



DEVELOPING NATIONAL LANDMINE CLEARANCE CAPACITY IN Ukraine

By Tobias Hewitt and Ronan Shenhav [The HALO Trust]

The mine action sector in Ukraine has seen significant growth and progression since the outbreak of hostilities along the eastern border in 2014. Continued development of government capacity is required to respond to the scale of landmine and explosive remnants of war (ERW) contamination. The HALO Trust (HALO) has supported the Ukrainian authorities to address mine contamination since 2015, through survey and large-scale mine clearance, as well as by assisting state entities such as the State Emergency Services (SES) to strengthen humanitarian mine clearance practices and procedures. HALO's ongoing capacity-development efforts aim to enhance existing resources in order to establish a multifaceted, sustainable, and independent mine action sector capable of dealing with current and future challenges. This article explores the obstacles and opportunities in national capacity building in Ukraine, lessons from HALO's ongoing demining training, and key priorities for Ukraine to deal with operational challenges of mine clearance.

Since the outbreak of the conflict in 2014, eastern Ukraine has become severely contaminated with landmines and ERW, with the fifth highest annual mine/ERW casualty rate in the world.¹ Ukrainian authorities have responded with a range of efforts, building on previous experience in clearing ERW from World Wars I and II. However, humanitarian demining is relatively new in Ukraine, where national coordination efforts, clearance operations, and legislation are still being developed.

The HALO Trust (HALO) started operations in eastern Ukraine in 2015. The organization has grown into the largest humanitarian mine action (HMA) operator in Ukraine, employing 450 Ukrainian staff (350 men and 100 women). Although more surveying is needed to reveal the true scale of the contamination, non-technical survey (NTS) has so far identified over 300 hazardous areas (234 confirmed, 75 suspected hazardous areas) covering a surface area of twenty-six million sq m with a variety of explosive threats, including anti-personnel mines, anti-vehicle mines, other unexploded ordnance (UXO), and abandoned ordnance (AXO). To date, HALO's deminers have cleared over 7.5 million sq m of previously contaminated land across Donetsk and Luhansk regions, and work is ongoing.

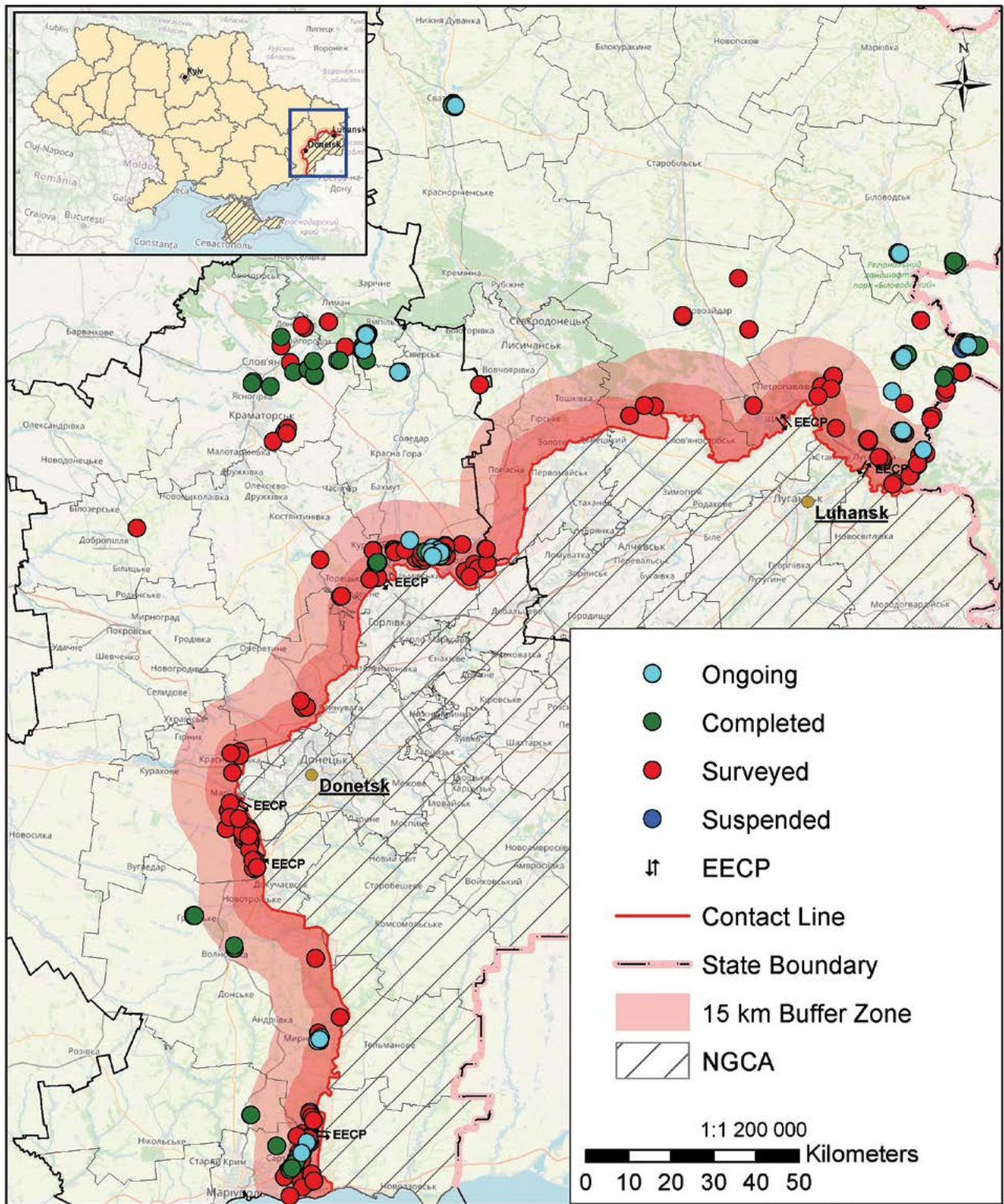
HALO supports the efforts of Ukrainian authorities to assume national ownership of mine action in line with the International Mine Action Standards (IMAS). Ongoing capacity-development efforts have focused on all aspects of the HMA process, including accreditation, survey, data management, clearance, explosive ordnance disposal

(EOD), explosive ordnance risk education (EORE), and quality control (QC). In addition to providing technical support to strengthen national coordinating bodies, HALO provides training courses to the authorities, building on HALO's globally tried and tested training model. Since early 2020, this has focused on support and the long-term mentorship of the SES, which is the Ukrainian government's main HMA entity.

Recent legislative developments have outlined an upcoming restructuring of the Ukrainian mine action sector. The Law 'On Mine Action in Ukraine' was adopted in December 2018 and came into force in January 2019. A subsequent amendment was passed in December 2020, which enabled the establishment of a national mine action authority (NMAA) and two national mine action centers (NMAC). These institutions are expected to become operational and take over responsibility of coordinating the response of national and international operators by the end of 2021. Since they will draw from the existing capacity present within the sector, it is crucial that current actors follow IMAS to ensure their continued success and sustainability.

This article outlines HALO's ongoing efforts to strengthen national mine action capacity in Ukraine, building on three decades of global expertise. Highlighting lessons learned from HALO's training and mentorship, the article explores challenges and opportunities in mine clearance capacity building, priorities to overcome obstacles in the field, and recommendations for future capacity-building efforts to enable Ukraine to rid itself of its explosive legacy of war.

Map of HALO areas surveyed in eastern Ukraine.
All figures courtesy of The HALO Trust.



The Ukrainian Mine Action Sector

The Legacy of the Second World War. At the time of publication (summer 2021), a functioning NMAA still needs to be established in Ukraine. However, Ukraine has a functional mine action sector with decades of experience in dealing with mines and ERW left behind by World Wars I and II. Between 1945 and 2000, an estimated three million items of ERW were removed from Ukrainian soil with military

engineers finishing clearance of most of the affected areas by the mid-1970s. Although the extent of the remaining residue is unknown, by the year 2000 the Ukrainian authorities estimated that approximately one million items of ERW remained, mostly spread across unpopulated areas in central and southern Ukraine.²

	1992–1998	2009	2012	2013	2014–2020
Explosive items destroyed	3,000 to 4,000/year	64,272	220,000	100,000	± 30,000/year
Area cleared	N/A	7.8 sq km	18.4 sq km	5.94 sq km	± 53 sq km/year

Table 1. Explosive items destroyed and area cleared by the SES (1992–2020)

A strong mine action response by the Ukrainian Armed Forces under the Ministry of Defence (MOD) and by the SES³ has emerged as a result of this deadly legacy. The National Police, Special Transport Service, and Border Guard Service also have EOD units to respond to explosive threats in their areas of operation in a more limited capacity. In 2001, the MOD set up a demining center aimed at training deminers at the Military Engineering Institute in Kamyanyts-Podilskyi in western Ukraine. The Demining Center has since become the main authority on national coordination and data-collection efforts to map explosive hazards. Since 2008, the center has also been the inspection authority for state operators conducting mine clearance.

The SES has a wide array of responsibilities for the protection of civilians, including emergency response, search and rescue, firefighting, industrial safety, administration of the Chernobyl exclusion zone, as well as EOD response. While the MOD is not currently engaged in humanitarian demining and only focuses on military demining in areas of military presence, the SES covers EOD response in all other areas of the country where mines and ERW affect civilian lives or infrastructure.⁴

Before the conflict began, the SES employed forty demining teams with a total of 490 personnel across the country. According to government data, the SES destroyed more than 220,000 items of ERW in 2012, including 2,143 aircraft bombs, and cleared 18.4 sq km of previously contaminated land.⁵ Between 2014 and 2020, the SES cleared a further 372.6 sq km and removed a total of 202,555 explosive items.⁶

National Mine Action Authority. The Ukrainian government has made several efforts to coordinate and regulate the national mine action response, and has undertaken steps to set up an NMAA since 2006.⁷ However, this process was put on hold as the conflict created an unforeseen escalation in mine/ERW contamination between 2014 and 2015. A wider response was required to address a broad new set of challenges, including NTS of vast tracts of contaminated land along the length of a 467- km-long *contact line*, the provision of assistance to hundreds of civilian mine survivors, as well as the regulation and oversight of national and international clearance operators to ensure adherence to IMAS.

Several attempts were made to draft in the years following the conflict. The main purpose of this law was to operationalize the national mine action response system and significantly enhance mine victim assistance and regulation for mine action operators. However, the law did not come into effect until January 2019. A further amendment was subsequently required to overcome constitutional

obstacles, which was signed in December 2020. The latest amendment outlines the establishment of an NMAA (under the chairmanship of the MOD) as a regulatory body that oversees two NMACs:

1. The Mine Action Center under the Ministry of Defence (overseen by the military Demining Center in Kamyanyts-Podilskyi)
2. The Humanitarian Demining Center under the Ministry of Interior (overseen by the SES)

This development is a big step forward for the mine action sector and will further strengthen national efforts to regulate, coordinate, and prioritize survey and clearance operations. The NMAA will provide regulatory oversight for the two NMACs, who will be responsible for the accreditation of mine action operators, quality assurance (QA), and the adherence to international norms and standards. The two centers will be built on the basis of existing institutions and will draw from systems and knowledge already in place, which makes reinforcing the capacity of the SES and MOD of paramount importance.

National Mine Action Standards. The Ukrainian government has aimed to follow and implement IMAS ever since taking the first steps to regulate the mine action sector. As in other countries that are dealing with landmines, IMAS will need to be adapted to the local context and adjusted to the specific type of contamination through the development of national standards. With support of leading experts in the field of HMA—GICHD, UNDP, OSCE, DDG, FSD, and HALO⁸—the Ukrainian MOD developed a provisional set of national mine action standards (NMAAS) in late 2018. However, at the time of writing, NMAAS have not been formally adopted.⁹ Once an NMAA is established, national authorities and national mine action operators will presumably adopt the NMAAS and make them mandatory for all operators.



NTS training for SES.



Together with other international experts, HALO continues to provide recommendations to the authorities and participates in regular meetings to refine and adjust sections of the NMAS ahead of its full implementation.

Mine Action Capacity Development. Capacity development in mine action covers a litany of subjects and themes, including all vital aspects of the HMA process from initial survey to the final release of land. In order to develop the Ukrainian mine action sector in an efficient and sustainable manner, HALO has implemented several capacity-development projects, funded by the governments of the United States, United Kingdom, the Netherlands, and European Union. HALO's approach has focused on three main aspects:

1. Technical assistance to develop NMAS
2. Support for administrative oversight and QA/QC procedures within mine action
3. Operational capacity development for national mine action entities

Accreditation and Quality Management. An integral aspect of all mine clearance efforts is administrative oversight to ensure the quality of clearance methods and the safety of land released by operators. This is accomplished through the regulation of formal accreditation of national and international operators, and a set of QA/QC procedures by host states. In Ukraine, the MOD's Demining Center has overseen this process. This system of checks and balances requires a thorough understanding of all procedures necessary to make land safe. To this end, HALO has helped the MOD align its existing expertise with IMAS and showcasing the procedures used by international operators.

In 2017, HALO developed a syllabus for a four-week training course on quality management that was grounded in the principles of IMAS and covered all aspects of the HMA process. In cooperation with the Ukrainian Institute of Standardization, HALO also facilitated technical support for the Demining Center to become the licensing body for humanitarian demining operators. Following these trainings the

Demining Center was formally certified to conduct accreditation and QC of nongovernmental HMA operators in 2018.

Another major milestone was achieved in June 2019, when HALO became the first international mine action operator to successfully undergo external QA/QC inspection of cleared land by the MOD. The MOD's inspection process involved selective sampling of cleared areas in line with the process established in IMAS. This was followed by the first ever formal handover of cleared land by an international operator in Ukraine. As a result, nineteen sites with an area of 710,000 sq m were officially handed over to local authorities. This process is ongoing and has greatly enhanced mutual learning between national authorities and international mine action operators.

Non-Technical Survey and Information Management. As the core component of the government's HMA capacity in Ukraine, the SES teams respond to explosive devices found by local residents and conduct EOD spot tasks across eastern Ukraine to remove and destroy them. However, in order to strengthen an approach that goes beyond an EOD-only response, IMAS prescribes a process of humanitarian demining that includes NTS, technical survey, clearance, and QC. The foundation of any efficient clearance operation is therefore primarily reliant on the survey report indicating the specific threats, hazardous area parameters, and any other relevant considerations before clearance work can begin.

HALO uses a methodical approach to data collection that emphasizes due diligence and triangulates information from multiple sources. This information creates the starting point for (a) planning and prioritizing clearance tasks, (b) selecting appropriate clearance techniques, and (c) determining the size of the hazardous area. Survey information can also help outline what the intended humanitarian impact of clearance will be for the surrounding community, furthering the prioritization of clearance work. This data should furthermore feed into a national Information Management System for Mine

HALO deminer training.





Deminer training for SES.

Action (IMSMA), which needs to be regulated on a national level and overseen by the NMAA.

In order to support this process, in 2018 HALO held comprehensive courses on NTS and information management for twenty national IMSMA operators from across the country and two instructors from the SES training center. The training aimed to strengthen surveying capacity to ensure that SES teams are compatible with the IMSMA format and follow IMAS. As each operator oversees the data management system in their region, the objective was to improve understanding of how data is collected, processed, and utilized through survey on the ground. These trainings were continued into 2020, focusing on building the operational capacity of all aspects of the HMA process.

Deminer Training. The main focus of HALO's support to the SES has been strengthening mine clearance knowledge and practices. In 2020, closely mirroring the in-house training plan provided to all HALO demining staff, HALO implemented a five-week capacity development training program for fifty SES personnel from across the country at the SES Mariupol training center in southern Donetsk. The training generated understanding of—as well as showcased HALO's application of—systematic mine clearance in line with IMAS.

Although the majority of SES participants had extensive prior experience responding to EOD threats, the training focused on building knowledge and skills around the basic principles of systematic humanitarian demining. All instructors were seasoned, senior Ukrainian HALO operations staff who had started their HALO careers as deminers. The outbreak of the COVID-19 pandemic postponed the initial training schedule, but the training restarted in the second half of 2020, and was divided into three sessions to limit the number of participants attending at one time. Social distancing and enhanced hygiene measures were also put in place and strictly monitored by senior HALO staff.

HALO's Training Model. The demining training for the SES largely followed HALO's tried and tested model for new, locally-recruited deminers. In Ukraine, HALO employs 450 local staff (350 men and 100 women) from a wide variety of backgrounds, many of whom are from

mine-affected settlements in eastern Ukraine. They are not required to have a background in demining or EOD.

HALO's demining training consists of a one-week theory exercise, three-weeks of practical training, and a one-week examination process, which cover all areas of manual mine clearance (aside from ordnance disposal, which HALO only provides for more senior staff). The theoretical component focuses on explaining current clearance techniques, which include a significant emphasis on the terminology and background of minefield equipment, marking, and humanitarian mine-clearance methodologies. During these sessions, trainees learn how to recognize different mine types, how devices and their internal components function, and how to identify certain markings or distinct features. Theory also provides an opportunity for new recruits to have a better understanding of HALO's philosophy—the concept of humanitarian demining and the wider principles of mine action. For the SES, this component provided the added value of focusing on IMAS, signifying the need for a change in approach to demining and adoption of systematic mine-clearance methods.

The practical phase of the training was conducted on a training ground free from live explosives but that mimicked the look and conditions of a real minefield. Trainees learn the standard operating procedures (SOPs) of mine clearance, from proper equipment handling to specific types of clearance techniques to how to respond to a minefield accident. Due to the wide variety of threat types found in Ukraine,



SES deminer mentorship.

Activity Type	Week 1	Week 2	Week 3	Week 4	Week 5	Total
Area cleared with linear method (m ²)	22	408	476	456	190	1,552
Vegetation cutting with trimmer (m ²)	200	100	10	370	180	860
Explosive devices found (#)	0	5	6	5	5	21

Table 2. Explosive items found and area cleared by the SES on Hnutove minefield (November–December 2020).

trainees are taught multiple clearance techniques. Training also imitates minefield safety procedures including wearing personal protection equipment (PPE) and following a set working schedule. Unlike other HALO programs worldwide, deminer training in Ukraine places a large emphasis on tripwire clearance as this is one of the most common threat types found.

Like HALO’s internal deminer training, the SES training concluded with two modules: medical training and final examinations. While HALO conducts an additional paramedic training for selected candidates, and basic medical training is taught to all trainees and focuses on procedures for responding to a minefield accident, stabilizing a minefield casualty, and responding to minor non-demining injuries (e.g., heat stroke, snake bites, sprained ankle, etc.). Final examinations are a combination of written tests and appraisals of practical work conducted on the training ground. Senior staff examining the trainees evaluate how well a specific area is prepared, processed, and cleared of any metal signals or dummy items. The test also involves appropriate tool selection, PPE wearing, and SOP adherence (e.g., proper clearance depth for signal excavations). Written examinations cover all modules taught during the training, including explosive item recognition and hypothetical scenarios that test trainees’ responses and adherence to safety procedures.

Minefield Mentorship. A pivotal aspect of HALO’s ongoing capacity development is its commitment to SES teams following the completion of deminer training and to ensuring that SES teams receive on-site mentorship. This means a senior member of HALO’s

operational staff is present every working day to provide assistance and advice to those conducting clearance. HALO’s mentorship involves not only the practical (e.g., minefield clearance techniques) but also advice on strategic or logistical considerations for team deployment (i.e., location and accessibility of medical support). While the deminer training given by HALO personnel is thorough and wide-ranging, every minefield presents specific challenges and peculiarities. Through mentorship,

SES team leaders and supervisors can continue to grow within their respective roles.

To build on and sustain knowledge gained in their training, SES deminers were subsequently deployed to conduct clearance on a live minefield near the village of Hnutove, outside Mariupol in southern Donetsk region in November and December 2020. This was done under close supervision and mentorship from HALO, who worked alongside the SES personnel. HALO surveyed the area in 2017, and teams confirmed a threat of anti-vehicle mines and suspected a threat of ERW. Due to the presence of minimum-metal anti-vehicle mines, specifically the TM-62P3 variant, clearance required the use of the Minelab F3 metal detector with a UXO head attachment. Although more time consuming, use of this detector ensures that even the smallest minimum-metal signatures are found and properly excavated. To ensure the SES Mariupol detachment had the necessary tools, HALO provided four vehicles, PPE, and metal detectors purchased under an EU grant.

The participants included twenty-two staff, who were grouped in four teams of four deminers and one team leader, with a supervisor overseeing all teams. An additional SES paramedic was present on stand-by. Over the course of twenty-two working days, the four teams cleared a total of 1,552 sq ms (an average of 70 sq ms per day) during which they found a total of twenty-one items of ERW, including fifteen projectiles (23 mm and 30 mm), four rifle-projected grenades (VOG-17 and VOG-25), and two rocket-propelled grenades (PG-7S). The results of the training can be found in Table 2.

Capacity-Building Challenges and Opportunities

Training Outcomes. Although this was only the first of several planned practical deployments for the SES, some preliminary outcomes shed light on the impact of this exercise. The main lessons learned for the SES staff deployed were three-fold. Firstly, by experiencing HALO’s clearance methodology, participants improved their understanding of the difference between targeted and systematic humanitarian mine clearance. Secondly, an important outcome of the training was increased awareness of safety standards, specifically in HALO’s extensive safety procedures, casualty evacuation procedures, and methods to calculate and maintain appropriate safety distances between deminers. Thirdly, participants’ exposure to HALO’s clearance methods provided SES staff with examples of how to overcome obstacles and improve operational efficiency. One example is that

clearance methods such as the linear method require an additional level of teamwork with a three-person team working on rotation to improve efficiency. Participants were also taught about HALO’s methods to overcome harsh weather conditions such as using a salt-water solution to defrost frozen soil in the winter. Moreover, training covered aspects specifically aimed at supervisors and team leaders, such as ways to accurately track clearance progress on a map. This also shed light on efforts to reassess NTS data before clearance, establish the correct boundaries, and mark minefields appropriately. These aspects of the training focused not only on ensuring that all activities were conducted in line with best practice and IMAS, but also developed the necessary critical thinking to deal with obstacles and find creative solutions to problems that arise in the field.

Reactive Versus Systematic Clearance. HALO expects the teams that were trained and mentored to further disseminate knowledge of humanitarian demining in Ukraine as they move back to their respective areas of operations. However, a fundamental shift in clearance approaches is often the hardest obstacle for mine action capacity development. One of the main challenges remaining for the SES is to fully grasp the difference between targeted and systematic humanitarian mine clearance, where the priority is to ensure the welfare of deminers through the strict adherence to safety standards and SOPs while simultaneously ensuring that 100 percent of a given area is made free from mines and ERW. In this regard, systematic clearance differs greatly from the more targeted reactive approach that is the default method used by the SES across Ukraine as part of their EOD response. A reactionary approach to clearing individual items is not enough to ensure that the land is safe for civilians to return to their homes and everyday routines. A systematic and thorough approach, carried out

HALO-SES supervisor meeting



with a precise methodology and with several layers of QC, is required to be certain that no explosive hazards remain. Additional exposure to other aspects of the HMA process—including NTS, GIS and quality management—will support the paradigm shift towards systematic clearance in the future.

Looking Ahead

Sustainability. An inherent concern with any form of capacity building is a loss of knowledge due to staff rotation, and when trained people take knowledge and skills with them upon leaving. HALO’s next step is therefore to train up SES instructors who will be able to conduct their own deminer training for new SES personnel. Under an upcoming multi-year capacity-development project funded by the government of the Netherlands, HALO will provide long-term mentorship and guidance to these instructors. This will enable sustainable oversight to ensure that new deminers are taught to the highest standards when they join the SES or the new NMAC. The instructors will also hold annual refresher training for people who have already undergone training.

Beyond the plans outlined previously, in order to deal with the scale and nature of the mine contamination in Ukraine, future national mine clearance training will need to focus on a set of approaches that address all operational challenges in the country. SES demining teams will benefit from more exposure to different types of hazardous areas, which require a wide range of clearance methods, including battlefield area clearance, mechanical clearance, as well as more traditional methods to clear minimum-metal anti-vehicle mines and devices laid with tripwires.

For future training, HALO will continue to develop knowledge of these methods in future training courses and will constantly re-evaluate its techniques, equipment, and practices in order to ensure maximum operational efficiency. To date, HALO has introduced the use of remote-controlled vegetation cutters to speed up tripwire clearance, hand-held detectors with ground-penetrating

radar in combination with a “rapid excavation” technique to increase clearance rates for minimum-metal anti-vehicle mines, and innovations in NTS and information management. As clearance is always subject to change, deminer training for the SES should therefore not be considered a one-off exercise. New techniques can be taught as they evolve or when new equipment can be purchased in a cost-effective, sustainable manner. There will never be a silver bullet for mine clearance, but innovation and refinement of current methodologies will play a key role in ongoing development.

	Training Course	Participants	Date	Days
Completed	Non-Technical Survey	12	Feb 2020	6
	Medical/First Aid	10	Feb 2020	10
	GIS/Information Management	5	Mar 2020	5
	Explosive Ordnance Disposal	10	Mar 2020	12
	Demining (Group 1)	18	Jul–Aug 2020	34
	Demining (Group 2)	22	Aug–Sep 2020	34
	Demining (Group 3)	10	Oct–Nov 2020	34
	Minefield Deployment (Group 1)	22	Nov–Dec 2020	22
Planned	Minefield Deployment (Group 2)	22	March 2021	30+
	Quality Management	2	Spring 2021	3
	EORE Instructor Training	6	Spring 2021	5
	Demining Instructor Training	15	2021–2024	TBD
	Demining Refresher Training	50	2021–2024	TBD
	NTS Team Deployment	10	2021–2022	TBD

Table 3. Training courses for the SES completed and planned by HALO.

Lastly, capacity development efforts will need to be coordinated with other actors engaged in this activity. The syllabus provided to the SES will only be effective if all organizations have a common approach, standards, and principles. HALO continues to engage with other experts in the HMA field in Ukraine to ensure that a standardized training package is provided. This will not only allow for easier adjustment to HMA principles but also for a smoother shift toward the use of systematic mine clearance, safety standards, and operational efficiency.

In the long-term, increased experience with conducting humanitarian clearance that goes beyond reactive, targeted EOD spot tasks will lead to an increased national capacity that is capable of independently addressing challenges and obstacles in Ukraine. This will enable Ukraine to adapt existing procedures to IMAS as well as local specificities. Future training should not simply focus on implementing a set of rules that need to be strictly followed but on teaching the adaptability needed to apply these rules and find solutions to overcome future obstacles.

Future Training Objectives. HALO will continue to offer ongoing mentoring to SES deminers, as a new rotation of twenty-two SES personnel are scheduled to continue clearance in Hnutove in the fall of 2021. They will undergo similar exposure to HALO’s clearance methods as the previous group, and HALO will continue to oversee their work to ensure understanding and adherence to all standards and procedures. In addition to demining training, HALO plans to hold a number of additional training sessions for SES staff on quality management, EORE, and NTS.

The recently adopted legislation mandates a quality-management capacity for both NMACs. The new NMAC overseen by the SES (the Humanitarian Demining Center) will become responsible for accreditation, quality management, and operational coordination of HMA in the near future. HALO will therefore extend its support to the SES in this field through comprehensive quality-management training.

Handover of equipment to SES



Similarly, QA/QC training can be extended to cover using appropriate detector types, looking at site maps to determine exactly which methods were applied.

In the longer term, HALO aims to support the SES with the formation of an NTS team by providing a full training package covering all practical and theoretical aspects of survey to a small group of SES personnel with previous mine-clearance experience. The four-week course would focus on NTS procedures, mine and ammunition recognition, GIS, and data management. After the training is complete, HALO would then oversee the deployment and mentorship of the survey team. With HALO mentorship, several SES survey teams could lay the groundwork for future clearance activity. By creating and fostering a multifaceted, mine-clearance apparatus, the SES’s internal capacity would thereby become a self-sustaining entity to conduct systematic humanitarian mine clearance. ©

BIOGRAPHIES

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Tobias Hewitt is currently Location Manager for HALO Ukraine, responsible for overseeing mine-clearance operations in the southern Donetsk region. Hewitt has worked for HALO since 2016 with postings in Abkhazia, Cambodia, Karabakh, Nagorno, and Somaliland. He has a bachelor’s degree in film from the University of California, Santa Cruz, and a master’s degree in international development from the University of Edinburgh.

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Ronan Shenhav has worked as Programme Officer for HALO Ukraine since 2019. He is responsible for overseeing monitoring, project development, donor reporting, and liaison. Before joining HALO, he worked in international development and as a researcher focusing on water management and energy security in Tajikistan. Shenhav studied modern history and international security at the University of Groningen.

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1. *Landmine Monitor*, Annual Report 2020, p. 36–38, <http://www.the-monitor.org/media/3168934/LM2020.pdf>.
2. The most heavily contaminated areas are thought to be around Vinnytsia, Ternopil, Zhytomyr, Dnipro, Kyiv, Odesa and Kharkiv. The Crimean peninsula remains one of the areas most affected by ERW contamination from WWII. *Landmine Monitor*, Ukraine 1999, http://archives.the-monitor.org/index.php/publications/display?act=submit&pqs_year=1999&pqs_type=lm&pqs_report=ukraine&pqs_section.
3. Until 2012 the called the Ministry of Emergency Situations.
4. Through the SES Department of Pyrotechnic Works and Humanitarian Demining.
5. *Landmine Monitor*, Ukraine 2014, <http://www.the-monitor.org/en-gb/reports/2014/ukraine/mine-action.aspx>.
6. Government of Ukraine, Official website of the Ministry of Defence of Ukraine, ‘Coordination of mine action activities’ (visited on 23 February 2021), <https://www.mil.gov.ua/diyalnist/protiminna-diyalnist/koordinacziya-protiminnoi-diyalnosti.html>.
7. An inter-ministerial working group was up for this purpose in 2006. The Cabinet of Ministers Decree No. 131 of 18 February 2009 adopted the State Program for Demining by the Ministry of Emergency Situations for 2009–2014, foreseeing clearance of 15 km² over five years with the destruction of 500,000 items of ERW. In 2010, relevant ministries were tasked to forward proposals by to establish of a national body for demining and a presidential decree established a NMAA in 2013. *Landmine Monitor*, Ukraine 2014, <http://www.the-monitor.org/en-gb/reports/2014/ukraine/mine-action.aspx>.
8. Geneva International Center for Humanitarian Demining (GICHD), United National Development Programme (UNDP), Organization for Security and Co-operation in Europe (OSCE), Danish Demining Group (DDG), Swiss Foundation for Mine Action (FSD).
9. The Ukrainian Institute of Standardization order № 511 ‘On the adoption of national standards’ of December 19, 2018, adopted the national standard DSTU P 8820-1:2018 ‘Mine action. Management Processes. Basic Provisions,’ which entered into force on April 1, 2019. However these have not been operationalised. Government of Ukraine, Official website of the Ministry of Defence of Ukraine, ‘Coordination of mine action activities’ (visited on 23 February 2021), <https://www.mil.gov.ua/diyalnist/protiminna-diyalnist/koordinacziya-protiminnoi-diyalnosti.html>.