

IMAS 09.13

First Edition
04 February 2019

Building Clearance

Director,
United Nations Mine Action Service (UNMAS),
1 United Nations Plaza
New York, NY 10017
USA

Email: mineaction@un.org
Telephone: (1 212) 963 1234
Website: www.mineactionstandards.org

Warning

This document is current with effect from the date shown on the cover page. As the International Mine Action Standards (IMAS) are subject to regular review and revision, users should consult the IMAS project website in order to verify its status at (<http://www.mineactionstandards.org/>, or through the UNMAS website at <http://www.mineaction.org>)

Copyright notice

The International Mine Action Standards (IMAS) are owned, controlled and copyrighted by the United Nations. None of the materials provided in IMAS may be used, reproduced or disseminated, in whole or in part, in any form or by any means, without prior written permission from the United Nations acting through the United Nations Mine Action Service (UNMAS), except as set out below. None of the materials in IMAS are to be sold.

The use, reproduction or re-dissemination of IMAS by third parties, in whole or in part, is permitted provided that the United Nations is appropriately attributed and provided also that such use, reproduction or re-dissemination is not for commercial purposes. The United Nations may be attributed by the placement of the following text: Used and reproduced with permission of the United Nations.

Director
United Nations Mine Action Service (UNMAS)
1 United Nations Plaza
New York, NY 10017
USA

Email: mineaction@un.org
Telephone: (1 212) 963 1234

Contents

Foreword	iv
Introduction	v
1. Scope	1
2. References	1
3. Terms, definitions and abbreviations	1
4. Building Clearance General	1
4.1. Aim of Building Clearance	1
4.2. Products of Building Clearance	2
4.3. Building Clearance Principles	2
4.4. Mandatory Actions (context specific)	2
4.5. Information Gathering and preparation	3
4.5.1. Non-Technical Survey	3
4.5.2. Building Clearance Threat Assessment	3
4.5.3. Clearance Plan	3
5. Systematic clearance	3
5.1. Access	3
5.2. The Building Clearance Process	4
5.3. Classification and sub-division of hazardous areas	4
5.4. Building Clearance Procedures	5
5.5. Specification of Clearance	6
5.5.1. Establishing Building Clearance Parameters	6
5.6. Buildings with Debris	7
5.6.1. Application of Mechanical Assets for Building Clearance	7
5.7. Animal Detection Systems	8
5.8. Unmanned Aerial Systems (UAS)	8
5.9. Non-explosive Hazards	8
5.10. Marking	8
6. Reporting and Handover	9
6.1. Information Management	9
6.2. Handover	9
7. Quality Management	9
8. Responsibilities	10
8.1. National Mine Action Authority/National Coordination Body	10
8.2. Monitoring/inspection	11
8.3. Mine action organisation	11
8.4. Donors to mine action	11
Annex A (Normative) References	12
Annex B (Informative) Building Search Equipment	13
Annex C (Informative) Building Search Safety Distances	14
Annex D (Informative) Building Search Personal Protective Equipment	15

Foreword

International standards for humanitarian demining programmes were first proposed by working groups at an international technical conference in Denmark, in July 1996. Criteria were prescribed for all aspects of demining, standards were recommended and a new universal definition of 'clearance' was agreed. In late 1996, the principles proposed in Denmark were developed by a UN-led working group and the International Standards for Humanitarian Mine Clearance Operations were developed. A first edition was issued by the UN Mine Action Service (UNMAS) in March 1997.

The scope of these original standards has since been expanded to include the other components of mine action and to reflect changes to operational procedures, practices and norms. The standards were re-developed and renamed as International Mine Action Standards (IMAS) with the first edition produced in October 2001.

The United Nations has a general responsibility for enabling and encouraging the effective management of mine action programmes, including the development and maintenance of standards. UNMAS, therefore, is the office within the United Nations responsible for the development and maintenance of IMAS. IMAS are produced with the assistance of the Geneva International Centre for Humanitarian Demining.

The work of preparing, reviewing and revising IMAS is conducted by technical committees, with the support of international, governmental and non-governmental organisations. The latest version of each standard, together with information on the work of the technical committees, can be found at <http://www.mineactionstandards.org/>. Individual IMAS are reviewed at least every three years to reflect developing mine action norms and practices and to incorporate changes to international regulations and requirements.

Introduction

Conflict in urban and peri-urban areas necessarily results in contamination of buildings and other human-made structures from explosive ordnance (EO) of all types. The challenges of working inside structures in conflict-affected areas that are intact or damaged, require a different operational framework and distinct methodologies from those for clearance of open areas. In both cases, all EO should be removed and destroyed. However, the restricted three dimensional context of buildings adds a level of difficulty to any mine action operational response.

The term “building” in this standard is used to refer to a wide range of structures from domestic homes, or commercial facilities, to those used in the provision of critical services such as power, water, sewage, health and education. As a result, a wide range of procedures may be required to address different types of structures and the wide variety of EO found in those structures. These procedures may vary from surface search for Explosive Remnants of War (ERW) to more intense search procedures and clearance requirements where conditions are restrictive and IEDs are present, for example. This difficulty must be addressed through sound Threat Assessments being carried out, based on evidence. In addition, secondary hazards such as unstable structures and significant levels of debris, that are regularly present in the context of clearing buildings, often raise the complexity level of building clearance operations. These standards outline a framework to mitigate the risks to clearance personnel.

Due to the high variability in terms of clearance procedures required for dealing with buildings, both reporting and quality management can be more challenging. Reporting is of a greater complexity due to the fact that interventions take place in three dimensional space, and involve many more elements to record. Similarly, in the case of quality management, the wide variation in terms of procedures conducted makes monitoring and verification difficult. Therefore, when addressing buildings, sound quality management relies heavily on a robust application of the core principles (see IMAS 07.12).

Given the ever-more common occurrence of conflict in urban areas, the ability to standardise the implementation of the various core elements of Building Clearance outlined in this standard is essential. Despite the complexities involved, adopting the following well-fined set of principles is fundamental to enhancing the safety and efficiency of mine action operations in urban and other environments where buildings have been contaminated by EO.

Building Clearance

1. Scope

This standard describes the specifications for the clearance of buildings known or suspected to be contaminated with Explosive Ordnance (EO). It provides guidance to National Mine Action Authorities (NMAA) for the establishment of clearance parameters, and provides the basis for the development of relevant quality management systems. It is applicable to all EO¹ and for any building.

2. References

A list of normative and informative references is given in Annex A. Normative references are important documents to which reference is made in this standard and which form part of the provisions of this standard.

3. Terms, definitions and abbreviations

A complete glossary of all the terms, definitions and abbreviations used in the IMAS series of standards is given in IMAS 04.10.

In the IMAS series, the words 'shall', 'should' and 'may' are used to indicate the intended degree of compliance.

- a. 'shall' is used to indicate mandatory requirements, methods or specifications that are to be applied in order to conform to the standard;
- b. 'should' is used to indicate the preferred requirements, methods or specifications; and
- c. 'may' is used to indicate a possible method or course of action.

The term 'National Mine Action Authority' (NMAA) refers to the government entity, often an interministerial committee, in an EO-affected country charged with the responsibility for broad strategic, policy and regulatory decisions related to mine action.

Note: In the absence of an NMAA, it may be necessary and appropriate for the UN, or some other body, to assume some or all of the responsibilities of an NMAA.

4. Building Clearance General

4.1. Aim of Building Clearance

The aim of Building Clearance is to identify, remove and/or destroy all EO present within buildings² that have been surveyed and are suspected or confirmed to contain EO. Building Clearance is based upon a thorough well-documented Threat Assessment and the correct application of the relevant search procedures. It is conducted using methods and procedures that protect life, prevent un-necessary damage to property and belongings, and facilitate the resumption of use as soon as possible. When combined with Explosive Ordnance Disposal (EOD) and Improvised Explosive Device Disposal (IEDD), these techniques enable the clearance of structures, based on documented evidence. As a process, it should achieve

¹ As defined in IMAS 1.10 (p.2), the use of the term Explosive Ordnance (EO) in this IMAS shall be interpreted as encompassing mine action's response to: mines, cluster munitions, unexploded ordnance, abandoned ordnance, booby traps, other devices (as defined by CCW APII); and it includes Improvised Explosive Devices (IEDs).

² The term "building" in this standard is used to refer to a wide range of structures from domestic homes, or commercial facilities, to those used in the provision of critical services such as power, water, sewage, health and education.

sufficient confidence that all reasonable effort has been made to ensure that the assessed threat of EO has been removed.

4.2. Products of Building Clearance

The products of Building Clearance should be based upon an analysis of the findings of the survey, in the context of other information about the type, nature and distribution of contamination within the theatre of operations, and should include:

- Clearance of any building containing EO contamination to defined parameters;
- Information gained through intrusive building clearance activities to adjust clearance plans for enhanced efficiency;
- Evidence that all reasonable effort has been expended to sufficiently determine and demonstrate, to the satisfaction of the NMAA and beneficiaries, that a building is free of EO contamination.

4.3. Building Clearance Principles

The following eight principles should be applied to Building Clearance:

- An EO Threat Assessment based on all available evidence gained from survey and technical interventions should be developed and continually reviewed;
- Building Clearance should be executed in accordance with an approved Clearance Plan. This plan should include control measures to account for the Threat Assessment being updated as more evidence on the EO contamination is obtained;
- If Threat Assessment cannot discount victim operated EO then appropriate procedures should be used as mitigation;
- Safe separation between individual searchers and search teams should be applied to minimise casualties in the event of an unintended detonation;
- Appropriate PPE commensurate with the Threat Assessment should be worn;
- Assessment of structural integrity of the building should be carried out prior to entry;
- If there is a suspicion that non-explosive hazards³ are present, personnel should be appropriately trained and equipped for those hazards;
- Building Clearance should only be conducted in appropriate light levels. If these do not exist naturally, then artificial light sources⁴ should be used⁵.

4.4. Mandatory Actions (context specific)

Whereas principles are globally applicable, mandatory actions should be specific to programme requirements. Mandatory actions should be developed based on operational factors such as equipment, threat and environment. They should be outlined in NMAS and refined and specified in Standard Operating Procedures (SOPs) that are accredited by the NMAA.

³ Such as confined spaces, toxic chemicals and working at height.

⁴ If the light levels are so low that a person cannot physically see without artificial light, they must be provided with a minimum of two light sources. This should allow light from at least two angles to assist in the visual identification of IEDs and provides a safety measure should one of those light sources fail.

⁵ The threat of light sensitive devices should be considered during the Threat Assessment and if required mitigation measures developed.

4.5. Information Gathering and preparation

4.5.1. Non-Technical Survey

Non-technical survey encompasses all non-technical means, including desk assessments, analysis of historical records and a wide range of other information-gathering and analysis functions, as well as physical visits to field locations. All elements of the non-technical process revolve around identifying, accessing, collecting, reporting and using information to help define what EO is to be found in which buildings, as well as where it will not be found. It supports the development of Threat Assessments, cancellation, and decision-making processes. Further guidance can be found in IMAS 08.10.

4.5.2. Building Clearance Threat Assessment

Threat and risk assessments are crucial in the delivery of all safe, effective and efficient Building Clearance operations. Threat Assessment involves the analysis of a variety of information sources related to the conflict, the environment, and the use of EO. In particular the evaluation of elements related to the armed actors that deployed the EO (such as their: Intent, Capability and Opportunity). An effective Threat Assessment process affords the ability to alter procedures before and during a clearance operation whilst still achieving the predefined clearance criteria specified by the NMAA. High quality Threat Assessments and clearance planning ensure that operations can adapt to additional evidence obtained during clearance as part of a continuous process. This is particularly pertinent to whether the threat is assessed to include victim operated EO.

Additional guidance on Threat Assessment is provided in *Annex C - Threat Assessment of 07.13 Risk Management in Mine Action*.

4.5.3. Clearance Plan

A Clearance Plan provides a road map for the execution of Building Clearance and should provide a clear link between the Threat Assessment and the procedures that are being employed. It should provide confidence regarding the quality of the final product that will be delivered.

The Clearance Plan may be amended at any point during the operation. It should be written in a methodical manner, stored in the task dossier and should provide the scope to deploy dynamic-interlinked search procedures in response to changes in the assessed threat. Suitable control measures should be in place, to account for these changes. Any changes that are made based on an increased understanding of the EO threat should be justified based on evidence, and approved at the appropriate management level and recorded.

Approval of Clearance Plans may be required by the NMAA prior to operations commencing. This will vary, however, depending on the complexity of the operation, the nature of the infrastructure being cleared, issues surrounding liability among other considerations. It is recommended that in dense urban environments plans are developed to include multiple buildings to increase efficiency by removing administrative burdens and repeated applications for approval. It may also be pertinent to develop more comprehensive implementation plans covering a wider geographic area with multiple hazard areas, which can be shared with other MA implementers, governmental organisations and departments, and other humanitarian NGOs.

5. Systematic clearance

5.1. Access

Where the presence of victim operated EO cannot reasonably be discounted through the application of Threat Assessment, Vulnerable Points (VPs) should be avoided when initially gaining access to the building. Examples of VPs include:

- Main entrances

- Doors and gates;
- Approach routes and paths.

Where access can only be gained through a VP, then the search procedures used should make appropriate mitigation. This may include positioning clearance lanes to initially avoid the assessed location of firing switches.

5.2. The Building Clearance Process

Building Clearance is not one prescriptive activity but the combination of a variety of procedures designed to “find and dispose” of specified explosive ordnance hazards, and subsequently confirm that a building has been cleared. IMAS 09.30 and IMAS 09.31 contain detailed guidance on the disposal of conventional ordnance and IEDs respectively.

The function of “finding” EO within a building is achieved through three functions:

- Detect;
- Locate; and
- Recognise.

Each of these functions is achieved through a combination of techniques that together form an appropriate procedure based on the assessed threat. An operator’s determinations regarding the appropriate procedures to use should be based on evidence that is properly recorded, and in keeping with an accredited quality management system.

The techniques and procedures for searching a building are dictated by the threat posed and the associated mitigation measures appropriate to the suspected EO contamination (defined by the Threat Assessment). The spectrum of possible EO is wide, including items in a benign state and those with a high probability of detonation, based on their nature and condition. The greatest threat is posed by EO that is victim-operated. Once (suspected or known) EO is identified, it should be marked and an individual with the appropriate IMAS EOD / IEDD qualifications should be tasked to deal with it.

5.3. Classification and sub-division of hazardous areas

Decisions about defining a building as a hazard area and progressing through the Building Clearance process should be taken on the basis of available evidence. The quality and quantity of available evidence will determine the reliability of decisions.

A Confirmed Hazard Area (CHA) can encompass either a single building or (more frequently) multiple buildings and adjoining open areas. Large CHAs should be further classified in order to define and describe more clearly:

- The presence of different contamination types or combinations of types;
- The different confidence levels associated with sources of evidence, and the analysis of that evidence; and

Areas suitable for different technical asset types and/or methodologies, for example BAC, Adapted Clearance and Full Disruptive Clearance.

The classification should enable sub-division of hazard areas based on the evidence, or lack of evidence, that is available for incorporation into the EO Threat Assessment. This will assist in the efficient and effective deployment of MA resources to conduct further technical interventions.

5.4. Building Clearance Procedures

Based on the results of the Threat Assessment carried out, appropriate Building Clearance Procedures should be adopted. The distinction between the search activity that is conducted is important to understand, not just to ensure quality of the end product but to communicate and monitor what is being conducted at a given task site. The following table provides a matrix of appropriate search procedures and techniques so that the appropriate clearance activity can be selected in accordance with a Threat Assessment.

Category	Threat Assessment	Activity	Appropriate Search Techniques
1	ERW only	BAC ⁶	<ul style="list-style-type: none"> • Surface visual search, use of controlled and approved manual techniques to move furniture, doors, windows, appliances, debris and small rubble. Use of rakes and other hand tools may be appropriate. • All areas where ERW could have been placed, projected, thrown or dropped should be searched. This includes the roof, outer walls and piles of clothing, rubbish and debris. • PPE and safe separation distances should be risk assessed based against the ERW hazard with the highest probability of detonation. • Sub-surface detection, location and excavation techniques are not normal in buildings but may be considered in order to remove explosive ordnance depending on the requirements of the task⁷.
2	Sufficient evidence to discount specific threats ⁸	Adapted Clearance	<ul style="list-style-type: none"> • Carefully controlled visual search of hard surfaces, furniture, household fittings and loose objects. • Avoidance of assessed firing switch locations until other areas have been searched. This is intended to increase the probability of identifying another component such as a main charge or battery pack to increase safety. • Use of aids and tools to increase the effectiveness of visual techniques. These include light sources, laser pens, finger-tip search and trip wire feelers. • Use of suitable detectors when appropriate⁹. • Any manual movement of objects that could be incorporated into an IED or mine should be avoided. • When absolute assurance cannot be achieved that a surface or object is not part of, or connected to, an IED, it shall be moved via

⁶ IMAS 07.12 Battle Area Clearance (BAC) provides additional guidance on the requirements and quality management related to clearance of ERW.

⁷ If direct evidence of sub surface ERW, such as entry holes, is present during surface search these should be recorded and investigation considered.

⁸ The majority of search procedures used in Building Clearance should fall into this category when victim operated EO is expected.

⁹ Depending on the construction of the building, and the functionality of the detector, they may be a viable option to enhance search.

			semi-remote techniques. This may include hook, line and weight droppers. • PPE and safe separation distances should be risk assessed based against the expected hazard in terms of fragmentation and blast. The structure of the building should be considered and the risk of collapse due to an unintended detonation assessed.
3	Insufficient evidence to discount specific threats	Full Disruptive Clearance	<ul style="list-style-type: none"> Any area in the specified building must be considered to contain victim-operated EO and booby traps. Firing switches, although still may be more likely to be encountered in certain locations, cannot be discounted anywhere in the building with confidence. Full systematic search and mitigation measures taken throughout the clearance operation. PPE and safe separation distances should be risk assessed based on the worst-case scenario in relation to the assessed fragmentation and blast hazard.

Depending on how hazardous areas are divided, this may mean that different search procedures are adopted in different parts of the same building (especially if it is a large multiple floor structure) or different buildings in the same task site.

5.5. Specification of Clearance

A building shall be accepted as “cleared” when the MA organisation has ensured that all structural surfaces, loose items and household fittings are free from EO.

Search procedures are used to find EO inside a building to specified parameters that have been set by the NMAA, or other appropriate authorities. These parameters are informed at national and regional levels through evidence gained through non-technical and technical interventions.

In dense urban environments, and depending on the subsequent building use (including intrusive reconstruction), the authority may prioritise the clearance of buildings based on the level of effort required to clear them. This may prioritise buildings requiring category 2 clearance over those requiring category 3 clearance, due to the increased pace of clearance. It may also mean that in the initial stage of a MA programme, buildings requiring category 3 clearance are only addressed if designated as ‘critical infrastructure’. Detailed information management systems to monitor changing clearance priorities are essential. A hazard area should not be cancelled based on being classified as a lower priority.

5.5.1. Establishing Building Clearance Parameters

The specified clearance parameters shall be determined by the tasking authority and may be determined through the use of non-technical surveys and evidence gained through other building clearance interventions. This evidence will be considered in line with an assessment of the future use of the building. Specifying clearance parameters will depend on the intended use of the building, the likely EO contamination, as well as other environmental factors. For example:

- Victim-operated EO and booby traps may be buried in unprepared floors and surfaces. In this case, the specification may call for the removal of EO to a specified depth. However, this may not be pertinent when the buildings contain only prepared surfaces made from concrete;

- Victim-operated EO and booby traps may have been incorporated into furniture, appliances and fittings such as air conditioning units and suspended ceilings. In this case the specification may require the confirmation that all these items have been confirmed “clear”. An auditable mechanism to enable Quality Assurance (QA) and Quality Control (QC) should be specified in NMAS, SOPs and re-affirmed in the clearance plan;
- EO may be found only on the surface, which could be driven by the operational environment. In this case, the specification may require the application of surface clearance procedures only;
- When the presence of large air dropped bombs, guided weapons or large calibre projectiles has been identified (normally by an entry hole), the depth of clearance may be several meters;
- Clearance in some circumstances areas may require the removal of many meters of rubble or debris as part of the clearance process.

The required clearance parameters can be adjusted as clearance progresses. However, any change must be agreed with the NMAA and shall be formally recorded. The clearance process should be repeated if there is a subsequent change to the land use which requires a greater depth of clearance. Detailed records and mechanisms for monitoring potential changes should be established.

In such circumstances, where there is no NMAA and/or national standards, the clearance organisation should use this IMAS and IMAS 07.11 “Land Release” to develop appropriate clearance parameters.

5.6. Buildings with Debris

During Building Clearance there may be the requirement to remove debris. This could take the form of physical objects that are present as a result of damage to the building but may also include large discarded piles of clothes, books, rubbish or food. It may be possible to remove light debris through manual procedures, although this may be extremely time-consuming, particularly where a victim operated EO has been assessed.

5.6.1. Application of Mechanical Assets for Building Clearance

General guidance on the processing and removal of rubble can be found for this in TN 10.10/03 “Explosive Ordnance Hazard Risk Assessment in Debris Management (Rubble Removal) Operations”. This guidance refers primarily to conventional EO and there are a number of factors to consider in relation to IEDs. When using the Explosive Hazard Risk Assessment Report, the following should also be considered if IEDs are likely to be encountered:

- *The probability of different EO types can often be determined by damage to the building (TN10.10/3 page 18).* In the case of an IED threat environment, there may be no damage to observe and the possibility of the presence of IEDs will initially rely on evidence gained through the NTS process. It is difficult to apply vulnerability categorization (TN 10.10/3 page 19) guidelines, but category F is of special interest and operators should consider “defensive positions” and “civilian area denial” as other war fighting/conflict related activities.
- *Deduction of the method of attack (TN10.10/3 page 20) should also include the most likely type of IEDs to be encountered.* This should be achieved through the application of a defined Threat Assessment. Many IEDs in buildings are victim operated and this should be of key importance when determining the Explosive Hazard Risk Assessment Level (TN10.10/3 page 21). The presence of IEDs may increase the probability of an unintended detonation and generally places them in the high risk section.

More general guidance on the use of mechanical assets can be found in IMAS 09.50 "Mechanical demining" and its use classified as ground preparation (4.3), prior to search of the rubble.

5.7. Animal Detection Systems

Animal Detection systems (ADS) can be applied to aspects of Building Clearance operations. Any deployment should be considered carefully; especially where the threat from victim operated EO is assessed to be present.

Additional guidance on the use of ADS is provided in IMAS 09.40 and 09.41.

5.8. Unmanned Systems (US)

Unmanned Systems may be deployed to provide the MA operator with the ability to conduct a non-intrusive level of visual survey with negligible hazard to the operator with reduced chance of unintended detonation. The use of suitable US can potentially be pertinent in many stages of the clearance operation such as gaining access to site and establishing a 360 degree visual of building(s), including the roof.

5.9. Non-explosive Hazards

Non-explosive hazards should be identified at the earliest opportunity. Non Explosive Hazards may include the following:

- Structural integrity;
- Hazardous enclosed spaces;
- Working at heights;
- Toxic Industrial Chemicals; and
- Toxic Industrial Materials.

Advice related to these hazards should be sought from either specialists or relevant technical authorities where necessary. If a MA organisation does not have the capability to conduct a safe and effective clearance of buildings affected by these hazards they should be clearly marked and recorded.

Depending on the construction of the building(s), the urban density and the severity of the use of explosive weapons, the secondary hazards present may pose a very significant challenge. NMAAs and other relevant stakeholders should take this into account and make efforts to ensure the availability of specialist advisors and equipment -- possibly holding these at a national or regional level, to provide the required level of support to the implementing organisations.

Accreditation should provide assurance that an organisation has the suitable qualifications, experience, equipment and documented procedures and policies to deal with specific non-explosive hazards. MA organisations should only be tasked when the non-explosive hazards present do not impede their operations.

5.10. Marking

Guidance on the marking of EO hazards is provided in IMAS 08.40. National standards and organisational SOPs should provide detailed guidance and direction for markings inside buildings.

6. Reporting and Handover

6.1. Information Management

Access to technical information is a key part of the Threat Assessment process. It drives the procedures and techniques that are employed during Building Clearance and enables continual improvement across the MA sector. IMAS 05.10 establishes general principles and provides guidance for effective information management in mine action programmes.

The submission of accurate and timely reports that can be inserted into appropriate databases that can store, control, search and facilitate access to data is the most efficient way to manage information on a large scale.

Building Clearance should be reported in m² based on the floor plan of each floor of the building, including the roof.

It is also useful for MA operators to have access to as much information as possible to enable them to do detailed Threat Assessments, especially in relation to IED construction and methods of armed actors. Where possible, detailed reports from IEDD activities should be entered into the data management systems and disseminated directly to appropriate parties (i.e. members of relevant technical working groups and clusters).

6.2. Handover

All reasonable effort shall be made to clear a building, based on an accurate assessment of the threat. The internal and external quality control process should be specified, documented and in line with NMAS. The specific parameters and procedures as detailed in the clearance plan, along with any limitations need to be clearly communicated during handover. This may be important in terms of assessing long-term risk.

Following a Building Clearance operation, all reports and information related to all aspects of the operation should be made available to the appropriate stakeholders. This documentation is essential for coordination and quality management purposes. It will confirm what Building Clearance activities have been conducted, and will allow the quality of those activities to be checked and confirmed, based on the national standards. The NMAA should be the custodian of all completion reports, handover certificates and supporting information.

Further guidance on handover documentation can be found in IMAS 08.30.

7. Quality Management

Quality Assurance (QA) should provide confidence in the quality of the product(s) of Building Clearance that MA organisations will deliver. Quality is achieved through ensuring that the MA organisation is properly accredited (IMAS 07.30), with staff that have the appropriate qualifications and competence levels, employing appropriate equipment, with procedures that match an agreed policy (both NMAS and organisational level SOPs), and with appropriate management practices and operational procedures in place. There should be a robust plan for monitoring the clearance organisation and its sub-units (see IMAS 07.40), with effective internal and external systems to identify and correct shortcomings in the Building Clearance activities. Continual improvement should be supported through analysis of data relating to the performance of the overall Building Clearance process.

During and after the Building Clearance process, Quality Control (QC) personnel may conduct checks and inspections to confirm that products of the Building Clearance process satisfy the specified requirements. Products may include both the release of building(s), information and reports. QC checks and inspections of buildings should be designed and defined prior to clearance commencing, and conducted so that they provide meaningful evidence to support the confidence in their subsequent use. Formal post-clearance inspections may not always be

necessary or justified, but longer term monitoring of released buildings in order to maintain confidence in quality, should be a feature of the overall process.

As part of the overall QM system, a Building Clearance Tasking Order from the NMAA, or appropriate authority, should specify the building(s) to be cleared. It should also denote the EO clearance parameters, the requirements for monitoring and inspection, and should also encompass how surrounding areas that are part of the same SHA/CHA will be released in conjunction with the building(s). Based on evidence, a Threat Assessment following an accreditation process should be conducted. This will enable appropriate search procedures to be conducted to ensure that all reasonable effort has been achieved to meet clearance parameters. Both the Threat Assessment and the associated search procedures should be formally recorded in a manner approved by the NMAA and form a part of the reporting requirements.

Building Clearance usually relies on visual search, although there may be instances where a detector may be used to aid in the investigation of areas of unprepared ground or to detect certain types of switches or electrical wires that are part of an IED. Accurate recording of effectiveness and efficiency of search procedures, EO types, and locations of items found, is important and will assist in continual improvement and in determining if subsequent clearance for EO that may fall outside the prescribed clearance parameters originally specified should be conducted in the future. This may include deep buried UXO or non-victim operated / low probability of detonation EO (such as Small Arms Ammunition), when there has been a humanitarian priority to increase the safety of large numbers of returning civilians to high density urban areas.

Overall guidelines for Quality Management (QM) are presented in *IMAS 07.12 Quality Management in Mine Action*.

8. Responsibilities

8.1. National Mine Action Authority/National Coordination Body

The NMAA, or an organisation acting on its behalf shall:

- a) establish and maintain national standards for Threat Assessment;
- b) establish and maintain national standards for Building Clearance;
- c) establish and implement information management systems, requirements and regulations for the management of Building Clearance and clearance information;
- d) accredit mine action organisations as fit to undertake Building Clearance operations, including the ability to deal with non-explosive hazards, where applicable;
- e) establish and maintain an effected and documented Quality Management System, including performance criteria and tools for quality and audit of mine action organisations Threat Assessment and clearance planning procedures and processes;
- f) establish and maintain the capability to monitor the effectiveness, safety and measures to protect the environment of mine action organisations involved in Building clearance operations;
- g) establish national systems for accident or incident reporting; and
- h) where necessary, seek assistance from other national governments, international organisations, or other stakeholders to obtain the specialist expertise and information necessary to establish safe and effective conditions for the implementation of Building Clearance.

8.2. Monitoring/inspection

The monitoring/inspection body shall:

- a) obtain NMAA accreditation to operate as a monitoring/inspection body;
- b) monitor the Building Clearance organisation and its sub-units in accordance with the intentions of IMAS 07.40 and the requirements of the NMAA; and
- c) maintain and make available documentation of monitoring/inspection visits as specified by the NMAA.

8.3. Mine action organisation

The mine action organisation undertaking Building Clearance shall:

- a) obtain from the NMAA accreditation to conduct Building Clearance operations;
- b) establish and maintain SOPs for Building Clearance and Threat Assessment which comply with national standards;
- c) ensure that all staff conducting Building Clearance activities are competent and suitably trained, equipped and qualified;
- d) apply SOPs for Building Clearance operations in a consistent, effective and safe manner which include procedures to protect the environment;
- e) maintain accurate records of all relevant activities, clearance planning and internal approval processes; and
- f) ensure that the affected community is fully cognisant of all building search activities, clearance regulations and implications.

8.4 Donors to mine action

Those organisations contracting or funding mine action operations shall:

- a) ensure that the projects they are funding are managed effectively, and in accordance with NMAS and/or IMAS;
- b) ensure that NMAAs and mine action organisations chosen to carry out such services/contracts are competent, and likely to meet IMAS and/or NMAS accreditation criteria; and
- c) ensure that standards and guidelines for quality management are applied, including monitoring and post-clearance documentation.

Annex A (Normative) References

The following normative documents contain provisions, which, through reference in this text, constitute provisions of this part of the standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this part of the standard are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid ISO or EN:

- a) IMAS 04.10 - Glossary of mine action terms, definitions and abbreviations;
- b) IMAS 07.12 - Quality Management in Mine Action;
- c) IMAS 07.20 – Guide for the development and management of mine action contracts;
- d) IMAS 07.30 - Accreditation of demining organisations and operations;
- e) IMAS 07.40– Monitoring of mine action organisations;
- f) IMAS 08.10- Non-technical Survey;
- g) IMAS 08.20- Technical Survey;
- h) IMAS 09.10- Clearance requirements;
- i) IMAS 09.11- Battle area clearance;
- j) IMAS 05.10- Information management for mine action;
- k) IMAS 08.30- Post-clearance documentation;
- l) IMAS 08.40- Marking mine and ERW hazards;
- m) IMAS 09.50- Mechanical demining.

Informative references:

- n) TNMA 10.10/03 - Explosive Ordnance Hazard Risk Assessment in Debris Management (Rubble Removal) Operations;
- o) TNMA 10.20/01 - Estimation of Explosion Danger Areas.

The latest version/edition of these references should be used. GICHD hold copies of all references used in this standard. A register of the latest version/edition of the IMAS standards, guides and references is maintained by GICHD, and can be read on the IMAS website (<http://www.mineactionstandards.org/>). NMAA, employers and other interested bodies and organisations should obtain copies before commencing mine action programmes.

Annex B (Informative) Building Search Equipment

The following is potential equipment required for Building Clearance:

- Hook and Line pulling equipment for semi-remote disruption including:
 - Cable(s) of sufficient strength and length to operate from a safe area;
 - Fittings for enabling changes of direction;
 - Attachment fittings to safely and effectively attach the cable to potential targets and move them through more than one plane.
- Hand tools for manual entry to be used on fixtures and fittings within the building;
- Metal Mine Detectors (MMD). The use of magnetometers over Bi-polar technology may be preferred due to the lack of interference from structural components in buildings. Visual and fingertip search may be the only option if the Threat Assessment dictates a deliberate search for victim operated EO;
- Equipment such as weight droppers to semi-remotely opening doors and proving flooring;
- Lighting for use in buildings where natural light is not sufficient for a manual search. This could include personal lamps and/or a static floodlight system;
- Working at height and access tools. This could include ladders and equipment to provide a safer working environment whilst working at height (harnesses and PPE);
- Specialist casualty evacuation equipment including specialist stretchers and casualty handling equipment;
- Wire (short and long) detection tools;
- Long range optics including scopes and binoculars;
- US for standoff survey and observation;
- Endoscopes to search inaccessible areas and objects;
- Tripwire feelers.

Annex C (Informative) Building Search Safety Distances

Multi agency liaison with local authorities will help ensure that appropriate cordon and evacuation can be achieved during the operation. This can be supported by other activities such as Risk Education for the effected communities and ensure the engagement between MA organisations and beneficiaries is maintained.

Suspected Explosive Threat

- **Searchers (individual and team) safety distances.** The task must be planned and executed to reduce the potential number of casualties to a minimum in the event of an un-planned detonation or structure failure. When conducting Building Search the 3-dimensional environments, along with the building's construction type should be considered. If there is a threat of VO explosive hazards there should never be more than one searcher per room and it is further recommended that a separation of 2 interior walls / floors between searchers is maintained¹⁰. There should never be a searcher in a room directly above or below another.
- **Public safety distances.** Until an explosive threat is confirmed a cordon and evacuation distance of 100m should be enforced. It is possible, depending on the Threat Assessment, and an analysis of the specific context, that this can be reduced.

Confirmed Explosive Ordnance

Once EO has been confirmed then an appropriate safety distance accounting for an un-intentional explosion should be implemented. IMAS 09.30 and IMAS 09.31 should be referred to, along with Technical Note (TN) 10.20 which provides safety distances that are in line with the disposal of Unexploded Ordnance (UXO). This sets a minimum distance that may be beyond the capacity of some security forces to implement in an urban environment. The NMAA must ensure that they are providing achievable guidance and direction to enable MA operators to manage and hold risk at an appropriate level. This should include assessment of secondary hazards such as fuel that could enhance the effects of an explosion and breaking glass or debris from un-stable structures that could increase secondary fragmentation.

¹⁰ A risk assessment should be conducted to ensure that the building's construction type makes this assumption is valid.

Annex D

(Informative)

Building Search Personal Protective Equipment

When assessing the appropriate PPE for Building Search, there must be consideration of what the equipment is trying to protect the searcher against. Most common PPE for demining is designed to protect the wearer to the front only, against conventional Anti-Personnel (AP) blast mines containing 240gm of explosives in open environments¹¹. However, in buildings the blast and fragmentation will be at least partially contained, with the blast and fragmentation ricocheting off at least six surfaces of walls, ceiling and floor increasing the chance of blast injuries¹². With this in mind, the level of protection that can be reasonably provided must be balanced against the PPE hampering, the searchers ability to conduct effective search and not increase the probability of functioning an explosive hazard. Factors that should be considered:

- Ability to manoeuvre the searcher's head and body into spaces while searching;
- Accessing restrictive spaces such as false ceilings;
- Mitigating against inadvertent interaction with the local environment while wearing bulky PPE or PPE with protruding parts e.g. aprons, collars and shoulder reinforcement;
- Eye protection of the type that enables the searcher to manoeuvre well and allow ease of removal in order to use the light levels in a building and identify indicators of explosive hazards at the earliest opportunity and from a distance;
- The temperature differential inside buildings causing some types of eye protection such as full-face visors to mist and hamper visibility.

¹¹ IMAS 10.30 "Safety & occupational health - Personal Protective Equipment"

¹² "Blast injury in enclosed spaces", U.S. National library of Medicine