



NMAS 08.20
Technical Survey (TS)

March 2020

Edition 2.1

Lebanon Mine Action Center-LMAC

Chekri Ghanem Casern–Fayadieh

Tel: +961 5 956143, Fax: +961 5 956192

Email: info@lebmac.org

Website: <http://www.lebmac.org/>

Warning

This document has been released on the date shown on the cover page. The National Mine Action Standards (NMAS) of Lebanon are subject to regular review and update, so users are advised to consult the most recent version. To ensure that you have access to the current version, contact the Lebanon Mine Action Center (LMAC) through the www.lebmac.org website or by sending an email to info@lebmac.org.

Copyright Notice

This is a national document generated and owned by Lebanon. It must not be copied or altered without the written consent of the LMAC.

Tel: +961 5 956143,

Fax: +961 5 956192

Email: info@lebmac.org

The LMAC gratefully acknowledges UNDP support during the preparation of this NMAS.

© LMAC 2020 – All Rights Reserved.

Table of Contents

Foreword.....	iv
Acronyms	v
Introduction	vi
1. Scope.....	1
2. References	1
3. Key Terms and Definitions	1
4. Purpose, Methodology, and Results of TS	3
4.1 Purpose of TS	3
4.2 Methodology of TS.....	3
4.3 Conduct of TS.....	4
5. TS Process	5
5.1 Results of TS.....	7
6. Documentation	7
7. Information Gathering and Reporting of TS	7
8. Criteria for Reduction through TS.....	8
9. TS Survey Team Requirements	9
10. Roles and Responsibilities.....	9
10.1 Role of the LMAC	9
10.2 Role of IAs	10
ANNEX A: Normative and Informative References.....	11
NMAS 08.20, Edition 2.1: Amendment Record.....	12

Foreword

The National Mine Action Standards (NMAS) of Lebanon were first developed in the form of Technical Standards and Guidelines (TSG). These TSG were edited into the first edition of the NMAS in 2010 and were written to comply with the first edition of the International Mine Action Standards (IMAS). Since then, the scope of the IMAS has been expanded to include more components of mine action and amended to mirror the most recent changes to standards as required in today's operations. These changes, as well as changes in the local context of Lebanon, have necessitated a review and update of the NMAS.

As detailed in the National Mine Action Policy of 2007, the Lebanon Mine Action Center (LMAC) has the responsibility to execute and coordinate the Lebanon Mine Action Program (LMAP) on behalf of the Lebanon Mine Action Authority (LMAA), including the development and amendment of standards. Such standards shall be developed in a participatory approach that shall involve international, governmental, and nongovernmental organizations.

The NMAS shall be reviewed as needed to reflect amendments in the IMAS as well as incorporate changes to international obligations and local requirements. Such revisions shall be made available on the LMAC's website www.lebmac.org or can be obtained through contacting the LMAC via the email info@lebmac.org.

Acronyms

CHA	Confirmed Hazard Area
ERW	Explosive Remnants of War
HTHA	High Threat Hazard Area
HMA	Humanitarian Mine Action
IA	Implementing Agency
IMAS	International Mine Action Standards
IMSMA	Information Management System for Mine Action
LTHA	Low Threat Hazard Area
LMAA	Lebanon Mine Action Authority
LMAC	Lebanon Mine Action Center
LMAP	Lebanon Mine Action Program
NMAS	National Mine Action Standards
NTS	Non-Technical Survey
SHA	Suspected Hazard Area
SOPs	Standard Operating Procedures
TS	Technical Survey
TSG	Technical Standards and Guidelines

Introduction

Except in emergency cases, Non Technical Survey (NTS) should precede all Technical Survey (TS) activities. NMAS 08.10 explains the requirements for NTS in Lebanon. Like NTS, TS is designed to be part of a well managed land release process that is planned, implemented, and adjusted in light of information obtained as the work is conducted.

While NTS can sometimes conclude that there is an absence of hazards in an area and so recommend that the surveyed land is 'cancelled', NTS is conducted without the surveyors being equipped to safely enter a SHA so can rarely provide a reliably detailed description of the hazards that are present or determine the extent of the contaminated area with a level of accuracy compatible with the efficient deployment of demining resources.

When NTS confirms that there is evidence of a hazard contamination in a reported SHA, the surveyors may assign all or part(s) of the area as SHA or CHA. To prevent deploying search and clearance assets over a wider area than necessary, it is common for the NTS surveyors to recommend that the SHA or CHA area(s) be subject to Technical Survey (TS).

TS may be conducted as an independent activity or as a preliminary to Clearance operations conducted by the same IA. Tasking both activities to run consecutively can increase safety by having the same organization conduct both activities and can increase efficiency by avoiding the need to deploy demining assets twice.

TS uses search procedures inside the SHA/CHA and focuses on determining where contamination is present, discovering its type, condition, distribution, and surrounding context. Efficiently conducted, TS increases efficiency by helping to ensure that area search and clearance is only conducted in areas where there is some EO contamination.

At all times, the performance of TS assets shall be monitored to ensure that 'all reasonable effort' to plan and conduct the work appropriately has been applied. As part of the LMAC Quality Management system, 'all reasonable effort' in TS requires the keeping of accurate records and risk assessments that can be used to justify the extent of the work conducted and the findings of the TS, so giving confidence that areas reduced by TS are not in fact contaminated with explosive hazards.

Technical Survey

1. Scope

This NMAS provides standards and guidelines for implementing Technical Survey (TS) in Lebanon. Their use provides confidence in the reliability of the TS findings. It should be read in conjunction with NMAS 08.10 Non-Technical Survey (NTS) and NMAS 07.11 Guide for Land Release.

The LMAC and Implementing Agencies (IAs) engaged in demining shall abide by the standards provided in this document.

2. References

A list of normative and informative references is provided in Annex A.

Normative references provide cross-referencing to other standards referred to in this NMAS, and which form an integral part of the provisions of this standard.

Informative references provide a list of documents that may be consulted for a clearer understanding of this standard.

3. Key Terms and Definitions

The following terms and definitions are used in this NMAS:

- *Area Clearance*: the acts or actions involved in searching an area of land using tools and procedures that ensures that any EO hazards within a specified depth beneath the ground surface are located and removed/destroyed. Often referred to as simply 'Clearance' or 'search and clearance'.
- *Cancelled Area*: an area previously recorded as a hazardous area which, as a result of actions other than TS or Clearance, is found not to be contaminated with explosive hazards. This change in status will be the result of more accurate and reliable information and can only be authorized by the LMAC. The documentation of all cancelled areas shall be retained together with a detailed explanation of the reasons for their change in status.
- *Confirmed Hazardous Area (CHA)*: an area where the presence of a contamination hazard has been confirmed based on direct evidence, such as an accident or incident or the reliable sighting of visible indications of EO hazards.
- **Explosive Ordnance (EO)**: all munitions or parts of munitions containing explosives, nuclear fission or fusion materials and biological and chemical agents. This includes bombs and warheads; guided and ballistic missiles; artillery, mortar, rocket and small arms ammunition; all mines, torpedoes and depth charges; pyrotechnics; sub-munitions and cluster munition dispensers; cartridge and propellant actuated devices; electro-

explosive devices; clandestine and improvised explosive devices; and all similar or related items or components that are explosive in nature (adapted from IMAS, 2nd ed., 2014).

- *Hazardous areas, (dangerous areas)*: all areas within Lebanon that are known to contain an EO hazard are marked and recorded as Dangerous Areas (DAs) in the Information Management System for Mine Action (IMSMA) that is used by the LMAC. DAs are frequently referred to as *Hazardous areas* or *Contaminated Areas*.
- *Land Release*: the process that is applied to release land to the community for socio-economic utilization through NTS, TS, or area Clearance. Data gathered and recorded during the Land Release process shall demonstrate that ‘all reasonable effort’ has been applied. ‘All reasonable effort’ requires the ability to demonstrate that all predictable information has been identified, gathered and accurately analyzed to support logical and evidence-based decision making.
- *Non-Technical Survey (NTS)*: the assessment of a defined area of land and categorization of the land (or parts of the land) as either hazard free, a suspected hazard area (SHA), or a confirmed hazard area (CHA). NTS is conducted in Lebanon using a desk assessment that involves the collection and analysis of historical records and the collection of primary data by interviewing members of the local community and the Local Authorities (LAs) in and around the area subject to NTS. NTS excludes the use of technical interventions but should involve visiting the area to gather evidence whenever practicable.
- *Suspected Hazardous Area (SHA)*: an area of land where the presence of an EO contamination hazard is suspected based on indirect evidence, such as information from witnesses or local community members.
 - *Systematic Technical Survey*: refers to a systematic process of applying technical survey in SHA or CHA. Often used in circumstances where so little information is present about the potential threat that it is impossible to adopt a targeted approach.
 - *Targeted Technical Survey*: refers to technical survey that is targeted to specific areas within a SHA or CHA that are more likely to be contaminated than other areas; i.e., high-risk areas. Targeted technical survey should be preferred to systematic technical survey whenever it is practicable.
- *Technical Survey (TS)*: the detailed topographical and technical investigation of a hazardous area identified during the NTS phase or previously known. It aims to determine where contamination is present as well as define the hazard type, and distribution. It investigates the environment of a hazardous area with a view to determining appropriate procedures and technical assets that can be used to search and clear the area safely. Frequently, it leads to an SHA being divided into areas that require

Clearance and areas that can be released by 'area reduction' because there is no evidence of them containing EO contamination.

In addition to the above terms, NMAS 04.10 provides a glossary of terms and definitions used across all standards.

As in the IMAS, the terms 'shall', 'should' and 'may' are used across all standards to indicate the required degree of compliance. For any organization working in Lebanon, the use of 'shall' indicates a compulsory requirement. The term 'should' indicates the national preference which may be varied with LMAC approval. The term 'may' indicates a suggestion that is not obligatory.

4. Purpose, Methodology, and Results of TS

4.1 Purpose of TS

Technical Survey is used to determine whether part or part(s) of a defined SHA are contaminated with EO hazards. The type(s) and condition of any EO hazards present are recorded. During TS, enough work shall be conducted to determine the extent of the area(s) within the SHA that is actually contaminated with EO hazards. In some cases the entire area may be contaminated. In many, part or parts of the SHA may be found not to be contaminated and so can be confidently recommended for release as not presenting a threat to end-users of the land.

TS is conducted using the same demining assets and procedures as those used in Clearance activities but is conducted over a limited area within the SHA.

Information gained by TS may also be used to support the determination of appropriate fade out zones. A fade out zone is the agreed distance surveyed or cleared to make it probable that no further direct physical evidence exists. Generally, if evidence is located during fade out, the LMAC shall decide whether technical survey may continue or whether the land should be marked for full area Clearance.

4.2 Methodology of TS

In Lebanon, TS follows NTS and uses technical demining assets to confirm or refute the presence of EO contamination in a SHA. At all times, TS methodology shall satisfy safety requirements and shall focus on providing a high degree of confidence that, if hazards are present, physical evidence of their presence is located and documented. A TS plan for each task shall be pre-agreed between the LMAC and the IA to which the TS task is assigned.

No TS shall be carried out unless an assessment of what is likely to be found in the SHA has been carried out. Such an assessment should categorize the land as either a Low Threat Hazard Area (LTHA) or a High Threat Hazard Area (HTHA). Based on this assessment, the appropriate assets to be used during TS is determined and agreed upon between the LMAC

and the tasked IA. Unless otherwise agreed, the default fade out zones for the following munition types is:

- Anti-Personnel mines should have a fade out distance of at least 5 meters;
- Anti-Tank mines should have a fade out distance of at least 10 meters; and
- Sub-munitions should have a fade out distance of at least 50 meters.

The shape of the fadeout zone should be radial on flat, unobstructed ground but may be varied in other contexts by agreement between the IA and the LMAC. The fadeout is used to determine the perimeter to be marked for search and Clearance and so indicate the area that may be reduced.

The TS methodology shall ensure the preservation of all information discovered about the nature and distribution of any contamination found.

Where possible, targeted technical surveys are preferred to systematic technical surveys. A targeted technical survey focuses on high risk areas that are identifiable inside a CHA. They may be identified before the TS during the NTS analysis of previous military action or of the tactics adopted by those who placed the contamination. They may be identified by TS surveyors while the TS is being conducted, safe access is gained and more is learned about the SHA. Whether targeted or systematic technical survey is conducted, unless otherwise agreed with the LMAC the survey methodology should involve a default of 30% of the SHA being searched using authorized search assets and procedures that are proven able to locate any of the anticipated hazards in the area. The percentage of land inside the SHA that is searched during the survey may rise to 100% if the entire area is contaminated, and in these cases the TS may be redefined as a Clearance task after the event.

The TS plan that is developed for each SHA/CHA should be amended to take account of new information as it is discovered and the TS risk assessment revised to ensure that risk to deminers/searchers and the end-users of the land is always minimized. To support QM review and system improvements, all changes to the TS plan shall be recorded along with the reasons for those changes.

Data collection and analysis arising from TS shall abide by the guidelines of NMAS 05.10 Information Management. The quality of technical survey outputs shall be monitored to inform improvement in the process and ensure confidence in the quality of information obtained and the safety of any land released as a result of TS.

Any fencing or marking resulting from TS shall abide by the guidelines provided in NMAS 08.40 Marking of Hazards.

4.3 Conduct of TS

TS may use a variety of approved demining assets, whether manual, MDD, or mechanical. Each asset offers different advantages and disadvantages. When deciding which asset(s) to

use, the LMAC and IAs shall carefully consider the level of Hazard (whether low or high) and the importance of preserving information to support sound decision-making. No asset that raises the risk to the TS staff shall be used.

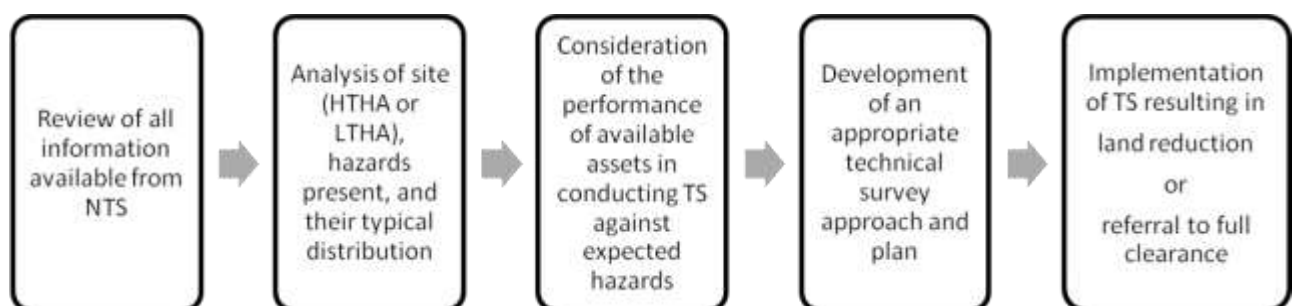
The LMAC and IAs shall assess:

- the safety aspects of the proposed demining asset, its suitability for use in the conditions inside the SHA and the probability that its use, with appropriate follow-up, will reliably discover the presence of all potential EO hazards;
- the extent to which the asset(s) used will preserve information gathered and aspects of the surrounding environment; and
- the speed and cost with which the demining asset can support TS.

In all cases, demining assets and procedures used in TS shall be approved by the LMAC before use.

5. TS Process

The TS process starts with a study of available NTS data which is used to plan the collection of further data that may help to reliably identify areas within the SHA that are not contaminated with EO hazards and so can be 'released' without further demining activity. This process is illustrated in Figure 1 below. Throughout the TS process, frequent reviews shall be conducted in light of what is discovered and information acquired shall feed into the continuous refinement and improvement of the process.



Integrating the TS process with area Clearance activities can significantly increase the efficiency of land release but requires flexibility in land categorization as more information is gathered during the work. Although the IAs may offer advice, the LMAC shall be solely responsible for deciding when integrated TS and area Clearance is appropriate. IAs shall always consult the LMAC and gain approval before deciding to integrate TS and area Clearance or to apply different categories to discrete parts of the SHA. The land release plan

for each SHA shall be managed by the LMAC in a flexible and pragmatic way that is designed to maximize the efficiency of the process with no reduction in safety.

5.1 Results of TS

Based on the analysis of information and evidence gathered, the output of TS shall be:

- releasing part(s) of the land that have not been searched during TS by area reduction where there is no evidence of contamination;
- marking part or all of the land for area Clearance when there is direct evidence that the land or those parts of the land is/are contaminated; and
- producing accurate and detailed documentation of the TS as required by the LMAC.

6. Documentation

To ensure that the recording and documentation of TS activities and outputs is of sufficiently high quality to give confidence in the decisions reached, the LMAC and IAs involved in TS shall apply appropriate quality control oversight (QA and QC).

The Quality Management cycle will ensure that records from TS are compared with the later findings made during any subsequent area Clearance and the post land release QC assessment. This will allow a critical assessment of the TS activities and decisions, and support the continuous improvement of TS planning and TS team activities. Information (including maps) shall be collected by IAs in a systematic matter during and after TS and recorded as directed by the LMAC.

7. Information Gathering and Reporting of TS

To support informed, evidence-based decision-making, TS should gather the following information as a minimum:

- direct evidence of the presence of EO hazards, including new evidence confirming or questioning existing recorded evidence;
- type, location, depth, and condition of any EO hazards present;
- information about the SHA and its surrounding conditions, such as, vegetation, soil, topography, and probable EO hazard contamination levels;
- changes to the ground since hazardous items were first laid/ deployed; and
- significant weather or climate factors (that may be seasonal).

In addition to the above information, a detailed site plan shall be prepared as part of the information gathering process, including at a minimum:

- a digital map of the area(s) covered by technical survey assets, including reference points and benchmarks as well as safe access routes;
- location(s) of any visible physical evidence of EO contamination and the pattern, if appropriate/known;

- type, depth and location(s) of all EO hazards found and/or destroyed during TS;
- natural and man-made features in the area, such as water courses, trees, cultural hallmarks; and
- any other relevant information.

In addition to the above, the TS report shall cover the following points:

- the type of TS conducted, type of assets used, the search depth, and how data is to be gathered. Data collection documentation shall demonstrate that ‘all reasonable effort’ has been applied to find direct physical evidence of any EO contamination present;
- recommendations for the categorization of the SHA or parts of the SHA as an area to be reduced or categorized as CHA to be Cleared;
- recommendations for the adjustment of the geographical boundaries of any CHAs of SHAs defined during the survey;
- recommendations about appropriate area Clearance assets to be used and the depth of Clearance necessary in specific areas where the presence of EO hazards has been identified; and
- recommendations for the prioritization of further actions.

Each TS report should be signed with the following signatures:

- the name and signature of the IA representative who has supervised and monitored the conduct of the TS;
- the name and signature of the LMAC representative who has supervised and monitored the findings of the TS; and
- the name and signature of an approved LMAC Representative assigned from the Operations Section.

In cases where the report recommends reduction of land, the reduction shall require the subsequent approval of the LMAC Head of Operations, followed by the approval of the LMAC Director.

8. Criteria for Reduction through TS

As a result of TS, an IA or the LMAC survey team may recommend to release some or all of the surveyed land by ‘area reduction’. Area reduction should take place whenever all reasonable effort has been applied to finding evidence of an EO hazard and no evidence has been found. The area is considered safe for use by the local population after ‘all reasonable effort’ has been applied to finding evidence of contamination. Reasonable effort during TS requires that:

- all efforts have been made to understand the nature and characteristics of contamination in the suspected area;

- all sources of relevant information have been identified and accessed;
- data has been collected by an accredited survey team;
- an unbiased and logical analysis of the data collected has been conducted;
- quality management efforts have been appropriately applied on the TS; and
- informed decisions are made following the chain of command set by the LMAC.

Reduction criteria are designed to determine whether there is any reason to believe that the reported SHA contains EO hazards. If there is no reason to believe that there is a hazard in the area, or part of it, it should be reduced as presenting 'no known threat'.

The following TS findings should be sufficient to justify recommending 'area reduction':

- an agreed percentage of the land area has been searched with demining assets able to reliably detect the anticipated contamination and no evidence of any EO contamination has been found;
- the area recommended for reduction falls outside the fade out distance of any CHA;
- no mines/ERW incidents or accidents have been recorded in the area;
- no direct or indirect evidence of the presence of EO contamination has been found.

9. TS Survey Team Requirements

TS shall be implemented by an LMAC accredited TS survey team using LMAC approved assets. Members of all TS survey teams shall:

- be qualified and experienced in demining operations and in the use of the relevant technical assets;
- possess a proven ability to carry out TS efficiently and effectively;
- possess adequate communication and analytical skills;
- have an understanding of the cultural, historical, social, and economic context where TS is to be conducted; and
- have excellent ground survey skills allowing them to make accurate maps that reliably show spot indications and the boundaries of discrete areas of land.

10. Roles and Responsibilities

10.1 Role of the LMAC

The LMAC shall:

- Ensure that TS data collection, analysis, and documentation satisfy quality requirements and the standards set in this NMAS and that the process is subject to QC oversight;
- assess SOPs for TS submitted for accreditation by IAs;
- accredit those IAs that submit appropriate SOPs to conduct TS;

- approve TS plans submitted by tasked IAs, and approve subsequent modifications to the TS plans as appropriate;
- use all available information to prepare and allocate TS tasks;
- be proactive in monitoring the quality of TS and assessing any short-comings in the processes and procedures used, taking appropriate corrective actions as a priority;
- ensure that location maps are used adequately and accurately;
- ensure the adequate involvement of LAs and local communities in TS;
- Ensure that 'all reasonable effort' has been expended before any land is released as a result of TS; and
- monitor land following reduction by TS and respond with an appropriate review of the TS process if any EO hazards are found.

10.2 Role of IAs

IAs which undertake TS shall:

- develop SOPs for the implementation of TS and submit them for the LMAC's approval;
- obtain accreditation from the LMAC to conduct TS;
- train TS teams to work to the NMAS requirements when conducting TS;
- ensure that TS data collection, analysis, and documentation satisfy quality requirements and the standards set in this NMAS;
- provide comprehensive TS reports, including detailed maps, in the format required by the LMAC;
- support the LMAC's QC review of the quality of data collected and the processes and procedures approved for TS;
- prepare a TS plan and obtain LMAC's approval for each task before starting it;
- ensure that location maps are drawn accurately;
- ensure the adequate involvement of local authorities and the local community during TS; and
- ensure that 'all reasonable effort' has been expended before categorizing land and making recommendations for land release or further actions.

**ANNEX A: Normative and Informative References**

March 2020

The documents listed below constitute normative references and form an integral part of the provisions of this standard.

- Current LMAC and IMSMA reporting formats (request copies from the LMAC);
- NMAAS 05.10 Information Management;
- NMAAS 08.10 Non-Technical Survey;
- NMAAS 08.40 Marking of Hazards;
- NMAAS 07.11 Guide for Land Release;
- NMAAS 07.30 Guide for the Accreditation of Demining Organizations and Operations; and
- NMAAS 04.10 Glossary of Mine Action Terms, Definitions, and Abbreviations used in the Second Edition of the NMAAS.

In addition to the normative references listed above, the following informative references may be consulted:

- National Mine Action Policy 2007; and
- IMAS 08.20 Technical Survey.

NMA 08.20, Edition 2.1: Amendment Record

The NMA are subject to a comprehensive or partial review by the Review Board periodically. Changes in the context as well as safety requirements and efficiency considerations may necessitate amendments to individual NMA standards more frequently. If this occurs, such amendments shall be given a number, dated, and detailed in the table below. The amendment should also be indicated on the header under the NMA edition number.

Whenever the formal review of the NMA is completed, a new edition shall be issued. Amendments that have taken place before the review date shall be incorporated in the new edition and the amendment record table cleared. Consequently, the recording of amendments shall start again until the next review.

The most recent revisions of the NMA shall be posted on the Lebanon Mine Action Center (LMAC) website on www.lebmac.org.

Number	Date	Amendment Details
1	March 2020	Removal of requirement for at least 30% of land to be searched during TS. 30% is now the default for any TS task if a variant (more or less) has not been agreed with the LMAC for that specific task.
2	March 2020	Minor corrections throughout.