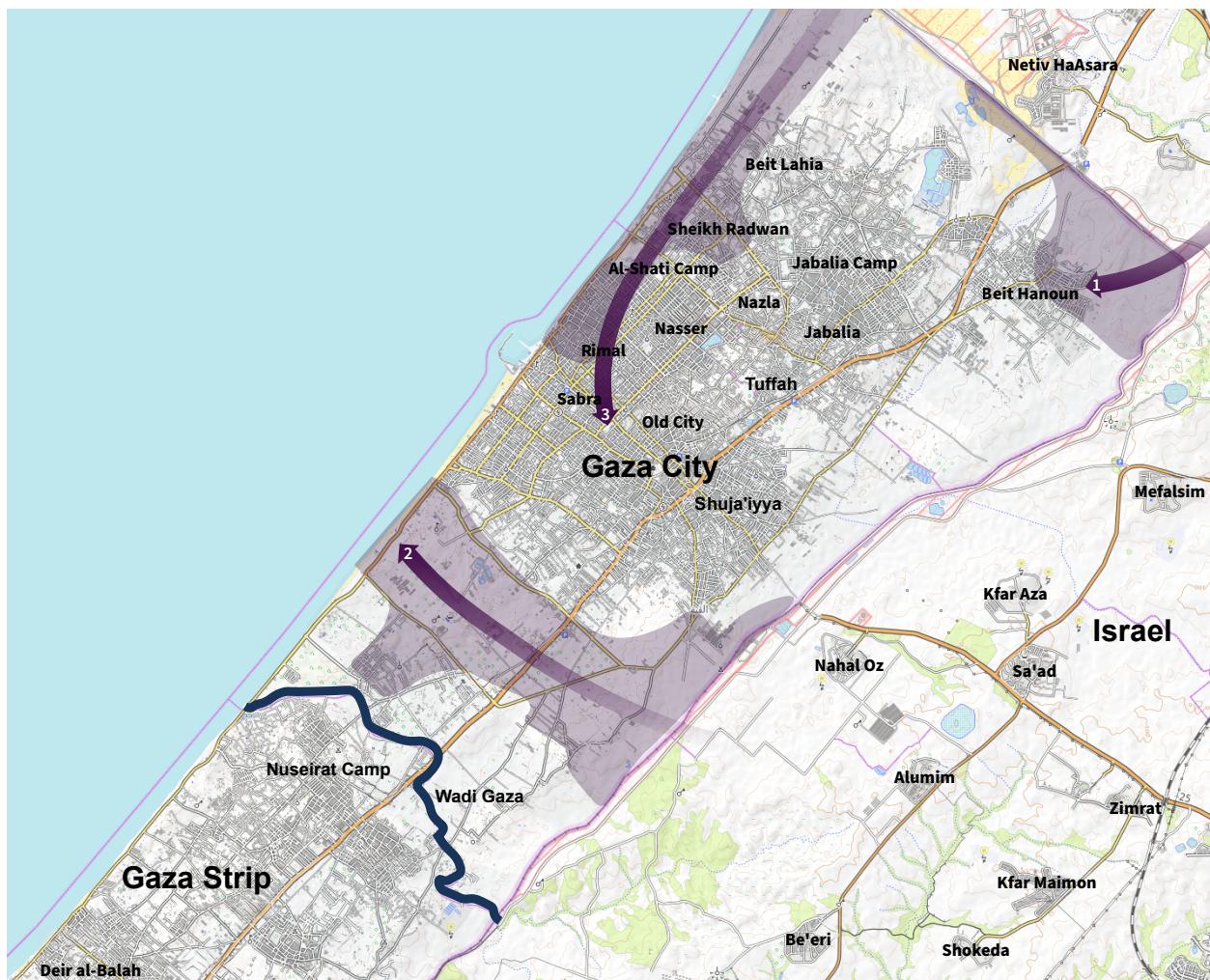
The period available for preparation was – in the view of IDF planners – constrained by three factors. First, alongside the ground attack on 7 October, Hamas initiated a massive rocket barrage of Israeli military and civilian sites.²⁹ In response, the Israeli Air Force conducted an immediate large-scale air campaign against identified Hamas targets in Gaza and assessed rocket launch sites. Despite these efforts, it was assessed that rockets would continue to be launched if Hamas could cache weapons underground, and so would only be prevented from launching more rockets by the IDF physically seizing the terrain.

Second, IDF planners believed that there was a window of opportunity created by the 7 October attack during which the international community would give Israel freedom of action, and that this window would close. This belief stemmed

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25. Given that this objective is increasingly dependent on conceptualising what might follow Hamas as a governing entity, it remains the least militarily precise. See Robert Satloff, Dennis Ross and David Makovsky, 'Israel's War Aims and the Principles of a Post-Hamas Administration in Gaza', Policy Analysis, PolicyWatch 3799, Washington Institute for Near East Policy, 17 October 2023, <<https://www.washingtoninstitute.org/policy-analysis/israels-war-aims-and-principles-post-hamas-administration-gaza>>, accessed 25 May 2024.
 26. Raphael S Cohen et al., *From Cast Lead to Protective Edge: Lessons from Israel's Wars in Gaza* (Santa Monica, CA: RAND Corporation, 2017).
 27. Author interviews with IDF J3 personnel, Israel, July 2019, September 2023 and March 2024.
 28. Author interviews with IDF J3/5 personnel, Israel, March 2024.
 29. Nadav Gavrielov, 'Hamas and Other Militant Groups are Firing Rockets into Israel Every Day', *New York Times*, 2 January 2024.

from the experience from previous rounds of fighting.³⁰ Indeed, just prior to 7 October, a senior IDF planner had indicated to one of the authors that the closing of the window within which operations could be conducted had prevented any kind of critical threshold being reached to change the dynamic during previous rounds of escalation with Hamas, as during 2021.³¹ The scale of the Hamas incursion in October 2023 meant that the IDF expected to have a longer period with freedom of action, but time was nevertheless considered a finite resource, and this created a belief among planners that they had to act sooner rather than later.

Figure 1: Axes of IDF Advance During Initial Break-in Operation



Source: By Ecrusized, influenced by user Rr016. - Own work, Israeli military presence in Gaza Strip citing Institute for the Study of War & Critical Threats Project. Maximum IDF advance citing *New York Times* and *Wall Street Journal*. Made using OpenTopoMap data., CC BY-SA 4.0, <<https://commons.wikimedia.org/w/index.php?curid=138592589>>, accessed 3 July 2024. Edited by RUSI.

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30. This dynamic has had a persistent shaping effect on IDF planning, even as far back as the Six-Day War, see Michael Oren, *Six Days of War: June 1967 and the Making of the Modern Middle East* (Oxford: Oxford University Press, 2002), pp. 294–327.
 31. Author interview with IDF planner, Israel, September 2023.

Third, although Hezbollah had not coordinated any operations against northern Israel with Hamas on 7 October, it did begin to attack Israeli communities with rockets in the days following the operation, and mobilised a large body of fighters.³² With the threat of a major escalation in the northern theatre coinciding with the commitment of forces in Gaza, the IDF assessed that it needed to be able to rapidly complete the most intensive part of operations in Gaza – the urban break-in – to enable forces to subsequently pivot north. Moreover, the longer the Hamas rocket barrage continued against Israel, the more Iron Dome interceptors would be used, increasing Israel's vulnerability to Hezbollah's much greater missile arsenal.³³

Given the impetus to act quickly, the plan formulated by the IDF ground forces involved an advance into Gaza City on three axes. First, there were raids planned towards Beit Hanoun. These incursions, largely at night, both enabled the emplacement of forces in Gaza and confirmed Hamas in its belief that its phase lines for a deliberate defence should be orientated to confront an assault from this axis.³⁴ The second axis divided Gaza City from southern Gaza by pushing along the northern side of Wadi Gaza, thereby isolating Hamas forces in the city from their line of resupply. The third axis was the main effort, heading south along the coast on a narrow front and then turning in to Gaza City. The coastal axis was intended to enable the IDF to circumvent most of Hamas's prepared defences. The plan therefore committed three mechanised divisions simultaneously into an area smaller than 70 km² to confront an adversary of approximately 20,000 personnel amid a civilian population of more than 600,000 people (approximately 1.1 million in the operational area north of Wadi Gaza, as compared with 40,000 Hamas fighters across the Strip).³⁵

It is worth noting that there has been some discussion of Gaza's population density in the media, suggesting that it is one of the most densely populated cities in the world.³⁶ Exact measures of population density vary, depending on where studies draw their boundaries.³⁷ Like most cities, Gaza City had some pockets of extremely high population density, while across the Strip, the density

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32. Reuters, 'Israel, Hezbollah Exchange Artillery, Rocket Fire', 8 October 2023.
 33. Shaan Shaikh and Ian Williams, 'Missiles and Rockets of Hezbollah', *Missile Threat*, Center for Strategic and International Studies Missile Project, 26 June 2018, last modified 10 August 2021, <<https://missilethreat.csis.org/country/hezbollahs-rocket-arsenal/>>, accessed 25 March 2024.
 34. Dan Williams and Nidal Al-Mughrabi, 'Israel Carries out Limited Raids in Gaza, Hamas Launches Drones', *Reuters*, 23 October 2023.
 35. This assessment of enemy strength is derived from IDF assessment of enemy forces briefed to the authors, Israel, March 2024.
 36. See, for example, Renee Rigdon and Amy O'Kruk, 'Maps Show the Extreme Population Density in Gaza', *CNN*, 11 October 2023.
 37. Estimates for the population of Gaza have ranged, for example, from 20,000 per square mile, see *ibid.*, to 36,000 per square mile, see Dylan Moriarty and Bonnie Berkowitz, 'Visualising the Size of Gaza City Compared with U.S. Cities', *Washington Post*, 17 October 2023.

is within the distribution for modern cities. Recognising that Gaza is not exceptional as an urban space is important, because it makes the lessons from Gaza in this regard transferable to other militaries in other theatres of operation.

These lines of effort were initiated on the night of 27 October and made considerable progress, so that by the time a ceasefire was declared to allow the exchange of prisoners for hostages on 24 November, a large part of Gaza City was under IDF control. The IDF has subsequently conducted operations against Khan Younis, and at the time of writing is conducting operations in Rafah, and it has also undertaken further raids into Gaza City in response to Hamas re-entering parts of the city that had previously been cleared.³⁸

With a rough outline of the scale of operations and scheme of manoeuvre, it becomes possible to identify a range of tactical lessons and adaptations that the IDF has learned over the course of the fighting.

38. Nidal Al-Mughrabi and Bassam Masoud, 'Battles Rage Around Gaza's Al Shifa Hospital, Israel Says 170 Gunmen Dead', *Reuters*, 23 March 2024.

II. Mounted and Dismounted Close Combat

The scheme of manoeuvre for each axis was drawn up at the divisional echelon, under the IDF Southern Command as the operational headquarters.³⁹

On the main axis, the division committed two brigades to an axis of advance less than 1 km wide. The brigade composition was an armoured battalion, a mechanised infantry battalion, an infantry battalion, a combat engineering battalion, an artillery battalion, a special forces attachment, and enablers.⁴⁰ The boundaries between battalions were drawn down the centre of city blocks. The initial incursion was led by D9 bulldozers, intended to overcome IEDs. Exact employment differed block by block and between units, as the formations used were ad hoc. However, a rough outline of the tactical approach saw the D9s work one bound ahead of Merkava main battle tanks, with the heavy armour moving in pairs of vehicles. They would establish overwatch to enable Namer infantry fighting vehicles to then move forward and disembark infantry into buildings flanking the next bound. As the mechanised infantry moved forward, light infantry would advance to clear and hold terrain to prevent attacks on the rear.⁴¹

There has been some debate as to the significance of high-rise buildings during urban operations and the extent to which armies need to work out how to fight within them.⁴² The evidence from Gaza suggests that these structures are of limited military value. In terms of their use as observation posts, it is difficult for observers positioned on the higher floors to maintain oversight of the cityscape beneath them without also exposing themselves to observation. Above a certain height, the streets become dead ground. Furthermore, fighters who move up a multistorey building lose the ability to reposition laterally. The IDF therefore found that observers would remain in the first few levels of a building (not least because observation from higher altitude can be achieved more effectively by UAVs), while

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39. Author interviews with divisional staff, Israel, March 2024.
 40. Author interviews with brigade staff, Israel, March 2024.
 41. Author interviews with brigade staffs, battalion staffs and operational analysts at Southern Command, Israel, March 2024.
 42. Some recent British Army exercises have explored how this might be done. See *Forces News*, ‘British Army Carries out Assault Exercise on Abandoned Tower Block’, *YouTube*, 19 July 2022, <<https://www.youtube.com/watch?v=1ZoE8w15Nlw>>, accessed 25 May 2024. The question of force density requirements to clear and secure these buildings was often a matter of debate in exercises, including *Urban Strike* and *Urban Lion*, observed by the authors in 2019 and 2022 respectively. Considerations for engagement angles and sniping from high rises has often been a point of discussion in literature on urban operations. See William Robinson and Lawrence Yates (eds), *Block by Block: The Challenges of Urban Operations* (Fort Leavenworth, KS: US Command and General Staff College Press, 2003), pp. 328–54, 455.

fighters rarely ventured above the second level. This is consistent with observations from Ukraine,⁴³ largely for the same reasons. Using sensors to detect activity on higher floors to engage them with fires is a relevant capability, but there appears to be a limited requirement for ground manoeuvre forces to extensively occupy and clear higher floors. Tall buildings do bring complications for close combat elements, however. First, to attack an enemy on lower levels with fires often requires higher payload ordnance. This is because the angles available to reach a target in a high-rise area are constrained by obstructions, and thus attacks often need to strike a higher floor but impact a lower floor. This has implications for collateral damage. It also means that there is an increased risk of rubble and debris falling further away from the building, increasing the minimum safe distance from friendly infantry within which fires could be employed.

Although the IDF made rapid progress during the early break-in, rubblisation caused a range of problems. Tank drivers could not accurately assess the depth of craters through night vision, especially when there had been rain, and some vehicles were lost owing to roll-overs when vehicles drove into shell holes.⁴⁴ Another problem arose from a lack of terms for coordinating direct fire. Fire control in either an offensive or defensive context is best conducted through the designation of unit boundaries, arcs of fire, known friendly and enemy positions, and reference points. The integration of many mobilised reservists with the mixed professional and conscript force proved a challenge. While all Israeli reservists have full-time military experience from, at minimum, initial service as conscripts, many reservists had not conducted much substantial training for several years. As a result, many were out of practice and would to varying degrees operate according to outdated doctrine, impeding a common understanding when attempting to coordinate either movement or fire.

Environmental factors exacerbated this problem. Gaza City's high population density and limited urban planning created an urban environment characterised by narrow streets and irregular high-rise buildings. Furthermore, the progressive reduction of the terrain to rubble through the course of fighting resulted in an irregular, congested and complex visual environment. The extreme degree of irregularity and rubblisation proved manageable when mapping terrain from above, but was anathema to the accurate identification and designation of reference points and targets for ground units. If targets were seen by a ground unit, they would often defy precise verbal description, creating scope for their mis-designation. Forces that had been trained to talk one another onto targets using the windows and floors of a building as reference points struggled to rapidly convey where enemy were to one another in structures that no longer

43. Author interviews with and observation of members of the Armed Forces of Ukraine, Ukraine, June, August and October 2022, May, July and October 2023, and February and April 2024.

44. Author interviews with IDF armour officers, Israel, March 2024.

had uniformity. The contrast with other urban operations the IDF had conducted was sufficient that the IDF's lessons learned teams have referred to what was experienced as a distinct category of urban operations – 'devastated terrain warfare'.⁴⁵ It should also be noted that rubblisation was to a large extent a product of IDF air- and artillery-delivered fires. This should therefore have been a factor in the planning of movement corridors and boundaries.

Related challenges that IDF personnel confronted were friendly fire and combat accidents, of which there were three main causes. The first, and simplest to resolve, was unfamiliarity with the impact of heavier weapons in close terrain, especially for weapons that soldiers were qualified on but rarely used. The most common culprit was M203 grenade launchers, with several soldiers injured by fragmentation after engaging targets at too close range.⁴⁶ Another issue was accidental cross-boundary fragmentation between units caused by heavier weapons carrying on through structures and therefore entering another unit's manoeuvre corridor.⁴⁷ It should be noted that communication between armour and infantry – in the IDF, this is generally done via radio – was critical for confirming channels of fire. Methods such as the use of phones mounted on the rear of tanks to speak to the crew inside were dangerous, given the functioning of active protection systems on Israeli armour.

The second cause of friendly fire and accidents, and much more challenging, was the difficulty in judging range and thus deconfliction lines between manoeuvre corridors. This was most pronounced when units were looking diagonally down a line of buildings. As rubblisation caused ruined buildings to visually merge, with the effect becoming more pronounced over distance or at night, movement in a building in an adjacent unit's movement corridor would frequently be mistaken for movement within a unit's area of responsibility. This issue was reduced, but not fully eliminated, by placing gaps between units' movement corridors rather than having contiguous boundaries, where both adjacent units had freedom to engage targets in the intervening space. This fire zone was usually placed along a block of buildings. Another important mitigation was to use rangefinders to distinguish buildings and thereby overcome the visual merging of structures.⁴⁸

The third cause of friendly fire related to perceived profiles. On several occasions, IDF personnel being tracked as mounted units dismounted to inspect buildings, run to colleagues' vehicles to coordinate, or otherwise shifted profile. Where this caused them to appear on ISR feeds in both unexpected locations and as

45. Author interviews with IDF lessons learned officers at divisional level and at Southern and Northern Commands, Israel, March 2024.

46. *Ibid.*

47. *Ibid.*

48. Author interviews with brigade and battalion staffs, Israel, March 2024.

small numbers of armed dismounts, misclassification occurred and in some cases, strikes were directed against them. This was a particular challenge for UAV operators, since while thermal imaging allows personnel to be accurately distinguished from the background terrain, it also reduces the visual distinctiveness of uniforms and equipment. The latter problem was exacerbated by IDF reservists wearing privately acquired armour and uniform elements that did not conform to IDF-issue equipment, reducing the uniformity of the force. Given the lack of uniform among Hamas fighters, this made it difficult to accurately distinguish targets. The challenges of distinguishing Hamas fighters from civilians are discussed later in relation to targeting and fires.

Hamas's tactics may be said to have evolved in three stages. At the beginning of the operation, Hamas appears to have conceived of its defence as being based around key junctions on the anticipated Israeli axis of advance.⁴⁹ A strongpoint, from which a position could be overlooked, would fix IDF elements on a given avenue and coordinate the movement of small teams to then attack IDF units in flanking ambushes.⁵⁰ This approach was disrupted by the unexpected axis of the main IDF advance. After many of the designated ambush sites were approached from different directions, Hamas thereafter began to raid and fight for key buildings and strongpoints. The fighting therefore shifted to a second stage, from being over particular intersections with favourable sight lines to building complexes that drew in IDF forces to enable attacks.⁵¹ The third stage of Hamas tactics emerged after the week-long November ceasefire and saw the emergence of harassing attacks by small, dispersed groups which would try to converge fires onto isolated IDF elements. As larger-scale engagements and the superiority of IDF fires inflicted heavy losses, Hamas instead switched to trying to attack weaker and smaller patrols of IDF personnel, rather than engage combined arms units. This near-uniform adaptation among Hamas cells demonstrates that they retained the ability to pass information during the initial phase of IDF operations, suggesting that the IDF was unsuccessful in fully degrading Hamas's C2. The adaptations were consistent with Hamas's assessed strategic objective of surviving as an armed presence across Gaza and thus retaining administrative control, even with a heavily depleted force.

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49. The following descriptions of Hamas's tactics are based on observations by IDF personnel of enemy action, review of ISR footage of Hamas fighters, and some information released by Hamas. This is necessarily an assessment based on partial information, given the lack of access to Hamas commanders for interview.
 50. *Times Now*, 'Hamas' Bloody Revenge Against IDF, Close-Range RPG Attacks Strike Israeli Tanks', *YouTube*, 21 December 2023, <<https://www.youtube.com/watch?v=bZDAnP5lywM>>, accessed 25 May 2024; *Hindustan Times*, 'Latest Hamas Video Shows Rocket Attacks on Israel Troops, Tanks; "IDF Bulldozer" Set on Fire in Gaza', *YouTube*, 5 November 2023, <<https://www.youtube.com/watch?v=nLZRJiX3bhQ>>, accessed 25 May 2024.
 51. This evolution in tactics is evident in the progression of contact reports assembled by IDF lessons learned officers, seen by the authors, which tracked Hamas's adaptation to the threat and the pressures placed on them.

Combined with the use of fires ahead of manoeuvring elements to disrupt Hamas repositioning, the IDF did not confront heavy anti-armour ambushes, but rather sporadic and harassing engagements. However, once the IDF pushed into an area, Hamas would begin to emerge from subterranean infrastructure to conduct rocket-propelled grenade (RPG) and sniper engagements against IDF vehicles through rubblised structures. In some cases, heavy weapons were brought out from tunnels camouflaged with earth. In others, Hamas fighters would move in civilian profile without weapons and then retrieve cached arms at their intended point of ambush to conduct the engagement. Hamas arms caches were widely dispersed throughout the terrain, with IDF units reporting that about a third of structures in Gaza City contained arms. The attack groups would withdraw to subterranean positions once they had conducted an attack.⁵² Hamas's coordination of these actions appeared to depend on spotters tracking IDF positions and then using fixed lines or runners to communicate this information. The passage of information could also be enabled through social media activity, largely indistinguishable from civilians commenting on events unfolding around them but providing significant situational awareness to combat groups.⁵³

The sporadic anti-tank guided missile and persistent RPG threat – often manifesting from a 30–50-m distance from IDF vehicles – posed a challenge for active protection systems (APS). Where APS had either been turned off, did not have a sufficient line of sight between the sensor and the threat, or had already been expended, hits were achieved on IDF vehicles. Nevertheless, while Hamas believed that APS could be defeated with close engagements,⁵⁴ this problem was resolved through software updates. In most cases, APS proved effective, although the distance between armour and infantry for APS to be fielded safely also offered Hamas fighters the opportunity to come in extremely close proximity to some vehicles.⁵⁵ Nevertheless, it was found that having pairs of vehicles operate in intimate support helped to increase their survivability, as the APS could often overlap and thereby increase the magazine depth to protect the vehicles.⁵⁶

It is worth briefly highlighting the number of casualties in Gaza since 7 October 2023, since these provide an indicator of the intensity of the fighting. In terms of individual engagements, Hamas has rarely concentrated forces above the

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- 52. Author interviews with IDF lessons learned officers at brigade and divisional level, who also provided ISR feeds showcasing the activities described, Israel, March 2024.
 - 53. Author interviews with officers of Unit 504 and Unit 8200, Israel, March 2024.
 - 54. David Axe, 'Hamas Distributed a Handy Guide to Destroying Israeli Tanks', *Forbes*, 15 October 2023.
 - 55. *The Telegraph*, 'Hamas Uses Rockets and Explosives Against IDF Tanks', *YouTube*, 3 November 2023, <<https://www.youtube.com/watch?v=CLHBWOL5dQ>>, accessed 25 May 2024; *Times of India*, 'Hamas Fighter Walks to IDF Merkava Tank; Blows it Up with Explosives in Gaza's Jabaliya', *YouTube*, 21 May 2014, <<https://www.youtube.com/watch?v=rolcKEf5r8g>>, accessed 25 May 2024.
 - 56. *Daily Mail*, 'Israeli Tank Shoots Down Two Hamas Rockets with "Trophy" Defence System During an Attack in Gaza', *YouTube*, 6 November 2023, <<https://www.youtube.com/watch?v=2ChupBvu4Rw>>, accessed 25 May 2024.

size of the platoon. Nevertheless, because urban terrain causes high-intensity combat between relatively small groups of people, these fights have often been costly. From the beginning of ground operations in Gaza on 27 October 2023 to the time of writing, 287 IDF soldiers have been killed in combat, with a further 1,798 wounded, of whom 357 were classified as severely wounded.⁵⁷ The IDF has therefore had more personnel killed so far than the UK did in the campaign to retake the Falklands from Argentina in 1982,⁵⁸ or during the entire British campaign in Iraq from 2003.⁵⁹ Hamas has not released casualty figures. The IDF estimated that it had killed between 10,000 and 12,000 Hamas fighters by February 2024.⁶⁰ Estimates of civilian and combatant casualties among Palestinians exceeded 35,000.⁶¹ In reality, the number of people whose bodies remain under the rubble make a conclusive figure impossible to provide. However, these estimates give a sense of the intensity of the fighting, albeit one distorted by the proportion of casualties from air-delivered and indirect fires.

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57. Israel's Ministry of Foreign Affairs, 'Swords of Iron: IDF Casualties', published 3 November 2023, updated 6 June 2024, <<https://www.gov.il/en/pages/swords-of-iron-idf-casualties>>, accessed 25 May 2024.
 58. British Legion, 'The Falklands War', <<https://www.britishlegion.org.uk/stories/the-falklands-war>>, accessed 25 May 2024.
 59. Ministry of Defence, 'British Fatalities: Operations in Iraq', <<https://www.gov.uk/government/fields-of-operation/iraq>>, accessed 25 May 2024.
 60. BBC News, 'Israel Gaza: Checking Israel's Claim to have Killed 10,000 Hamas Fighters', 29 February 2024.
 61. Reuters, 'Gaza Death Toll: How Many Palestinians has Israel's Campaign Killed?', 14 May 2024.

III. Combat Engineering

Israeli operations started with the assumption that Hamas would have extensively laid landmines and IEDs along the anticipated routes into Gaza.⁶² Thus, Israeli forces at first either avoided roads or only used them in conjunction with meticulous clearance operations with support from D9 bulldozers, which slowed the pace of their advance. The IDF determined that it required 20 D9s per brigade to meet the required tempo of operations, although this was only allocated to the lead brigades.⁶³ This proved to be largely unnecessary, as Hamas had not laid mines in sufficient concentration, and those that it had deployed along roads were often surface laid and thus easy to detect and simple to remove. It is debatable whether Hamas's decision not to lay significant IEDs on the roads into Gaza City reflected a recognition that Israel's combat engineering assets would make these efforts redundant. In other words, it may be that the density of breaching equipment pushed Hamas to prioritise efforts elsewhere. Hamas's failure to mine the approaches could also have arisen from the limited time available, intensity of overhead observation, and local political impact on civilians prior to 7 October.

While route proving did not demand significant engineering support, clearance and search operations placed a heavy demand on dismounted combat engineers. First, Hamas seeded IEDs throughout buildings in the Gaza Strip, and at the time of writing, these continue to inflict casualties.⁶⁴ IEDs were also used to defend the entrances to tunnels and slow the IDF's passage into Hamas's subterranean infrastructure. Thus, dismounted combat engineers became an integral element of all combined arms operations. Alongside explosive ordnance and disposal (EOD) search and clearance, combat engineers were also critical to the breaching of buildings and rooms to enable the IDF to move unpredictably through the urban terrain.⁶⁵ This reduced the exposure of manoeuvring infantry to traps and ambushes.

Overall, the technical combat engineering skills required are unsurprising; any observer with experience of coalition operations in the wider Middle East and Afghanistan would be familiar with most of the dynamics at play. However, the need to integrate combat engineers with ground combat formations at the

62. Author interviews with IDF J5 personnel, Israel, March 2024.

63. Author interviews with IDF brigade staffs, Israel, March 2024.

64. *Jewish News Syndicate*, 'Two IDF Soldiers Killed by IED in Tunnel Shaft near Rafah', 19 May 2024, <<https://www.jns.org/two-idf-soldiers-killed-by-ied-in-tunnel-shaft-near-rafa>>, accessed 25 May 2024.

65. A practice long part of IDF doctrine, see Eyal Weizman, 'Walking Through Walls: Soldiers as Architects in the Israeli–Palestinian Conflict', *Radical Philosophy* (Vol. 136, 2006), pp. 8–22.

sub-unit level re-emphasised the need for a significant number of appropriately trained personnel. This also raises questions about how to distribute engineers across different formations while maintaining the ability to centralise combat engineer operations where necessary, and to assimilate lessons learned, spread them across the force and conduct training – all essential to combining arms at scale for urban warfare. Furthermore, as will be covered in the next chapter, the subterranean nature of some of the fighting meant that difficult engineering tasks would have to be conducted under even more challenging conditions underground.

Another consequence of the engineering challenge was that the use of novel sensors to locate subterranean infrastructure required close collaboration between technically sophisticated engineering units and intelligence practitioners. Here the IDF benefited from the experience of reservists with skillsets beyond the traditional military competencies. Capturing Hamas fighters or their caches and thus their documentation demanded the ability to move through terrain quickly. This required breaching and rapid EOD support. Conversely, when examination of captured materials or interrogation of captured fighters enabled the identification of tunnels, this often required engineering reconnaissance expertise to rapidly turn this information into an actionable plan on the ground. The level of engineer training at the sub-unit level therefore exceeded what would traditionally be covered by a pioneer, but instead necessitated sappers to be distributed across the force.

The complexity of the terrain also produced tactical challenges where engineering equipment had to be moved between echelons quickly. The repair of water pipes and facilities would normally sit at a relatively high echelon in dedicated engineering units, as a function brought in to stabilise an environment and tend to civilians after the completion of major clearance operations. In some instances, however, the IDF elected to flood Hamas tunnels using seawater and conduct other new engineering tasks during fighting.⁶⁶ This required specialised expertise to be brought into the area of responsibility of combat arms units during combat, and thus brought engineers to an echelon with which they did not routinely train. Nevertheless, such techniques allowed some challenges to be bypassed.

At higher echelons, plans for engineering proved critical. Rainfall in Israel and Gaza can be intense, as it usually falls in concentrated periods. The impact of rainfall on the terrain was uneven, producing mobility challenges, as well as humanitarian problems relating to sanitation. This meant that as units rotated into and out of the Gaza Strip, viable movement corridors and the engineering

66. Emanuel Fabian, 'IDF Confirms Flooding Hamas Tunnels in Gaza with Seawater', *Times of Israel*, 30 January 2024, <<https://www.timesofisrael.com/idf-confirms-flooding-hamas-tunnels-in-gaza-with-seawater/>>, accessed 25 March 2024.

support equipment necessary to restore mobility changed over time. Given the need to have the equipment available within a short timeframe, despite its large footprint, equipment needed to be accessible to units without being organic to them and thus a burden. This required intelligence and planning so that appropriate equipment could be pre-positioned.

IV. Subterranean Operations

The extent of Hamas's subterranean infrastructure in Gaza makes it an almost unique operating environment. While not on a comparable scale, subterranean manoeuvre has been an element in fighting in Mariupol,⁶⁷ Bakhmut,⁶⁸ Mosul⁶⁹ and other urban operations. This chapter is, therefore, probably the most case specific in its conclusions, but the lessons are still valuable.

In the years prior to the 7 October attack, Hamas claims to have constructed more than 500 km of tunnel networks under Gaza. This required an immense volume of cement, concrete and iron, not to mention the removal of soil. The level of and exact split between Hamas coercion of and active collaboration by the civilian population remains unclear; the tunnels and their entrances run under residential buildings, schools, mosques and hospitals.⁷⁰

To describe Hamas's subterranean infrastructure merely as 'tunnels' is a mischaracterisation. Some were intended as covert passageways between key points – such as beneath Wadi Gaza. Others were made with the intent to bypass Israeli defences. Still others housed barracks, caches, C2 centres, data storage⁷¹ and manufacturing facilities.⁷² There are roughly two levels of subterranean infrastructure – commanders' tunnels and operatives' tunnels. These are separated, with commanders' tunnels running deeper and with a better quality of construction and more facilities, enabling them to be used for longer-term habitation and operations. The tunnels are not one single network. While some sections are linked, many are smaller sub-networks that are not integrated into an overall underground structure, with the segmentation of the network limiting

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67. James Rothwell, 'Inside the Azovstal Steelworks: The Sprawling Underground City Standing Between Vladimir Putin and the Fall of Mariupol', *The Telegraph*, 20 April 2022.
 68. Author interviews with Ukrainian soldiers defending Bakhmut, Ukraine, March 2023.
 69. Amanda Erickson, 'The Islamic State has Tunnels Everywhere: It's Making Them Much Harder to Defeat', *Washington Post*, 14 April 2017.
 70. *Memri TV*, 'Hamas Leader in Gaza Yahya Al-Sinwar Salutes Al-Jazeera TV, Iran, and Yasser Arafat, Adds: We Have 10,000 "Martyrdom-Seekers" Within Israel; Our Missile Capability Remains Intact, Can Hit Tel Aviv With a 250-Rocket Salvo; We Have 500 km of Tunnels in the Gaza Strip', 26 May 2021, <<https://www.memri.org/tv/hamas-leader-gaza-yahya-sinwar-we-have-500-km-of-tunnels-in-gaza>>, accessed 25 May 2024.
 71. Emanuel Fabian, 'Directly Beneath UNRWA's Gaza Headquarters, IDF Uncovers Top Secret Hamas Data Center', *Times of Israel*, 10 February 2024, <<https://www.timesofisrael.com/directly-beneath-unrwas-gaza-headquarters-idf-uncovers-top-secret-hamas-data-center/>>, accessed 25 May 2024.
 72. Although Hamas exaggerates what it is able to manufacture in Gaza. See *Forgotten Weapons*, 'Hamas Claims to Make Sniper Rifles in Gaza – Are They Really?', *YouTube*, 21 December 2023, <<https://www.youtube.com/watch?v=DRcVRLtd6c>>, accessed 25 May 2024.

the exploitation potential of any given tunnel. While at least one major data centre was captured, the majority of underground C2 nodes were very small, consisting of as little as internet-connected or ethernet-connected laptops.⁷³ These could be found throughout the tunnel networks.⁷⁴

Prior to the current conflict, it was well known that Hamas conducted tunnelling and built underground infrastructure. However, even with a capable ISR apparatus, the IDF lacked the ability to accurately map the subterranean environment. While various units of the IDF had conducted training exercises focused on hypothetical operations in Gaza, Hamas had a far better understanding of the terrain than the IDF, and this was especially true of the subterranean environment. The tunnels were also central to Hamas's concept of operations, allowing them to reinfilitrate areas on the surface that the IDF had cleared and granting them a safe haven from the fighting above ground.

At the beginning of the operation, the IDF conceived of surface and sub-surface operations as occurring sequentially: ground would be occupied and thereafter searched, with tunnels found and denied.⁷⁵ As the operation developed, it became evident that this allowed Hamas to persist in conducting ambushes for a protracted period and to then transition to a layered defence of underground facilities. Nor could underground infrastructure be safely bypassed. Instead, therefore, the surface and sub-surface fighting needed to be carried out simultaneously, posing competing dilemmas for Hamas's schemes of manoeuvre. Access to the tunnels required combat engineering, while entering and clearing them demanded highly specialised equipment and procedures, and thus personnel.⁷⁶

The IDF found that subterranean fighting was extremely stressful for its personnel and required many distinct techniques. The fact that every corner could lead to an extremely close confrontation with an enemy, or the discovery of an IED, created a staccato quality to the pressure on individuals that was corrosive of morale.⁷⁷ This was exacerbated by the fact that while the risk of close confrontations can arise in urban operations, in tunnels there was no ability to attack from unexpected axes, or to move around a threat. Tunnels had to be cleared deliberately, and the enemy could fight a series of delaying or blunting actions throughout this process that could not be circumvented.

At the beginning of the incursion, the IDF stressed identifying, controlling and sealing or denying the entrances of tunnels.⁷⁸ In some cases, tunnels could be

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- 73. Author review of imagery from tunnels and exploitation of material recovered, Israel, March 2024.
 - 74. Author interviews with officers of Unit 504, Israel, March 2024.
 - 75. Author interviews in and observation of training at the IDF's urban training centre, Israel, July 2019; author discussions with IDF concepts and doctrine officers, June 2021 and June 2022.
 - 76. Author interviews, IDF brigade and battalion staff, Israel, March 2024.
 - 77. Author interviews with IDF personnel who participated in these operations, Israel, March 2024.
 - 78. Author interviews with IDF J3/5 officers, Israel, September 2023.

collapsed from the air, a factor that drove the use of heavy air-delivered ordnance early in the war. In most cases, however, this could not be done, for several reasons. While tunnel infrastructure could be assumed to be explicitly military in a way that above-ground infrastructure could not, offensive operations were slowed by the concerns for hostages who might be held there. Furthermore, collapsing underground tunnels could threaten the structural stability of civilian buildings above ground. Sensitive site exploitation was necessary both for obtaining further intelligence on Hamas and the missing hostages, and for documenting and attributing Hamas military activity directly below civilian infrastructure. These factors influenced a slower and more deliberate pace of subterranean operations.

To enable the widespread deliberate clearance of Hamas's subterranean infrastructure, the IDF increasingly paired conventional and special operations units together. The special operations forces involved were predominantly a combination of troops from Shayaret-13 (Israel's naval commandoes) and Yahalom (Israeli special forces engineers). These troops would be attached at brigade level.⁷⁹ Clearing underground areas needed to be slow and deliberate, and there were limitations to how closely this could or should be tied to progress above ground, given the inability to provide effective mutual support or shared situational awareness except at tunnel entrances. However, by coordinating offensive operations above and below ground, dilemmas could be imposed on Hamas, constraining their movements and preventing them from using the tunnels as they wished. The specialist capabilities of special operations forces could be brought to bear in the subterranean environment, but this required a good working relationship with conventional forces that included the rapid sharing of intelligence and information, which did not always come naturally to the special operations forces and had to be actively fostered. While robots and military working dogs assisted in route proving in tunnels,⁸⁰ much of the clearance operation continued to have to be carried out by humans, given the number of doors, steps and other obstacles confronted.

One challenge to simultaneous surface and subterranean manoeuvre was that the tunnels did not adhere to the boundaries of the units operating above ground. Because of the need to have relays behind an advancing force in the tunnel to maintain communications, the C2 of units underground had to be managed by the brigade to which the forces were attached. Nevertheless, they would often cross into another unit's boundary. This could be deconflicted through notification, but it added a further consideration for units above ground of the effects they employed and which routes were used by heavier vehicles.

79. Author interviews with IDF brigade staffs, Israel, March 2024.

80. *Times Now*, 'Hamas' "Large Dogs" to Take on Israel's K9 Unit? 17 IDF Military Dogs Killed? Israel to Import More', YouTube, 6 February 2024, <<https://www.youtube.com/watch?v=HIQgMbOJfm8>>, 25 May 2024.

V. Fires

Fires coordination during the operations in Gaza was complicated by being applied through several parallel processes. First, the IDF had a high-value target list that it began to prosecute at the onset of the conflict. This had been built using all-source intelligence fusion and included both persons and structures, including some subterranean targets.⁸¹ Stand-off targeting continued throughout the operation. Targets located by intelligence would be framed by reconnaissance,⁸² to cue precision strikes. ‘Framing’ is an Israeli doctrinal term indicating that positive identification is established and then maintained until the target is struck. The processes for these targeted killings were largely unchanged from before the war; where they became significantly more complicated was how they interacted with the other forms of strike that arose during the war.

Alongside targeted killings, the IDF prosecuted signature-based strikes in response to targets identified through surveillance. Early in the conflict, a good example of this kind of strike was against rocket launchers. Subsequently, the identification of groups of militants by UAVs or other routine surveillance could lead to the generation of a strike.⁸³ It is important to note that because the IDF could not choose the time and place of these interdiction strikes, they would often be carried out in areas where there had not been an intelligence soak to provide a detailed assessment of likely collateral damage. Just as dynamic strikes in Mosul led in some cases to large numbers of civilians being killed because their presence inside buildings could not be detected within the timeframe of the engagement,⁸⁴ IDF dynamic strikes against large structures have led to intergenerational casualties within civilian families.⁸⁵ There has been much speculation in the media about the extent to which the IDF was using AI to build the target packs for such strikes.⁸⁶ A more accurate characterisation would be that the IDF targeting teams used software tools to assist in fusing large volumes of data to generate strikes.⁸⁷ This has significantly increased the speed and scale

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81. David Gritten, ‘Israel Targets Hamas’s Labyrinth of Tunnels Under Gaza’, *BBC News*, 13 October 2023.
 82. Ronen Bergman, *Rise and Kill First* (New York, NY: Random House, 2018), pp. 518–28.
 83. Author review of ISTAR, Israel, March 2024.
 84. Martin Chulov, ‘US Admits Mosul Airstrikes Killed Over 100 Civilians During Battle with Isis’, *The Guardian*, 25 May 2017.
 85. Sarah El Deeb, ‘The War in Gaza has Wiped Out Entire Palestinian Families: AP Documents 60 Who Lost Dozens or More’, AP, 17 June 2024.
 86. See, for example, Yuval Abraham, “‘Lavender’: The AI Machine Directing Israel’s Bombing Spree in Gaza”, *+972 Magazine*, 3 April 2024, <<https://www.972mag.com/lavender-ai-israeli-army-gaza/>>, accessed 27 May 2024.
 87. Noah Sylvia, ‘Israel’s Targeting AI: How Capable is it?’, *RUSI Commentary*, 8 February 2024.

at which target packs can be generated.⁸⁸ Often the target generation process has outstripped the planning process to enable targets to be prosecuted. However, the decision to strike is still made by a human, and it is a human who is accountable for how the ecosystem of data processing tools is employed. The errors that have been made are therefore not because of the software – which provides decision-makers with all the information necessary to test its conclusions – but often because operators are not taking sufficient time to verify automated conclusions.⁸⁹

The third kind of strike was one that emerged from ground forces calling for fires. In the IDF, fires – including air strikes – were allocated to brigades, with the brigade staff responsible for determining the synchronisation of these effects with their scheme of manoeuvre, or setting targets during the time when a strike is available in response to a threat. Although ground commanders can be connected to pilots to impart their intent, the technical coordination of air strikes is carried out at the brigade command post in the IDF. The IDF does not use Joint Terminal Attack Controllers to direct strikes. Despite this, the IDF managed to conduct strikes in extremely close proximity to manoeuvre elements – up to 200 m – with minimal fratricide.⁹⁰

As a consequence of these three types of strike, in any given piece of battlespace there were three targeting processes. Different elements of international humanitarian law (IHL) and the laws of armed conflict are relevant to each process. Interception or negative treatment operations – the intelligence-driven targeting of Hamas and Palestinian Islamic Jihad personnel – had the tightest controls around them. The IDF works to positively identify a target and then to continuously frame it until it is struck. Targets tended to work hard to avoid giving the IDF easy shots, exploiting protected sites to narrow the opportunities to attack them.

The IDF also had to deal with the problem of the revolving door. Known members of Hamas could be treated as combatants. During 7 October and Israel's subsequent ground operations in Gaza, however, there were many Gazans who participated in military activities against the IDF. These ranged from picking up weapons and participating in fighting, to retrieving cached equipment, or 'spotting', to sustain Hamas fighters.⁹¹ While these individuals could be struck as participants in the conflict while they conducted these activities, targeting them once they had stopped this participation, unless they were confirmed to be members of Hamas, raises more complex legal questions.⁹² The distinction

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88. Harry Davies, Bethan McKernan and Dan Sabbagh, "The Gospel": How Israel Uses AI to Select Bombing Targets in Gaza', *The Guardian*, 1 December 2023.
 89. A long-running problem with military automation, for the US military as much as for the IDF. See Paul Scharre, *Army of None: Autonomous Weapons and the Future of War* (London: WW Norton, 2018), pp. 137–43.
 90. Author interviews with IAF personnel and brigade staffs, Israel, March 2024.
 91. Author observations of surveillance footage showing participation, Israel, March 2024.
 92. Author interviews with Military Advocate Generals Corps, Israel, March 2024.

between someone incidentally participating in hostilities and someone routinely supporting Hamas can be difficult to make clearly in a way that is consistently applicable. For example, a military cook is a legitimate target in war. A civilian providing food to Hamas fighters could be a civilian providing a service and thus not a legitimate target. However, there is a boundary where this same individual becomes a participant, actively deviating from normal civilian behaviour to sustain an armed force.⁹³ Where precisely the line is drawn is a matter of judgement, and under time pressure in a large-scale operation, the exact demarcation can become variable between who is making the decision and the context in which it is being made. It is important to note that this is not a challenge unique to Gaza. It has been confronted in almost every conflict to varying degrees and is becoming more complicated as the boundaries, for example, between civilian communication and spotting become harder to distinguish.⁹⁴

The process of dynamic strikes could fall either under the same rules of engagement as targeted strikes, or under the rubric of self-defence in the case, for example, of destroying the launch sites of Hamas rockets. Unlike targeted strikes where the IDF had some control over the timing and thus more time to evaluate whether there was military necessity and proportionality before striking, dynamic strikes had to be carried out quickly. While the same IHL obligations applied, the time in which to exercise judgement was shorter, with a greater likelihood of mistakes. For those cases where IDF troops were in contact and called for fires, the justification for the effect was self-defence, with proportionality judged against the expected harm to IDF personnel.⁹⁵ The judgements of proportionality and military necessity often posed problems. For example, a high-value target might be close to civilian structures. However, to attack the structure with ground forces would require strikes to support the passage of those forces to the target and would affect a much greater area of civilian structures. An air strike might cause greater immediate collateral damage, but less secondary collateral damage. Mistakes could easily be made when the same target began to be assessed on multiple processes. A high-priority target that was positively identified, but where framing was lost, could be reacquired subsequently for a dynamic strike, without the same confidence of their identity being established.

The biggest challenge for targeteers was to construct a system to address the IDF's obligation to take measures to reduce civilian harm, before making a judgement on proportionality. Any system devised had to scale, given the number

93. The problem of the revolving door has long been debated among Israeli jurists, see International Crimes Database, 'Public Committee v. Government of Israel', 13 December 2006, <<https://www.internationalcrimesdatabase.org/Case/3253/Public-Committee-v-Government-of-Israel/>>, accessed 25 May 2024.

94. For a broader discussion of participatory warfare, see Matthew Ford and Andrew Hoskins, *Radical War: Data, Attention and Control in the 21st Century* (London: C Hurst & Co., 2022).

95. Author interviews with Military Advocate Generals Corps, Israel, March 2024.

of troops operating in the city. The eventual approach was to divide the Gaza Strip into boxes. For each box, an assessment would be made, and routinely updated, as to the density of civilians prior to the conflict, their status and how many had been displaced.⁹⁶ IDF personnel began to examine forthcoming operational plans and synchronise measures to move the population away from areas likely to see intense fighting. This was usually done through a mixture of leafleting,⁹⁷ outreach to mobile telephones, and recommendations on timing and routes for movement.⁹⁸ Estimating displacement allowed for the grading of each box as to the level of civilian presence and thus the appropriate rules of engagement in the area.⁹⁹ Such a system clearly had significant drawbacks. First, not all civilians could move. Second, the civilians had a limited understanding of the boundaries between the boxes, so that someone who had left might later return. Third, the movement corridors became threat vectors that Hamas would try to exploit, while deconflicting strikes from these corridors at such a scale proved highly challenging. There were inevitably mistakes. There has been some reporting of this process as designating IDF ‘free fire zones’ in Gaza.¹⁰⁰ Instead, the IDF was endeavouring to provide troops with rules of engagement that were appropriate to the area within which they were operating, for commanders acting on variable levels of information.

In the eventual structure, each brigade fielded an intelligence and strike cell consisting of officers from both specialisations working in tandem, along with support personnel. However, divisional headquarters oversaw much of the targeting and deconfliction. The process was refined until it followed the stages below:

1. Intelligence-gathering and defining the location of the target.
2. Comparing the target with the evacuation map to determine whether the area was sufficiently clear of civilians.
3. Checking whether the target was close to any sensitive sites.
4. Checking whether any civilians could be seen or identified on target.
5. Considering the issuing of warnings.
6. Choosing the correct munitions for the desired effect.
7. Confirming the rules of engagement.
8. Decision.¹⁰¹

96. Author observation of the system, Israel, March 2024.

97. Siba Jackson, ‘Israel-Hamas War: IDF Drops Leaflets Warning Palestinians to Flee Parts of Southern Gaza’, *Sky News*, 16 November 2023.

98. CBS News, ‘Israel’s Military Publishes Map of Gaza “Evacuation Zones” for Palestinians as Airstrikes Resume in War with Hamas’, 1 December 2023.

99. The size and structure of the boxes, along with the methods by which each box was assessed, have been withheld from this paper because Hamas could use knowledge of these procedures to game the process.

100. Yaniv Kubovich, ‘Israel Created “Kill Zones” in Gaza. Anyone Who Crosses into Them is Shot’, *Haaretz*, 31 May 2024.

101. Process as briefed to the authors separately by divisional staff and the Military Advocate Generals Corps, Israel, March 2024.

In practice, when applied, this process produced a range of outcomes. Higher echelon decision-makers often lacked the sensors to have a high confidence assessment of civilian presence inside structures. Lower echelon decision-makers often perceived a greater direct threat to themselves or their personnel and had to decide within a compressed timeline. In some instances, where the incentives to strike between these echelons reinforced one another, errors were made. Where framing was not continuous – during dynamic strikes – assumptions could be made that led to tragic outcomes, as was the case with the strike on workers for the aid organisation World Central Kitchen in April 2024.¹⁰²

One area where it did prove highly effective to hold organic capabilities at lower echelon was tactical strike UAVs. It was discovered that units that had these systems as well as ATGMs could monitor more urban terrain and conduct precision strikes at tempo in support of tactical actions. The IDF benefits considerably from its fielding non-line of sight ATGMs in its units. The small size of the munitions used meant that they could be used with an expectation of precision. In some cases, one screening company with these tools was able to hold the ground that would otherwise require a battalion to manage.

Due to the limitations of synchronisation and airspace deconfliction measures, it proved impossible to fully track or communicate UAV use. IDF ground combat units therefore found a high degree of air defence fratricide to be unavoidable, and shot down a large number of their own UAVs.¹⁰³ Operations also highlighted that the technology and concepts of employment for UASs had outpaced the evolution of training, and IDF personnel had to learn on the job how to both tactically employ UAVs and defend against them. This was exacerbated by the disinvestment and retirement of many short-range air defence capabilities from the IDF arsenal and order of battle.

102. Nick Waters, ‘Strike That Killed World Central Kitchen Workers Bears Hallmarks of Israeli Precision Strike’, *Bellingcat*, 2 April 2024, <<https://www.bellingcat.com/news/2024/04/02/strike-that-killed-world-central-kitchen-workers-bears-hallmarks-of-israeli-precision-strike/>>, accessed 22 April 2024; IDF, ‘Conclusion of the Investigation into the Incident in Which 7 WCK Employees were Killed During a Humanitarian Operation in Gaza’, 5 April 2024, <<https://www.idf.il/en/mini-sites/hamas-israel-war-24/all-articles/conclusion-of-the-investigation-into-the-incident-in-which-7-wck-employees-were-killed-during-a-humanitarian-operation-in-gaza/>>, accessed 22 April 2024.

103. This was reported as a problem by interviewees at all echelons, from battalion to division. It is consistent with data from Ukraine and in exercises in the US. Exact numbers are withheld for reasons of operational security.

VI. Information Operations

Given the IDF's planning assumption that there would be a window during which international opinion would allow for the greatest freedom of action, the IDF has worked to try to extend the timeline. First, the IDF has slowly released information as investigations have progressed about events surrounding 7 October, to keep the atrocities committed and the justification for the war as part of the discourse. Packaging video from 7 October and showing it to journalists also extended the timeframe within which the context of 7 October framed reporting on subsequent developments.¹⁰⁴ Footage has continued to be released, focusing on emotive topics such as the treatment of women. This has also been used to keep the story of Israel's hostages at the forefront of the public discourse, since this is a justification for continuing operations.¹⁰⁵

Despite being forward leaning on much information release, however, information operations is an area where the IDF has underperformed during the conflict. First, there have been inconsistencies between Israel's military and political messaging that have undermined the communication of many of the control measures put in place by the IDF. Second, the IDF has repeatedly inflated expectations of what will be found – for example, by briefing that there was a Hamas C2 centre beneath Al-Shifa hospital and releasing graphics suggesting a digitised C2 hub – and then failing to reveal something that met expectations.¹⁰⁶ The IDF also undermined its own credibility by presenting a document showing the days of the week as a guard duty roster for hostages, owing to a shortage of Arabic speakers.¹⁰⁷

Beyond these tactical errors, it is notable that Israel has not been proactive in controlling the narrative surrounding the conflict. A good example of this is the reporting of casualty figures. Civilian casualties are to be expected in high numbers during any urban operation. In Gaza, journalists had come to rely on reporting from the Gaza Health Ministry for casualty figures. The Gaza Health Ministry has a track record of producing reasonably accurate aggregate counts of casualties in previous rounds of fighting, but during the current war, the level of damage to health infrastructure has caused the ministry to have to change

104. IDF Spokesperson's Unit, *Bearing Witness to October 7th Massacre*, 2023.

105. Lorenzo Tondo, 'Israeli Hostages' Families Release Footage of Female Soldiers Captured on 7 October', *The Guardian*, 23 May 2024.

106. IDF, 'Hamas HQ Hidden Under Gaza's Largest Hospital', *YouTube*, 27 October 2023, <<https://www.youtube.com/watch?v=6pTYHBZVgVQ>>, accessed 22 April 2024.

107. Vedika Bahl, 'IDF Found a Calendar in Arabic, not a Hamas "Names List" at Hospital', *France 24*, 17 November 2023, <<https://www.france24.com/en/tv-shows/truth-or-fake/20231116-idf-claims-to-find-list-of-hamas-names-but-it-s-the-days-of-the-week-in-arabic>>, accessed 22 April 2024.

its methodologies from a central reporting system to a scrape of social media and reports from families, rendering aggregate numbers more questionable.¹⁰⁸ The issue from an information operations point of view, however, is not the precision of the overall count. No one disputes that civilian casualties have been high. Because the Health Ministry does not distinguish between combatant and non-combatant casualties, its use by journalists drives a distorted discussion of the proportion of civilian and combatant casualties. Moreover, because the Health Ministry is controlled by Hamas, it can issue disinformation at critical moments. For example, the ministry was quoted by journalists as stating that 500 civilians had been killed at a hospital by an air strike,¹⁰⁹ with much subsequent confusion,¹¹⁰ when in reality a Palestinian rocket had harmed a smaller number of civilians at the site.¹¹¹ Israel has been quick to use the many inconsistencies in Health Ministry data to try to undermine its credibility.¹¹² These efforts have failed, however, because there is no alternative data source. The IDF has not endeavoured to release its own estimates, nor to proactively explain civilian casualties. Indeed, when the IDF releases assessments of combatant casualties,¹¹³ they tend to contrast these with the aggregate casualties reported by the Health Ministry, despite also arguing that this same source is inaccurate.

Another sustained issue has been the use of mobile phones and the internet by IDF personnel. This has caused problems, for example during prisoner detention. In some areas, the IDF detained a significant number of people. Given that Hamas fighters were wearing civilian clothes without distinguishing markers, and that there were civilians still in the areas being contested – some of whom participated in the fighting – distinguishing between combatants and non-combatants was challenging. This required individuals to be detained and processed. In view of the fact that Hamas has a long history of using IEDs to target Israeli soldiers, and noting the widespread practice by Islamic State of seeding suicide bombers into surrendering groups,¹¹⁴ the IDF took to requiring those being detained to strip.¹¹⁵ Several problems emerged.¹¹⁶ Detainees were

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108. Ben van der Merwe, 'Israel–Hamas War: Gaza's Morgue Network Has Effectively Collapsed – How are They Recording Their Dead?', *Sky News*, 4 April 2024.
 109. *Al-Jazeera*, 'World Reacts as Gaza Officials Say 500 Killed in Israeli Airstrike on Hospital', 17 October 2023.
 110. Isabel Debre, 'What is Gaza's Ministry of Health and How Does it Calculate the War's Death Toll?', *AP*, 6 November 2023.
 111. Evan Hill, Meg Kelly and Imogen Piper, 'A Barrage and a Midair Explosion, What Visual Evidence Shows About the Gaza Hospital Blast', *Washington Post*, 26 October 2023.
 112. Jake Horton, Shayan Sardarizadeh and Adam Durbin, 'Gaza War: Why is the UN Citing Lower Death Toll for Women and Children?', *BBC News*, 6 May 2024.
 113. Merlyn Thomas and Jake Horton, 'Six Months On, how Close is Israel to Eliminating Hamas?', *BBC Verify*, 6 April 2024.
 114. Martin Chulov, 'No Regrets, no Remorse: Isis Mastermind Who Sent Out 15 Suicide Bombers', *The Guardian*, 31 August 2023.
 115. Peter Beaumont, 'Footage Shows IDF Parading Scores of Palestinian Men Around in Underwear', *The Guardian*, 8 December 2023.
 116. Paul Adams, 'Video Shows Stripped Palestinian Men Detained in Gaza', *BBC News*, 8 December 2023.

not allowed to dress immediately after being verified as unarmed. They were also filmed while being processed. The fact that large numbers of troops have cameras on the modern battlefield, combined with a growing cultural tendency to film a wide variety of events, means that the filming of detainees has become quite common. Where reservists or recently mobilised civilians are in the battlespace, this is even more widespread. Indeed, poor discipline by some IDF personnel has done significant harm after being filmed and released publicly. Nevertheless, there are two lessons to be drawn. First, the uncontrolled use of mobile phones to film and release information can be highly damaging. Second, while UK and other NATO doctrine for dealing with captured persons exists,¹¹⁷ it is not clear that the procedures are well rehearsed when required at scale. The processes for managing an unanticipated large number of captured persons also bring with them significant disinformation risks.

It must be noted that there are peculiarities to this conflict that make it an especially difficult context within which to conduct effective information operations. Globally, there is an animated audience in favour of both parties, and consequently, the actors directly involved have less agency in crafting perceptions.¹¹⁸ Instead, information is liable to be interpreted in the least favourable light by supporters of each side, and these individuals then amplify the worst interpretation available to their own communities. Within Israel, there is a prevailing sense that the battle is not worth contesting and that the vehemence of Western policymakers in directing Israel to pursue or refrain from particular courses of action is largely driven by the level of domestic political pressure they feel, rather than by any sustained conviction as to how the situation might be improved. This despondency does not help shape the environment.

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117. Ministry of Defence Development, Concepts and Doctrine Centre, 'Joint Doctrine Publication 1-10: Captured Persons', Fourth edition, September 2020, <https://assets.publishing.service.gov.uk/media/5f71e2c9e90e0747bfb9c3a/doctrine_uk_captured_persons_jdp_1_10.pdf>, accessed 25 May 2024.
 118. Nick Reynolds, 'Performing Information Manoeuvre Through Persistent Engagement', *RUSI Occasional Papers* (June 2020), pp. 13–18.

VII. Humanitarian Support Operations

Prior to the conflict, Gaza's habitability was already weak. Gaza urbanised rapidly during the 20th and early 21st centuries, and its population growth outstripped the resource-constrained municipality's ability to provide essential services for residents. Urban planning has been poor, and the infrastructure supplying potable water and power has lacked either resilience or redundancy. This was exacerbated by Hamas's use of construction materials for military purposes,¹¹⁹ which led the IDF to sustain the blockade of the Gaza Strip and limit access to dual-use materials.¹²⁰ The IDF did have extensive surveillance and databasing of information regarding the civilian population, but given the lack of physical presence in the Gaza Strip in the years leading up to 2023, and the fact that these capabilities were security oriented and had not been intended or optimised for humanitarian work, these needed to be supplemented with dedicated humanitarian mechanisms that could operate multilaterally and integrate different NGOs, international agencies and Israeli government entities.

Given the size of the population and the disruption caused by the conflict,¹²¹ a large volume of supplies soon became necessary. This need was exacerbated by damage to Gaza's infrastructure, with bottled drinking water needing to be brought in. Initially, flows into Gaza were disrupted by Israel's desire to isolate it and the declaration of a total siege. At the political level, the siege became a point of discussion relating to leverage over the release of hostages,¹²² with Hamas threatening to execute hostages in response to strikes.¹²³ This initial measure, taken in the aftermath of 7 October, was counterproductive and was

119. Eado Hecht, 'Gaza: How Hamas Tunnel Network Grew', *BBC News*, 22 July 2014.

120. Attila Somfalvi, 'Cabinet: All Non-Military Items can Enter Gaza Freely', *YNet News*, 20 June 2010, <<https://www.ynetnews.com/articles/0,7340,L-3907978,00.html>>, accessed 25 May 2024; UN Office for the Coordination of Humanitarian Affairs Occupied Palestinian Territory, 'Gaza Strip: The Humanitarian Impact of 15 Years of the Blockade', June 2022, <https://www.unicef.org/mena/media/18041/file/Factsheet_Gaza_Blockade_2022.pdf>, accessed 25 May 2024.

121. World Bank, 'Joint World Bank, UN Report Assesses Damage to Gaza's Infrastructure', 2 April 2024, <<https://www.worldbank.org/en/news/press-release/2024/04/02/joint-world-bank-un-report-assesses-damage-to-gaza-s-infrastructure>>, accessed 25 May 2024.

122. Emanuel Fabian, 'Defense Minister Announces "Complete Siege" of Gaza: No Power, Food or Fuel', *Times of Israel*, 9 October 2023, <https://www.timesofisrael.com/liveblog_entry/defense-minister-announces-complete-siege-of-gaza-no-power-food-or-fuel/>, accessed 4 June 2024.

123. Oliver Holmes and Ruth Michaelson, 'Israel Declares Siege of Gaza as Hamas Threatens to Start Killing Hostages', *The Guardian*, 9 October 2023.

quickly reversed under international pressure. However, once aid was allowed into Gaza in principle, ensuring a sufficient volume could enter Gaza remained challenging.

Once IDF forces began to operate inside Gaza, the main constraint on flows of humanitarian aid became the inspection of shipments to prevent Hamas rearming. The rate at which aid entered was around 70 trucks per day during the early phases of the operation,¹²⁴ a number clearly inadequate to support the population. It then rose to 140 trucks per day early in 2024¹²⁵ and at the time of writing was between 300 and 400 trucks per day.¹²⁶ These remain lower in number than aid flows prior to the conflict.

The most contentious part of the inflow of trucks was who to trust to search for incoming military materiel destined for Hamas. Given that Hamas moved large quantities of weaponry into Gaza prior to the war, Israel is wary of those who have previously managed crossings and inspections. This mistrust arguably led to relatively poor coordination with organisations endeavouring to move materiel into Gaza. Aid agencies, for example, reported uncertainty as to what constituted dual-use items that would be prevented from moving.¹²⁷

There are many ways in which the process for getting aid into Gaza could be improved. Most of these are highly context specific, however. For the purposes of this paper, the area of friction in humanitarian operations that has the broadest relevance is the distribution of aid. This has been complicated by the close proximity of Hamas positions to civilian objects, which means that almost any part of Gaza is necessarily adjacent to sites from which attacks could emanate. Thus, separating areas of military operation from areas for humanitarian operations has proven complicated.

Furthermore, simply allowing humanitarian aid to flow into Gaza has also presented challenges. First, where the need has been greatest, desperation has driven violence around aid distribution centres, such that protection for humanitarian workers has been advisable.¹²⁸ Even where more orderly processes

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124. Jacob Magid, 'Only 69 Aid Trucks Entered Gaza Thursday, UN Says', *Times of Israel*, 8 December 2023, <https://www.timesofisrael.com/liveblog_entry/only-69-aid-trucks-entered-gaza-thursday-un-says/>, accessed 25 May 2024.
125. *Jerusalem Post*, 'More Humanitarian Aid Trucks Entering Gaza Since Start of War – Report', 6 March 2024, <<https://www.jpost.com/israel-hamas-war/article-790422>>, accessed 25 May 2024.
126. *Al-Jazeera*, 'More than 300 Aid Trucks Enter Gaza as Palestinians Battle Starvation', 8 April 2024, <<https://www.aljazeera.com/news/2024/4/8/more-than-300-aid-trucks-enter-gaza-as-palestinians-battle-starvation>>, accessed 25 May 2024; Jemma Crew and Tom Spender, 'Is Israel Meeting Promise to Let More Aid into Gaza?', *BBC News*, 12 April 2024.
127. Author interviews with diplomats working on humanitarian supply, various locations outside Israel, March 2024.
128. Bethan McKernan, 'Civil Order "Starting to Break Down" in Gaza as People Raid UN Warehouses', *The Guardian*, 29 October 2023.

emerged, this did not mean all was well. The theft of supplies by Hamas to sustain their own forces is clearly an issue of interest to the IDF.¹²⁹ Separately, control over food is a vector for exerting control over the population. Since one of Israel's goals in the war is to supplant Hamas's control over the population, it goes directly against Israeli war aims to allow Hamas to exert control over aid distribution. Further complications have arisen in Israel with aid being attacked by Israeli citizens in protest.¹³⁰ It is notable that the IDF has been less active in preventing this kind of disruption to supply. The point here is that while it might be desirable to leave humanitarian activity to humanitarians and thereby impose some separation between the IDF and the civilian population, in practice, the IDF has had to be heavily involved in the protection and distribution of aid in Gaza. Even where humanitarians were leading at the point of delivery, their movements had to be deconflicted from IDF manoeuvre and fires plans. Another complicating factor was the requirement for the IDF to use military engineering to restore some services.

An enduring challenge for the IDF was that distribution of aid could be taken over by Hamas and used to maintain control over the local population, thereby preventing the implementation of one of Israel's war aims. However, if the IDF took over distribution, the distribution point would also become a target for attack, to which the IDF would respond, risking the lives of civilians in the ensuing crossfire. There was also the risk that desperate people would end up in confrontations with soldiers who would use force in self-defence.¹³¹

Another element of the humanitarian situation has been the impact on health infrastructure and its coordination. First, the IDF at several points during large troop movements cut access to the internet and phone network in Gaza to limit Hamas's ability to report on its movements. This made military sense. It also collapsed the coordination of medical services during these periods.¹³² The IDF therefore came under significant international pressure to restore these services.¹³³ The impact on health infrastructure of the fighting in Gaza has been devastating and will be long lasting.¹³⁴ The IDF took care not to fire directly on functioning hospital buildings, which have protected status. However, as hospitals became isolated, they also ceased to function. Thereafter, Hamas occupied and operated

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- 129. Daphne Psaledakis and Simon Lewis, 'US Calls out Israel and Hamas After Gaza Aid Shipment Attacked, Diverted', *Reuters*, 2 May 2024.
 - 130. Malu Corsino, 'Israeli Protesters Block Aid Trucks Destined for Gaza', *BBC News*, 14 May 2024.
 - 131. Nidal Al-Mughrabi, 'More than 100 Killed While Seeking Aid in Gaza, Overall Death Toll Passes 30,000', *Reuters*, 29 February 2024.
 - 132. *Sky News*, "We Can't Even Check on our Families": Inside Gaza After Phone and Internet Lines Cut', 28 October 2023.
 - 133. *Washington Post*, 'Israel Restored Gaza's Internet Under U.S. Pressure, Official Says; Netanyahu Warns of Long War', 30 October 2023.
 - 134. Si Horne, 'Red Lines and Red Crosses', *RUSI Commentary*, 14 November 2023.

from some hospital sites, such as Al-Shifa. At this point the hospital lost its protected status and ground operations in and around the area destroyed it.¹³⁵ This is to some extent analogous to the international coalition bombing the hospital building in Mosul because it had ceased functioning as a medical facility and was being held by Islamic State fighters.¹³⁶ While such actions may be legal, the long-term consequences of the destruction of a healthcare facility are severe. Moreover, alternative provision of medical care was not readily available, even as supplies of medicine necessary to keep the facilities running were disrupted.

It is reasonable to conclude that the IDF have made attempts to address the humanitarian issues, while continuing to pursue their military objectives. But none of the measures taken have been successful in preventing significant harm to the civilian population. Conditions in Gaza for civilians remain very poor as regards sanitation, the ability to move beyond areas of active fighting, and access to food and healthcare.¹³⁷ The lesson here for militaries observing the conflict is cautionary. Many of the demands placed on the IDF by humanitarian organisations are incompatible with achieving the military tasks which they have been assigned. These conflicting imperatives remain messy and complex and have in the long run proven very damaging to the IDF politically. Learning from and improving methods for the provision of humanitarian assistance in urban warfare, where fighting will remain close to sensitive sites, is a challenge worthy of further consideration by the British Army and other militaries.

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135. Yolande Knell and Sean Seddon, 'Gaza's Al-Shifa Hospital in Ruins After Two-Week Israeli Raid', *BBC News*, 1 April 2024.
 136. Spencer Ackerman, 'US Launches Airstrike on Mosul Hospital used by Isis, Military Says', *The Guardian*, 7 December 2016.
 137. *Reuters*, 'Details of the Humanitarian Crisis in Gaza', 4 June 2024.

Conclusions

Many of the lessons identified by the IDF from the conflict in Gaza have direct relevance to other militaries. Nevertheless, there are observations that have specific salience for the British Army from the conflict that are not as significant for the IDF. It must also be acknowledged that there are particularities of the fighting in Gaza that are context specific. In parallel to their internal lessons learned process, the IDF has also had to establish an unlearning process to avoid tactical adaptations in Gaza being carried to the northern border with Lebanon, where some would be dangerous. One distinct characteristic of the fighting in Gaza is that Hamas – unlike Hezbollah – has no effective artillery. This has given the IDF rear-area security for their enablers and has also meant that units have been able to concentrate in a way that troops in other theatres, such as Ukraine, have found perilous. For the British Army, which must be ready to fight Russia to effectively contribute to NATO's deterrence posture, capabilities must be aimed at maximising the ability to concentrate effects without concentrating forces. To this end, the levels of dispersion of Israeli mixed UAV and ATGM armed companies may be highly instructive as to the force density required to effectively screen urban terrain. But the levels of dispersion of Israeli infantry are less indicative of what would be viable in a conflict with Russia.

Another fundamental difference between IDF operations in Gaza and most other theatres – including Israel's northern border with Lebanon – is the IDF's total dominance in the electromagnetic spectrum (EMS). On the northern border, where Hezbollah has been using one-way attack UAVs and other capabilities to strike Israeli positions,¹³⁸ the need for electronic protection has produced such a cluttered EMS that the IDF has had to revert to printed maps, rather than depend entirely on digital map interfaces.¹³⁹ For the British Army, given the extent of Russian electronic warfare, the battlespace management challenges that have emerged on Israel's northern border are potentially more instructive than how centralised C2 has been conducted in Gaza. Unit boundaries and control measures remain relevant, but the blue force tracking possible in Gaza cannot be ensured in a highly contested EMS.

A further consideration is the scale of the enemy force. Hamas predominantly operated in small groups of two to five personnel, with five or so groups often attacking within the same area. Hamas rarely concentrated above platoon strength. Although its 40,000 fighters make a sizeable force, the scale of its

138. Author interviews with divisional staff under Northern Command, and a battalion commander on the northern border, Israel, March 2024.

139. *Ibid.*

operations after 7 October was extremely limited. For the British Army, it is in some respects more useful to consider itself in Hamas's position: defending urban areas with a coastline to the rear against a numerically superior enemy operating at divisional scale. It is the ability to effectively blunt Russian forces that is at the heart of the Land Operating Concept and thus the British Army's contribution to NATO's deterrence posture.¹⁴⁰ Viewed from this perspective, some distinct lessons come into stark relief.

The foremost observation of relevance to the British Army is the decisive role played by firepower in determining initiative during the fighting in Gaza. Ultimately, the superiority in responsiveness and organic lethality of IDF units made it costly for Hamas to mount attacks, and the larger the force it endeavoured to bring to bear, the higher the cost of any given action. Furthermore, while indirect fire prevented Hamas from concentrating its forces, the limited organic lethality of its teams meant that once they engaged IDF troops, they were quickly suppressed and thereafter destroyed. In many wargames, the British Army currently avoids confronting its diminishing tactical lethality by drawing on fires or capabilities held at the highest echelon represented in the scenario. In a war, however, these echelons would have other lines of effort to support, and these fires cannot be allocated to multiple targets. The lesson is clear. Firepower at the tactical level matters a great deal. The risk for the British Army is that the Land Operating Concept's conclusions are not funded, so that while British troops may be trained to fight like the IDF, they find themselves equipped to die like Hamas. Increasing the British Army's organic lethality at echelon should therefore be a high priority.

A second important lesson for the British Army is the criticality of air defence to maintaining a position in an urban space. Hamas's lack of ability to threaten Israeli aircraft and ISR meant that it was unable to concentrate and lacked freedom of manoeuvre. Once its defensive strong points were identified, they could be reduced. The weight of munitions deliverable from the air outweighs anything deliverable from artillery systems, such that many of the defensive advantages of urban terrain can be bypassed if it is possible to conduct precision bombing from medium altitude. The ability to operate from an urban environment, therefore, requires air defences, whether ground based or delivered through offensive and defensive counter-air patrols. In a major conflict, the density of enemy air defences means that the availability of counter air patrols may be extremely constrained. Thus, it seems clear that for the British Army to fight competitively on the ground, it must be able to hold enemy fast air at risk when flying at medium altitude. This lesson also reflects experiences in Mosul, Raqqa and throughout Ukraine. In Mosul, the ability of coalition fast air to enable Iraqi

140. British Army Land Operating Concept, 2023. Not publicly available.

units to level defended positions fixed Islamic State to defend where they could not be detected. In Ukraine, whenever the Russian air force has established access at medium altitude near an urban settlement, it has rapidly destroyed it, enabling subsequent capture.

A third lesson is that the relationship between offence and defence in the urban environment is micro-tactical. If the enemy can get around a flank, dislodging it requires attack into urban spaces, accompanied by its associated complications. For this reason, slowing the pace of enemy manoeuvre through urban terrain is critical to enable repositioning and preventing the defence from becoming unhinged. The most effective tool for this purpose is counter-mobility support. This is critically lacking in the British Army and is necessary.

The freedom a force gains from air defence and counter-ISTAR allows it to manoeuvre in the urban environment, and manoeuvre is critical to urban operations. The force density required to hold a specific piece of urban terrain means that most armies will need to choose which parts of a city they contest at any given time. Furthermore, not all urban terrain is equal. The significance of Wadi Gaza and other movement corridors that, once controlled, limited Hamas's ability to resupply or redeploy was disproportionate. Control of the rural-urban interface is necessary to sustain a force within an urban stronghold. Sensitive sites such as hospitals also have a significant shaping effect on the tempo and scope of urban manoeuvre. A city should not be examined as a homogeneous environment. It is critical that terrain assessments identify seams and vulnerabilities in a defence that can be exploited to move without having to directly confront prepared enemies in defensive positions. Careful planning can turn an urban space against the defender. To enable manoeuvre in ways that are not canalised by urban planning, there is a need for a high density of engineers. This spans mobility support, breaching, explosive ordnance search and clearance, and engineering reconnaissance. It must also be supported by a critical mass of relevant engineering platforms. The notion that a force can do without these enablers is a non-starter.

The British Army must consider how it conducts battlespace management in urban environments. Deconfliction of boundaries in urban spaces requires different tactics, techniques and procedures to fire control outside the urban environment, because an enemy will often be placed between friendly units, and reduced ranges mean that fire may carry through into friendly units. There is therefore an increased likelihood of friendly fire and combat accidents. Training that disproportionately focuses on small arms rather than heavy weapons can exacerbate this problem. If troops do not have an intuitive appreciation for how backblast, for example, is redirected in urban spaces, they

will suffer combat accidents.¹⁴¹ Procedures for blue force tracking must account for the transition from mounted to dismounted patrols and must be pushed across unit boundaries.

The application of fire in urban terrain results in different echelons having overlapping responsibilities, because the distances between echelons is compressed. High-payoff targets are therefore hunted in the same battlespace that tactical ISR and strike assets endeavour to find and strike dynamic targets. This leads to different rules of engagement – divided by target – in the same area of responsibility. Given the scaling of targeting that takes place in a major conflict, there is a significant risk that errors will be introduced if targets shift between targeting processes. The ability to explain how the force applies fire is important to ensure compliance with IHL, but also to set expectation among civilians in the environment about risk, and to shape the information environment.

There are more lessons to be learned from the Gaza conflict, but at this juncture, it is necessary to allow more time to elapse for the relevant details to be releasable and therefore available for analysis. This paper is, therefore, a starting point for the analysis, rather than a conclusion.

141. Indeed, the authors observed British troops on exercise making the same mistakes as IDF personnel with heavier calibre weapons such that, had they been using live rounds, they would have suffered injuries from backblast and other effects. Author observations, Project Convergence, US, March 2024.

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