



Cambodian Mine Action Sector Briefing Paper Series

Baseline Survey, Non- Technical Survey, and Technical Survey



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Clearing for Results IV
Mine Action for Human
Development

Briefing Paper: Baseline Survey, Non-Technical Survey, and Technical Survey for the Mine Action Sector in Cambodia

Introduction

Humanitarian mine clearance operations in Cambodia started in 1992 with the support of the United Nations Transitional Authority in Cambodia (UNTAC) to clear transportation routes to enable the repatriation of hundreds of thousands of Cambodian refugees living in camps in Thailand back to Cambodia. When clearance of the routes was completed, clearance operations shifted to clear land to support the resettlement of the refugees. Due to the magnitude of the landmine contamination, the clearance was then extended to clear land for agriculture and productive use to support local reconstruction and development projects without knowing the locations and the level of the contamination in the country.

In 2000, the Royal Government of Cambodia (RGC), through the Cambodian Mine Action Centre (CMAC), requested the Government of Canada to fund a National Level 1 Survey – a general survey to identify suspect areas - of Cambodia to understand the magnitude of contamination and to support the mine clearance prioritization. The Government of Canada, through the Canadian International Development Agency (CIDA), agreed to support and contracted a Canadian Company (GeoSpatial International) to conduct the National Level 1 Survey with CMAC providing staff to work for this project. The project commenced in October 2000 and concluded in April 2002. The Survey results showed that 46% of Cambodia's villages were situated on contaminated lands covering 4,544 km² (about 2.5% of Cambodia's territory). Results from the Survey were released to the RGC through CMAC for the benefit (utilization) of the mine action sector.

In 2008, when mine clearance operators in Cambodia were invited by the Cambodian Mine Action and Victim Assistance Authority (CMAA) to quantify the remaining challenges in preparation for the RGC's first extension request to the deadline for Cambodia to complete clearance of all known minefields from 2010-2019 under Article 5 of the Convention on the Prohibition of the Use, Stockpiling, Production and Transfer of Anti-Personnel Mines and on Their Destruction (also known as the Anti-Personnel Mine Ban Convention -

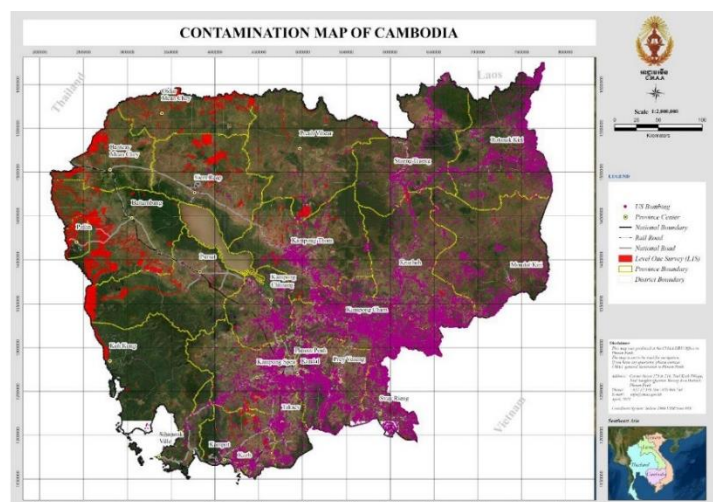


Image 1: Map courtesy of CMAA

APMBC); the clearance operators collectively acknowledged that data from the National Level 1 Survey was no longer accurate and reliable. This was based on the collective understanding that some suspected minefields had been reclaimed for productive use, additional contaminated areas had not been identified, inaccuracies existed in the records of suspected areas, and some contaminated areas were deemed too large to be accepted. As a result, it was agreed a new comprehensive Baseline Survey was needed with the findings superseding the previous data from the original National Level 1 Survey. The objective of the Baseline Survey was to better define the magnitude of the remaining contamination by defining the boundaries of suspected lands and to classify the lands according to the nature of the contamination in a standardized manner. It was also agreed that the Baseline Survey shall be conducted by CMAC, HALO Trust and MAG and managed by the CMAA under a Standard to be developed jointly by the CMAA and the three operators.

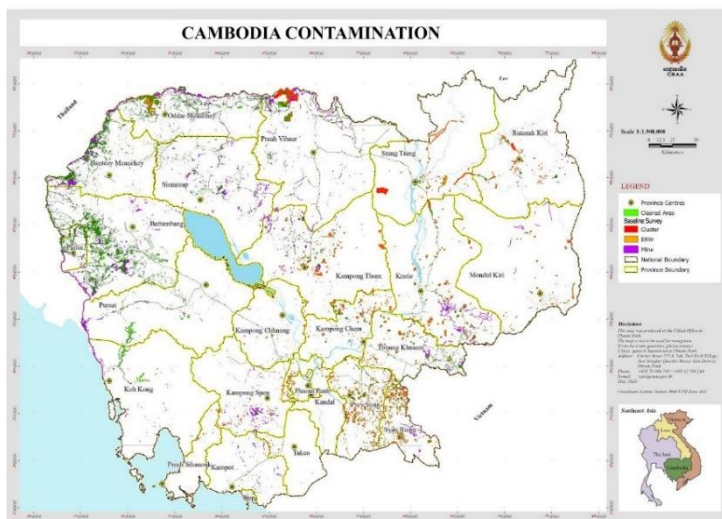


Image 2: Map courtesy of CMAA

Following completion of the Baseline Survey Standard and associated Standard Operating Procedures (SOPs), training, field testing, and dissemination of lessons learned from the field testing by the three operators, the first Baseline Survey commenced through the three operators in late 2009 focusing on the 23 most densely contaminated districts on Cambodia’s north-west boarder shared with Thailand. In May 2011, the Baseline Survey of the 23 districts was completed and the Survey was expanded to other districts. By the end of 2012, 124 districts had undergone a Baseline Survey. The

Baseline Survey across the entirety of Cambodia was finally completed in late 2020, finishing with districts in the eastern provinces that are mostly contaminated by explosive remnants of war (ERW).

Before 2012, only clearance activities were used to release minefields. Recognizing it is not efficient to have only one method to release minefields due to vastly differing terrain and threat levels, even within the same minefield, CMAC in cooperation with NPA (Norwegian People’s Aid) and GICHD (Geneva International Center for Humanitarian Demining) jointly developed two additional methods to release minefields to complement the clearance. The two methods were Non-Technical Survey and Technical Survey. The development and trial of the two methods ran from 2009 to 2011, with CMAC officially implementing the two methods to supplement clearance activities from 2012 onward.

The purpose of this briefing paper is to provide the reader with a better understanding of the Baseline Survey, Non-Technical Survey, and Technical Survey processes that are being implemented by the mine action sector in Cambodia to complement traditional clearance activities.

Definitions

Baseline Survey

Baseline Survey is an activity undertaken to collect and analyze local information in order to determine the size and the classification of a mine suspected land. In short, a Baseline Survey identifies and records suspected minefields for releasing.

Non-Technical Survey

Non-Technical Survey aims to confirm whether there is evidence of a hazard or not, to identify the type and extent of hazards, and to define, as far as possible, the perimeter of the suspected hazardous areas without physical intervention. In short, Non-Technical Survey is a method used to release a suspected minefield based on information.

Technical Survey

Technical Survey involves the utilization of technical assets (deminers, animals and/or machines) to confirm the presence of mines on suspected land. In short, Technical Survey is a method used to release a suspected minefield land with the use of clearance assets and to define contaminated land for clearance.

Land release

In the Cambodian mine action context, the term land release refers to the conversion of suspected minefield land to an end-stage land. Released land generally refers to land that has been released through Non-Technical Survey and/or Technical Survey. However, we can say that 'this land was released through clearance'. Thus, the term land release refers to the conversion of suspected minefield land to end-stage land whether it is through Non-Technical Survey, Technical Survey and/or clearance.



Image 3: Photo courtesy of CMAC

Responsibilities

Cambodian Mine Action and Victim Assistance Authority (CMAA)

The CMAA was established by the Royal Decree No. 160 in September 2000 with the mandate to regulate, coordinate and monitor the mine action sector in Cambodia. On the technical aspects, the CMAA is responsible for development of Cambodian Mine Action Standards (CMAS) and monitoring their implementation by the operators. The CMAS is developed based on International Mine Action Standards (IMAS) and the practical experience gained over the years by the Cambodian mine action sector. Operators have been consistently involved in the development and revision of the CMAS.

Survey and clearance operators

Based on the CMAS issued by the CMAA, the survey and clearance operators are responsible for development of SOPs to ensure they meet the minimum requirements of the CMAS. The CMAA has access to operators' SOPs to provide recommendations for improvement before their implementation. Operators are to ensure that field activities follow the approved SOP and discrepancies are detected and addressed in a timely manner.

The process of Baseline Survey, Non-Technical Survey, and Technical Survey in summary

During a conflict, the pattern of distribution and the reasoning behind the placement of landmines is easy to see. When the conflict ends, soldiers leave, but landmines remain in the ground. As time passes, the exact locations become less obvious and the pattern becomes less visible. As their locations become harder to access, fear in the returning population increases. Accidents frequently occur leading people to often avoid vast areas, including areas that are actually safe. Land release involves surveying a large and exaggerated suspected hazardous area using new methods to quickly identify and eliminate safe areas from the risk picture and directing both time and resources to those areas which do contain landmines.

Baseline Survey

Baseline Survey was first introduced in late 2009 resulting from a collective decision by the mine action sector in Cambodia. The objective of the Baseline Survey was to better define the magnitude of the remaining contamination by demarcating the boundaries of suspected lands and classifying the lands according to the nature of the contamination in a standardized manner. The Baseline Survey activity is guided by the Baseline Survey SOP that operators developed in accordance with the Baseline Survey Standard that was jointly developed by the CMAA and the clearance operators¹.



Image 1: Photo courtesy of CMAC

The Survey team, generally consisting of 4-5 people, review available survey data, clearance data, explosive ordnance disposal (EOD) data, accident data, etc., before they start working in a village. When the Survey team is in the village, they meet with the Village Chief and key informants² to confirm the presence of minefields recorded by the previous survey and seek information on

¹ CMAC, HALO Trust and MAG

² They key informant could include person who laid the mines, present or former soldier, mine victim, person who encountered the mines, person who used land close to the minefield.

suspected or emerging minefields that have not been previously captured, roughly sketching their positions on a map. The Survey team and key informants then systematically visit the potential minefields, inspecting ground conditions and seeking to understand land use around the minefield in order to define the boundaries and the threats of the minefield based on local knowledge and evidence obtained during the field visit.

The following list, while not exhaustive, constitutes evidence which is considered sufficient to record a piece of land as a confirmed/suspected minefield:

- Mine(s) is/are visible,
- Mine(s) is/are discovered by land user,
- Mine accident(s) to humans or animals,
- Explosion(s),
- Intelligence provided by present/former soldier/s involved in laying the mines,
- Military bases, etc.



Image 2: Photo courtesy of CMAA

When there is sufficient evidence collected, the Survey team records the coordinates of the minefield and completes the relevant survey form accordingly. The completed survey form is then presented to the Survey supervisor for confirmation before being submitted to head office for data entry. Finally, the data is sent to CMAA's Database Unit for final review and dissemination to the sector for their reference.

Non-Technical Survey

The objective of the Non-Technical Survey is to assess and release minefield land (entirely or partially based on the evidence) recorded by the previous survey without the use of mine detectors. A minefield identified 10 years ago is likely to change its shape and threat due to local activity reclaiming the minefield land for productive use, allowing a whole or partial release of the mined land through Non-Technical Survey.

According to the Land Release Standard (CMAS chapter 15), an anti-personnel minefield land can be released, entirely or partially, if the minefield land has been ploughed three time in a row without accident and without presence or information about the presence of mines. When the minefield land meets these criteria, the Survey team marks the coordinates of the land and completes the required land release form. When the



Image 3: Photo courtesy of CMAA

land release form is completed, it is sent to survey team supervisor for review of completeness and correctness before the data is entered into Information Management System for Mine Action (IMSMA) by head office. The data is sent periodically by the operator to CMAA's Database Unit who will complete the final check and share within the sector for reference.

There is a clear correlation between land reclamation activity and the amount of land that can be released through Non-Technical Survey. If the local land reclamation activity is increased, the chance for the minefield land to be released through Non-Technical Survey is high. In addition, if



Image 4: Photo courtesy of CMAAC

the quality of the Baseline Survey was poor, the chance for the minefield land to be released through Non-Technical Survey is high as well. This is due to both the efforts and commitment of the Survey team and their ability to source quality information from key informants - the people who plough, cultivate, and use the reclaimed minefield land.

Non-Technical Survey is the first step in the land release process. It involves the collection of information from a variety of sources, reviewing maps and field inspection. Once this information is collected and analyzed, a portion or the entirety of the suspected minefield land can be released.

Technical Survey

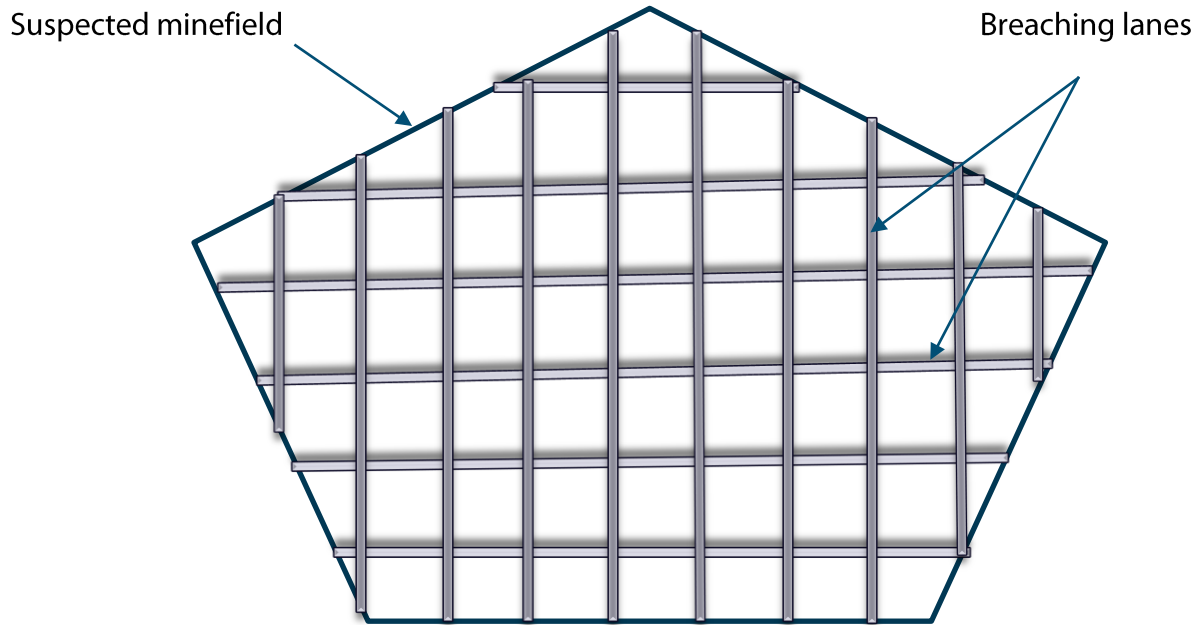
Technical Survey involves the utilization of technical assets (deminers, animals and/or machines) to confirm the presence of mines on a suspected land. Technical Survey may follow Non-Technical Survey or be implemented in conjunction with the Non-Technical Survey. Technical Survey may also be completed as part of the clearance process so that clearance can be best directed to confirmed hazardous areas. Technical Survey may result in hazardous areas being reduced so that no further clearance effort is required. There are three techniques under the Technical Survey method: 1) systematic inspection, 2) target investigation and 3) full coverage investigation as detailed in CMAS Chapter 15 on Land Release.

1. Systematic investigation refers to the systematic process of applying technical survey in a polygon with the deployment of breaching lanes clearance into part or all of the suspected minefield. The distance from one breaching lane to another is about 20-25 meters. The breaching lanes are deployed in two directions, at approximately 90 degrees, establishing square boxes. This technique is typically used where there are no areas within a polygon that are more likely than others to contain mines/ERW. However, if no mine or evidence of mine

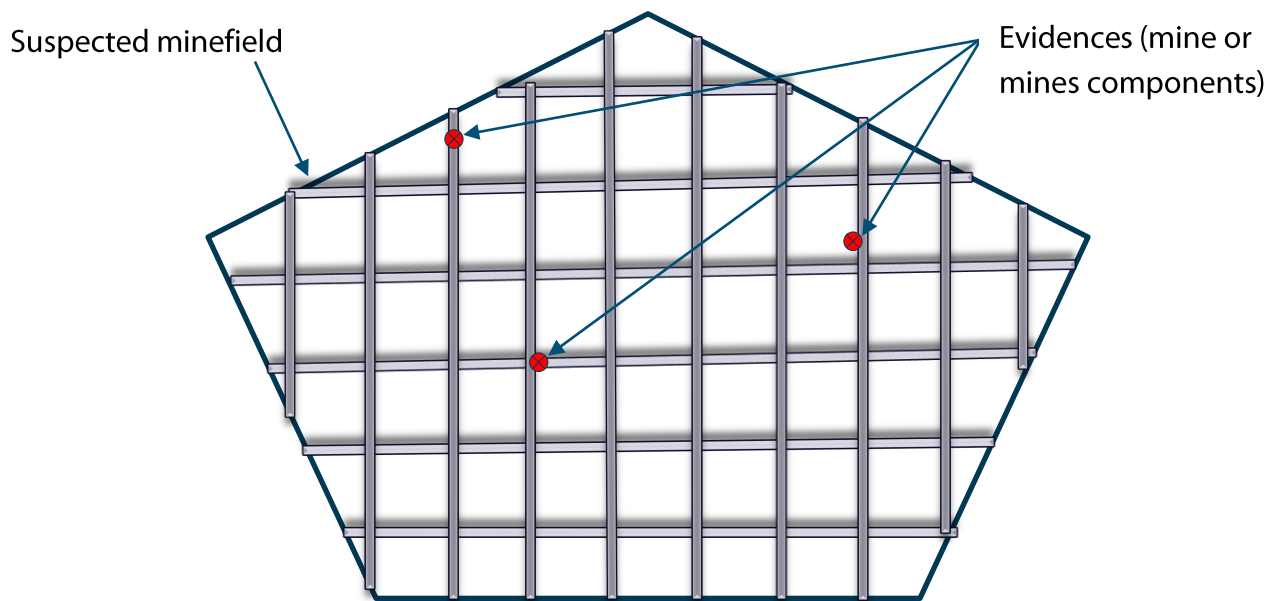


Image 5: Photo courtesy of CMAAC

presence can be established from the systematic inspection, the area is subject to be released. If there are indications of the presence of mines, a portion, or the entirety, of the suspected minefield will be cleared depending on the evidence found.



The drawing above shows that there is no evidence found from the employment of systematic investigation and as such the entire suspected minefield can be released to end-stage land.



The drawing above show that there is evidence of mines present resulting from the systematic investigation and as such the entire suspected minefield is subject to clearance. If during clearance

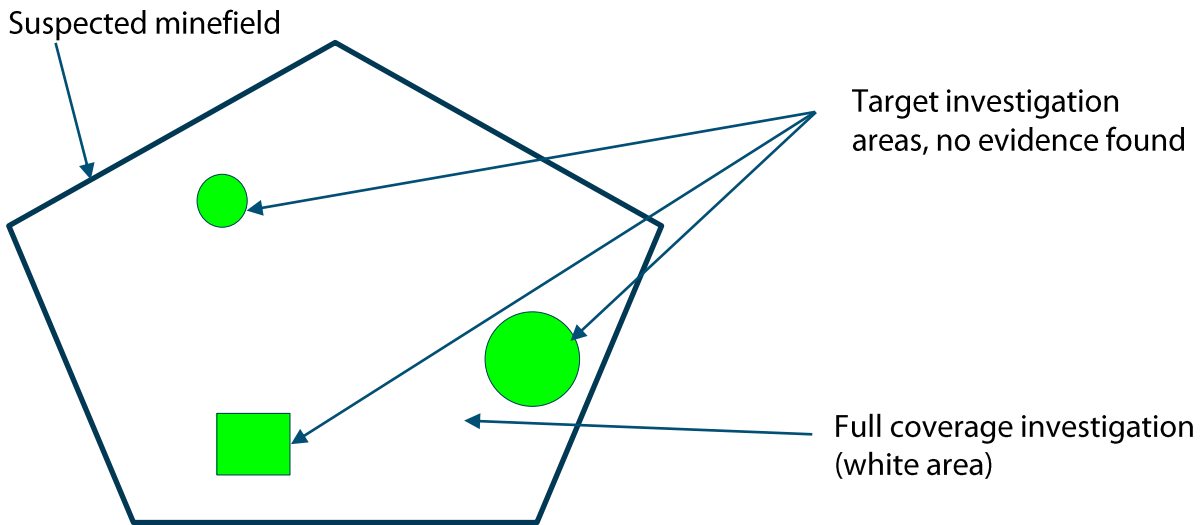
demining assets fail to identify mines, the methodology (clearance) shall be reviewed and the polygon subjected to further technical survey in order to confirm the presence of any further hazard or if the land can be released.



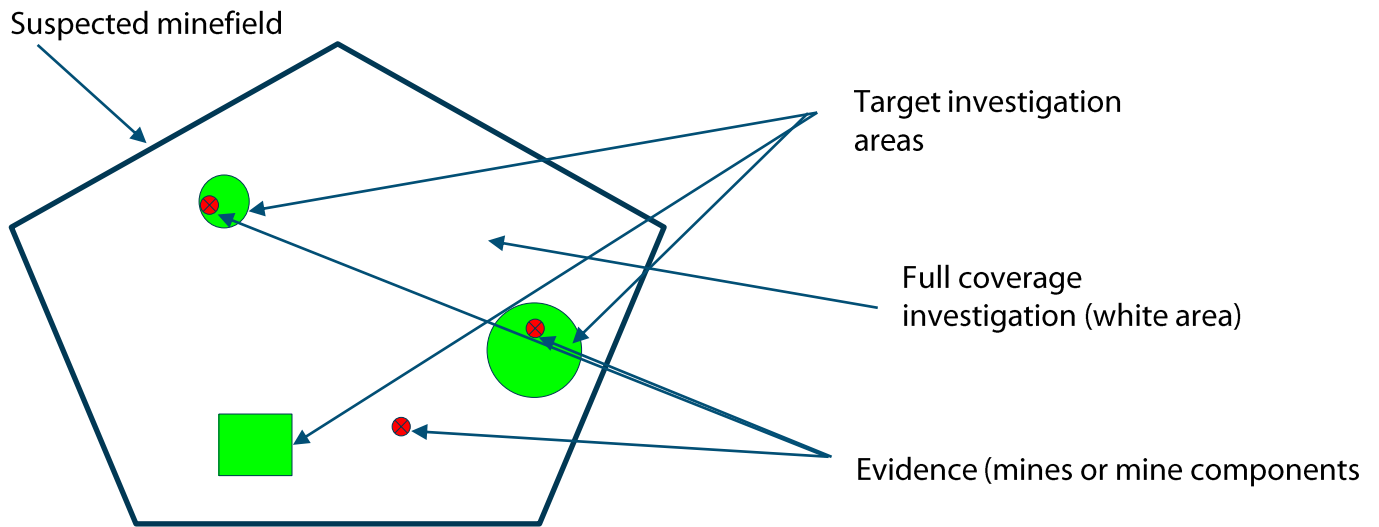
Image 6: Photo courtesy of CMAC

2. Target investigation refers to the deployment of clearance assets on certain areas of a polygon which are more likely to contain mines/ERW than others (e.g. previous accident sites or other evidence points) to find evidence of mines being present. If the target investigation cannot establish evidence of the presence of mine, the area is subject to be released. If there is indication of mines present, some or the entire area will be cleared depending on the evidence found. Target investigation is usually

implemented in conjunction with full coverage investigation if there are untouched (unused) areas within the reclaimed area. Target investigation technique is deployed on areas that have not been reclaimed, while full coverage investigation is deployed on areas that have been reclaimed.



The drawing above shows the implementation of target investigation in conjunction with full coverage investigation, and no evidence found. As such, the suspected minefield can be released to end-stage land.



The drawing above shows the implementation of target investigation in conjunction with full coverage inspection, where evidence of contamination was found through both techniques. In this case, the whole suspected minefield will require clearance.

Technical Survey is usually implemented after Non-Technical Survey and it is undertaken with a variety of tools such as manual deminers, animals and machines aiming to identify the evidence of mines for clearance assets to tackle.

3. Full coverage investigation refers to the deployment of deep search clearance onto a suspected minefield (partially or entirely) that has been ploughed to search for a large mine item. The search area may be released to end-stage land or cleared with mine detector depending on the evidence found during the deep search clearance.

A suspected minefield can be released through a single or a combination of the methods based on the characteristic and threat of the minefield as presented in the diagram below.



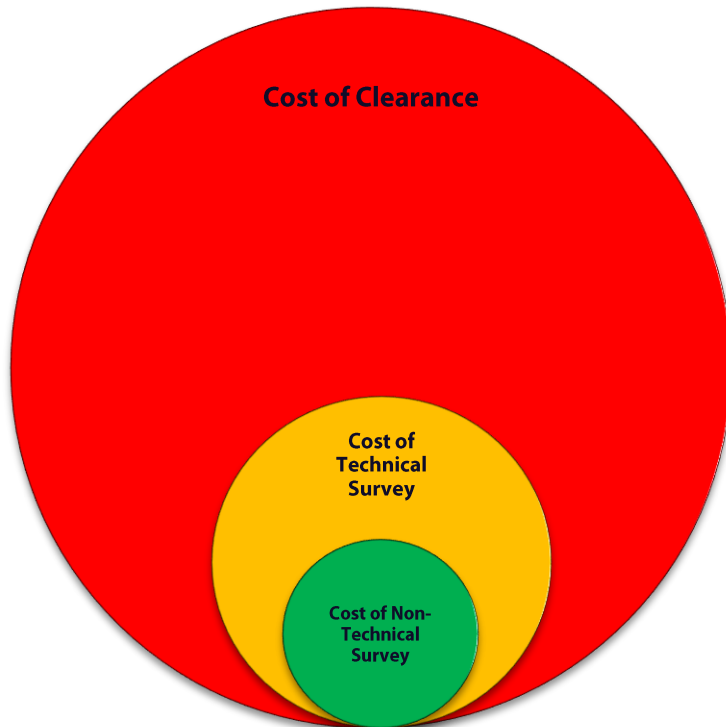
Image 7: Photo courtesy of CMAC



Note: International mine clearance operators in Cambodia also implement Non-Technical Survey and Technical Survey to complement clearance activities.

Costs of Non-Technical Survey, Technical Survey, and Clearance

The cost of releasing suspected minefields depends on the methods used to release the suspected minefield land. The cost of releasing suspected minefield is cheaper when the minefield is released through Non-Technical Survey and become progressively more expensive when released through Technical Survey, and most expensive when requiring release through clearance. The costs of releasing a suspected minefield through a combination of methods is generally cheaper than releasing through clearance alone.



In 2015, the Clearing for Results project implemented the first Non-Technical Survey by funding clearance operators to conduct Non-Technical Survey activities in the field, followed by a second Non-Technical Survey in 2017. Results from the Non-Technical Survey in the two-year period identified that 55,594,754 square meters of recorded suspected minefield land were released at a total cost of USD 795,146 (USD 0.0143 per square meter). Based on average clearance costs in 2015 (USD 0.1739 per square meter), releasing the same area through clearance would have costed the project about USD 9,666,316.

Increasing efforts towards Non-Technical Survey can contribute to efficient land release and redirection of resources to the areas of greatest need.

Challenges

In a country like Cambodia, the employment of Non-Technical Survey and Technical Survey to complement clearance is necessary. One of the challenges for the Baseline Survey and the Non-Technical Survey teams is the availability of suitable and reliable key informants on the ground, without whom Survey teams will face restrictions or delays to complete their work. Importantly, key informants need to include both women and men to gain an accurate understanding of land use across the whole population.

While there is a clear separation of responsibilities in the Cambodia’s mine action sector between the CMAA and operators, the sector could benefit further if operators who are conducting clearance refrain from conducting the Baseline Survey to mitigate against risk of fraud and potential conflict of interest. This separation of power will best allow the sector to operate in a collaborative, effective and efficient manner. As of 2021, CMAC, HALO Trust and MAG are conducting Baseline Surveys to record suspected minefields that have not been identified by the previous survey and are also conducting land release (Non-Technical Survey, Technical Survey, and Clearance).

Conclusion

During a conflict, the pattern, and the reasoning behind the placement of landmines is easy to see. As time passes, the exact location become less and less obvious. As the location becomes harder to access, fear in the returning population increases. The frequency of, or fear surrounding the potential for, accidents occurring will often result in people avoiding vast areas of land, even if the area is actually safe for productive use.

Land release involves surveying a large and exaggerated suspected hazardous area using new methods to quickly identify and separate safe areas from the risk picture, spending time and resources only on the areas actually containing landmines. Non-Technical Survey is the first step in the land release process, it involves the collection of information from the variety of sources, map review, and field inspection. Once this information is collected and analyzed, the whole or a portion of the suspected minefield can be released to end-state land.

Technical Survey is usually implemented after Non-Technical Survey. Technical Survey is undertaken with a variety of tools to identify the evidence of mines for clearance intervention to tackle. Non-Technical Survey and Technical Survey complement each other and together they produce a polygon referred to as a confirmed hazardous area and result in a more accurate understanding of landmine contamination for clearance.

When Non-Technical Survey and Technical Survey are properly applied, mine clearance should only take place in locations with actual landmine contamination. This area will be a lot smaller than areas traditionally cleared, saving both valuable time and money.

References

- Level 1 survey summary stats,
- CMAS Chapter 14: Baseline survey
- CMAS Chapter 15: Land release
- Report on the results of baseline survey in 124 districts
- Video on effective land release produced by NPA
- Best practice on the implementation of land reclamation non-technical survey,

UNDP Cambodia have been proud partners of the RGC in the mine action sector through the multi-donor funded flagship project Clearing for Results (CfR) since 2006. Now in its fourth and final phase, the CfRIV: Mine Action for Human Development (2020-2025) project is the transition project aimed at supporting the RGC, through the CMAA, to reach the RGCs goal of a mine free Cambodia by 2025 and strengthen broader national capacities to address residual threats post 2025. CfRIV is supported by contributions from Australia, the Republic of Korea, New Zealand, UNDP and the RGC.

