

Terrain/Area Denial

What is on the horizon

by Capts James J. McGeady & Zack A. Pinkerton

On 31 January, the Secretary of Defense signed a policy ending Presidential Policy Directive 37 (PPD 37), stating:

In light of the current and emerging strategic environment, and the critical warfighting capabilities that area denial systems can provide, the President has decided to cancel PPD-37.¹

The impact of this policy cannot be overstated. The new policy authorizes combatant commander's to employ non-persistent (i.e., self-destructing or self-deactivating) Lethal Area Denial Systems (LADS), such as anti-personnel landmines, in support of terrain shaping operations.² Our subordinate operating concept, expeditionary advanced base operations (EABO), identifies that the future Marine Corps must be able to support and fight as part of the Naval force. The concept of EABO proposes small, distributed forces defending against numerically superior forces by augmenting Marines with autonomous systems, advanced sensors, and long-range weapons to create a dilemma for our adversaries. However, because of self-imposed restrictions, the Fleet Marine Force (FMF) faces a critical gap in area denial capabilities, as the future force would be hard-pressed to either defend itself or shape enemy actions without using landmines. Historically, landmines have proven to be the most effective obstacles against conventional militaries, specifically wheeled and tracked assets.³ The Marine Corps has successfully used mine warfare to shape the terrain for the last 100 years and now must field an area-denial weapons system to support EABO.

Historical Use of Landmines

Commanders at every level use obstacles tied into the natural terrain

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The current SAVO is a hand-emplaced, a scatterable munition system. (Photo by author.)

and integrated with fires to shape the battlefield. As far back as the American Revolutionary War, countries have used explosives, specifically mines, to deny or deter enemy actions along avenues of approach, friendly flanks, and key terrain in support of their scheme of maneuver. However, beginning in 1997, signatories to the United Nations' "Ottawa Treaty" began limiting the use, stockpiling, production, and transfer of anti-personnel

landmines.⁴ The signatories include 130 countries and 164 parties across the world; however, the United States, Russia, China, North Korea, and Iran have yet to adopt this treaty. Though not signed by the United States, the treaty influenced the selection of terrain/area-denial obstacles U.S. forces could utilize in the defense. With the exception of the Korean Peninsula, the United States stopped integrating anti-

personnel landmines into obstacle plans. Over time, multiple presidential policies have prohibited the use of all persistent (i.e., non-self-destructing) landmines and all anti-personnel landmines (persistent and non-persistent). The recent, yet extended, focus on counterinsurgency operations in the global war on terror resulted in a reduced need for such assets.

Today's Countermobility Shortfalls

Combat engineers help shape the battlespace and improve the commander's ability to defend their forces and control key terrain. Explosive and non-explosive obstacles incorporated with existing terrain maximize the effects of fires. Constructed obstacles consist of wire, log hurdles and cribs, hedgehogs, tetrahedrons, and anti-tank ditches and berms. These obstacles, though effective when tied into terrain, require significant personnel and equipment hours in order to achieve the desired effects of fix, turn, block, and disrupt enemy forces. As seen during MAGTF Warfighting Exercise 1-20 (MWX 1-20), building the obstacles required to stop an enemy force is an intensive process. During this exercise, 2dMarDiv defended key terrain in the western corridor of Marine Corps Air-Ground Combat Center Twentynine Palms. The 2d Marine Regiment held the Delta-T and Noble Pass training areas while the 3d Marine Regiment defended Morgan's Well, Rother's Crossing, Gays Pass, and Argos Pass.

Marines from 2d Combat Engineer Battalion, 8th Engineer Support Battalion, and Marine Wing Support Squadron 271 massed engineer efforts within 96 hours to construct obstacles needed to block a peer competitor from moving through the five major passes. Employing bulldozers and backhoes, the units worked 24 hours a day, stopping only to conduct preventative maintenance checks or to move to the next engagement area. The obstacles consisted of anti-tank ditches, berms, log cribs, log hurdles, and wire; in accordance with policy guidelines, no landmines were employed. However, to meet the intent of an obstacle belt within the given timeframe, the combat



Combat engineers help shape the battlespace. (Photo by author.)

engineers integrated two phony minefields with the non-explosive obstacles. This decision saved time in addition to creating a more complex obstacle. The combination of explosive and non-explosive obstacles forced the enemy to expend additional breaching assets. The complexity of the obstacles made the engagement area impenetrable by the opposing force and hastened their destruction through integrated fires.

To defend against ground forces, the FMF landmine inventory consists of munitions from the family of scatterable mines. The M777 Howitzer is the only system available to the FMF that delivers anti-vehicle family of scatterable mine mines; no anti-personnel mines are available. Against a peer adversary, concealment and signature management of indirect fire assets will be vital to survive within the enemy's weapon engagement zone. It is unlikely a commander would choose to expose their positions to deliver a family of scatterable mines minefield that only provides a 48-hour obstacle—the maximum time before the obstacle self-destructs.

Countermobility of Tomorrow

The *National Defense Strategy* of 2018 directs the DOD to refocus and prioritize its efforts in the Indo-Pacific Command's area of operations. The shift to the Pacific requires that the

FMF rapidly move from the concepts outlined in EABO to execution. EABO describes a Navy-Marine Corps Team that counters adversary sea denial forces, overcomes disadvantages in capacity and/or weapons ranges, and maintains a persistent, yet mobile, forward presence to deter aggression in the contested littorals.⁵ The capability to quickly emplace obstacles and deny enemy access to key terrain across the Pacific is critical in order for the Navy and Marine Corps to win in the future fight.

Joint Publication 3-15 states:

Employment of barriers, obstacles, and mine warfare can, in concert with other capabilities, enhance a commander's ability to mass combat power, sustain the force, conduct offensive or defensive operations, achieve surprise, and use key terrain, airfields, or sea routes.⁶

Tomorrow's FMF requires a lethal area-denial capability for all ground units to be an effective contact and blunt layer force. These capabilities enable the FMF to avoid constructing large obstacle groups within their assigned areas while also providing local commanders more flexibility to repel ground forces.

The operations conducted in MWX 1-20 serve as proof of the time and logistics required to support the establishment of a complex defense. We must retain and sustain this capability within the Marine Corps in order to deter large

formations in the attack. However, a modular and scalable capability within the FMF for area denial will ensure combat engineers can quickly shape the battlespace to the maneuver commander's advantage. A modular capability transported by a single Marine is more sustainable than transporting heavy equipment across islands that may not have an extensive road network to support movement.

One of the most efficient capabilities to deny access is the explosive obstacle. During Operations IRAQI FREEDOM and ENDURING FREEDOM, the IED took a deadly toll on allied forces and effectively slowed the movement and maneuver of forces. The enemy's low-budget version of the modern landmine proved to be the deadliest weapon on the battlefield despite the United States' superior military technology. If the Navy and Marine Corps are seeking ways to economically deny aggressors from accessing islands and closing sea lines of communication, they must invest in systems that enable Marines to emplace non-persistent mines.

Risks of Landmine Warfare

The inherent risks associated with mine warfare to both friendly forces and civilians is well known. The greatest risk comes from persistent mines: once activated, their ability to maim or kill does not go away—even long after a conflict ends. From World War I to present day, advancements in mine emplacement, lethality, triggers, anti-handling devices, and non-metallic materials greatly increased their effectiveness.⁷ It is clear why some would be reticent to produce, maintain, stockpile, and employ these weapons systems. However, the same technological advances which have made these weapons more capable may also reduce risk.

Current and developmental technologies allow LADS to be emplaced in a dormant state but ready to go at the press of a button. Furthermore, these assets are reusable for follow-on missions.⁸ The on-and-off option reduces the risk of LADS-related fratricide, civilian casualties, and infrastructure damage, all while still enabling greater control of mobility corridors. Proper

training and education can serve to further reduce the associated risks basic and advanced courses at the Marine Corps Engineer School can train students to plan for and employ LADS. The Decisive Action Defense instruction block currently taught at the Army's Engineer Captain's Career Course is a good example for future training. This course instructs students on planning LADS employment across a wide spectrum of scenarios, enabling them to accurately shape the deep, mid, and close fight.⁹

A Path Forward

Conditions are set for the FMF to acquire LADS assets now. The Marine Corps' bid for success is to partner with Army engineers and invest in and procure short- and long-term LADS solutions. In April 2017, the Army recognized a significant gap in their own terrain shaping operations capabilities. In response, they drafted a Joint-Service Operational Requirement (JSOR) to develop LADS to supplement their current Volcano system, designated as the standoff activated volcano obstacle (SAVO).¹⁰

As of April 2019, the Army completed a two-year focused assessment on the SAVO. The assessment included fielding SAVO equipment to soldiers

in both the United States and United Kingdom. The results were overwhelmingly positive.¹¹ The current SAVO is a hand-emplaced, scatterable munition system.¹² It will disperse non-persistent, anti-vehicle, landmines utilizing legacy Volcano canisters. Operators initiate the obstacle either via wired means, locally, or via wireless means up to six kilometers away. It has a life span of 6 months deactivated, and once activated is programmed for a self-destruct time of 4 hours, 48 hours, or 15 days.¹³ This provides commanders a surface-laid anti-vehicle obstacle capable of all doctrinal obstacle effects. Moreover, the new *DOD Landmine Policy* now enables the SAVO to utilize APLs, significantly increasing its area-denial capability against dismounted enemy. Investing with the Army in the SAVO program provides a LADS solution for the near fight.

However, SAVO is not the long-term solution. Requirements for a long-term LADS solution identified during the FMF East Coast Engineer Working Group, held in January 2020, describe the future of LADS.¹⁴

The future system must meet the following requirements:

- Compliant with current *DOD Land Mine Policy*.



If the Navy and the Marine Corps are seeking ways to economically deny aggressors from accessing islands and closing sea lines of communication, they must invest in systems that enable Marines to emplace non-persistent mines. (Photo by author.)

- Effective against both personnel and vehicles.
- Controlled and supervised by a man in the loop via portable electronic device: monitor status, battery life, location, and sense tampering.
- Utilize both top-attack and bottom-attack munitions.
- Function in multiple terrain types and operating environments.
- Be on/off capable with multiple self-destruct and command-destruct options.
- Recoverable and reusable for follow-on missions.
- Use common munitions, emplaced by hand and/or by unmanned vehicle delivery.
- Decrease unexploded ordinance and breaching resistance.
- Effective at area denial in the deep, mid, and close fight.
- Affordable to produce and easy to train.

In October 2019, Wayne A. Sinclair of the Center for Emerging Threats and Opportunities clairvoyantly described the current political environment and FMF demand for a LADS:

With corresponding changes in policy, future anti-infiltration mines that can be hand-emplaced and reliably networked for on/off activation would provide excellent long-term deterrence and protection of defensive positions or forward operating bases. Long duration (e.g., can be activated for up to 90 days), anti-vehicle and tethered, shallow-water mines would also add powerful capabilities to the terrain shaping toolkit of the MAGTF.¹⁵

With the aforementioned future requirements met, there is considerably less risk for a combatant commander to assume when approving the use of land mines. This equates to speed in the decision-making process, enabling initiative, and the ability to impose his will on the enemy.¹⁶ Furthermore, reinforcing an operation with LADS, whether offensive or defensive, allows a commander to shift combat power to another location to support a main effort while minimizing risk by not compromising security of the remaining forces.¹⁷



There is considerably less risk for a combatant commander to assume when approving the use of land mines. (Photo by author.)

In a statement before the House Armed Services Subcommittee regarding sea power and projection, an analyst from the Center for Strategic and Budgetary Assessments stated:

Despite the enormous combat power that a 21st-century MEU can bring to bear, the margin of military superiority that U.S. amphibious forces can expect to enjoy has eroded over the last several decades.¹⁸

The FMF and Navy will continue to be at a numerically superior disadvantage against a peer competitor. We cannot afford to be disadvantaged in regard to our ability to deny access to key terrain. If we procure and utilize terrain and area-denial mines to shape the battlespace, combat engineers will have the ability to explosively turn, block, fix, or disrupt enemy formations, and to deny the enemy access to key terrain.

The policy letter introduced in January 2020 provides the Marine Corps and Army the opportunity to partner and invest in both offensive and defensive non-persistent mining capabilities. Both are necessary in the future operating environment. MWX 1-20

was a great proof-of-concept for how MAGTF engineers can save time and resources by shaping terrain through the integration of explosive obstacles in their obstacle belts. Unfortunately, the future operating environment will not be in Twentynine Palms but will be dispersed across thousands of miles of islands in the littorals. In order for EABO to work, maneuver commanders must prioritize engineer efforts in time and space in order to effectively support their scheme of maneuver. The SAVO is the short-term LADS to fill our critical gap in area-denial and will enable combat engineers to maximize their capabilities in a time-compressed environment. Partnering with the Army on a current and future LADS will make the Navy and Marine Corps Team both more lethal and better prepared to face a numerically superior enemy on the battlefield.

Notes

1. Department of Defense, *DoD Policy on Landmines*, (Washington, DC: 2020).

2. Ibid.
3. William Schneck, *Landmines Versus Vehicles*, (Fort Belvoir, VA: Night Vision Electronic Sensor Directorate, July 2019).
4. United Nations, "The Convention on the Prohibition of the Use, Stockpiling, Production, and Transfer of APL Mines and on their Destruction" (Oslo, Norway: United Nations, September 1997).
5. Headquarters Marine Corps, *Littoral Operations in a Contested Environment*, (Washington, DC: 2017).
6. Joint Chiefs of Staff, *JP 3-15, Joint Doctrine for Barriers, Obstacles, and Mine Warfare*, (Washington, DC: September 2016).
7. Wayne A. Sinclair, "Deep Dive Report, Terrain Shaping Obstacles, Assessing a Capability," (Quantico VA: Commanding General, Marine Corps Warfighting Laboratory and Director, Futures Directorate, October 2019).
8. Lawrence M. Burns, "Standoff Activated Volcano Obstacle (SAVO), Focused Assessment (FA), Final Report," (Fort Leonard Wood, MO: US Army Maneuver Support Center of Excellence, Capabilities Development and Integration Directorate, Maneuver Support Battle Lab April 2019).
9. This finding is the author's assessment based on experience in formal instruction while attending Army Engineer Captain's Career Course. Engineer Captain's Career Course, Fort Leonard Wood, MO: U.S. Army Maneuver Support Center of Excellence (MSCoE), May through October 2019.
10. Department of the Army, Program Executive Office, Armaments and Ammunition, *Multiple Delivery Mine System (Volcano), Joint Service Operational Requirement (JSOR) DRAFT*, (Washington, DC: December 2017). At the time of drafting this reference the Army had not established a position on the revision to the Volcano JSOR, and it is not an authoritative source for the content herein. The author(s) utilized this as a source to provide content as to the aim the U.S. Army is taking in regard to the search for a supplemental LADS over the past few years.
11. "Standoff Activated Volcano Obstacle (SAVO), Focused Assessment (FA), Final Report."
12. "Deep Dive Report, Terrain Shaping Obstacles, Assessing a Capability."
13. *Multiple Delivery Mine System (Volcano), Joint Service Operational Requirement (JSOR) DRAFT*.
14. These requirements come from the 2020 January East Coast Engineer Working Group in which both authors were active members. Marines from II MEF came together for a week and discussed items of importance for the engineering community and their support of the FMF and future EABO writ large. A key takeaway was the need for a lethal area denial system in support of terrain shaping operations.
15. "Deep Dive Report, Terrain Shaping Obstacles, Assessing a Capability."
16. Headquarters Marine Corps, *MCDP 1, Warfighting* (with Change 1), (Washington, DC: April 2018).
17. Headquarters Marine Corps, *MCWP 3-34, Engineering Operations*, (Washington, DC: February 2000).
18. U.S. Congress, *Statement by Jesse Sloman before the House Armed Services Subcommittee*, (Washington, DC: May 2017).

