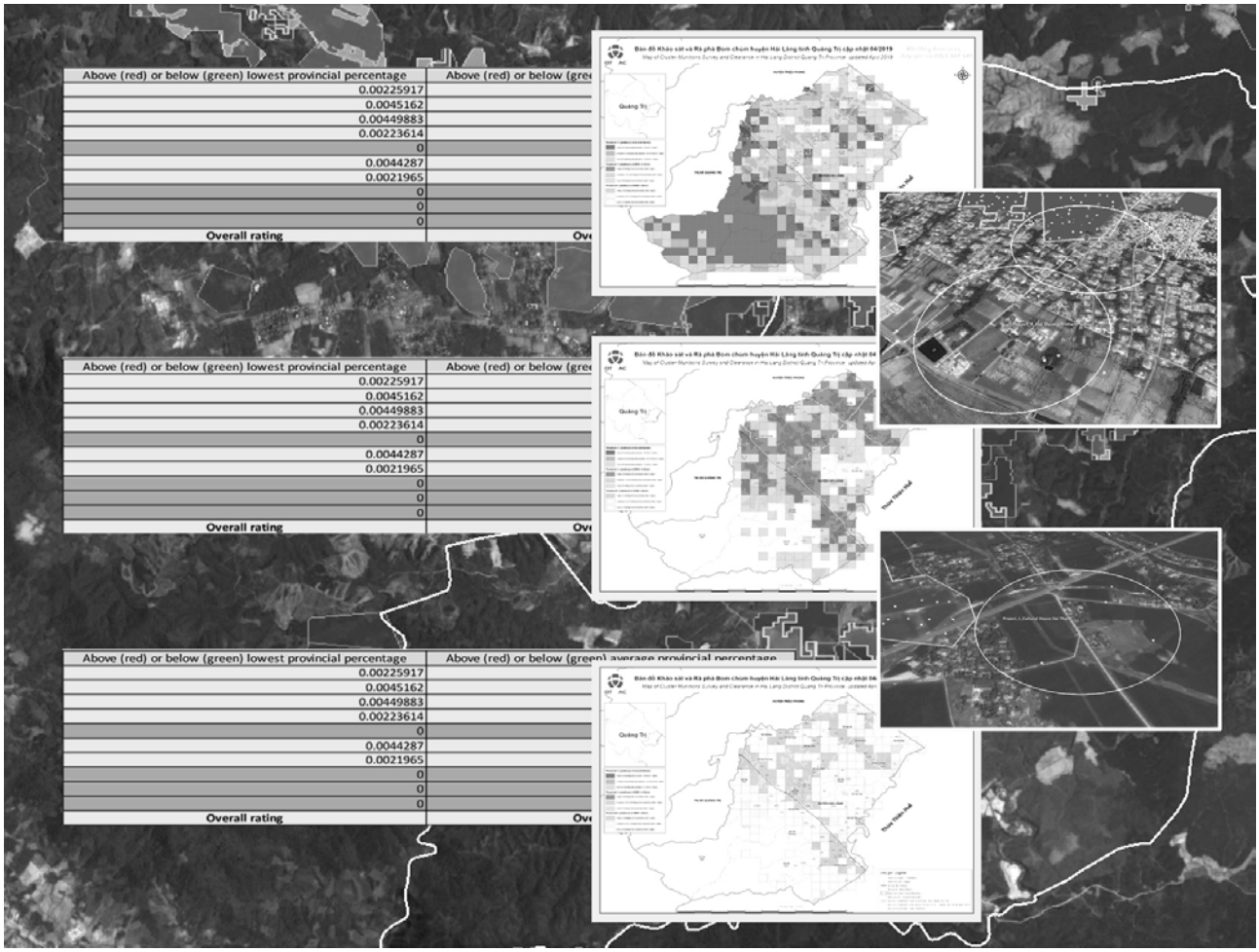

VIETNAM

LONG-TERM RISK MANAGEMENT TOOLS AND PROTOCOLS FOR RESIDUAL EXPLOSIVE ORDNANCE MITIGATION

GICHD

VNMAC
VIETNAM NATIONAL MINE ACTION CENTRE

GENEVA INTERNATIONAL CENTRE FOR HUMANITARIAN DEMINING (GICHD)

The Geneva International Centre for Humanitarian Demining (GICHD) works towards reducing risks to communities stemming from explosive ordnance, with particular focus on mines, cluster munitions, other explosive remnants of war and ammunition storage.

The Centre helps develop and professionalise the sector for the benefit of its partners: national and local authorities, donors, the United Nations, other international and regional organisations, non-governmental organisations, commercial companies and academia. It does so by combining three distinct lines of service: field support focused on capacity development and advice, multilateral work focused on norms and standards, and research and development focused on cutting-edge solutions.

Based at the Maison de la paix in Geneva, the GICHD employs around 70 staff members from 23 different countries. This makes the GICHD a unique and international centre of expertise and knowledge. Our work is made possible by core contributions, project funding and in-kind support from more than 30 governments and organisations.

Acknowledgements

The GICHD wishes to thank the author and contributors to this report: Katrin Stauffer, RISKey GmbH; Sn Col Tuan (retired), GICHD consultant; Vietnam National Mine Action Centre (VNMAC); Quảng Trị Mine Action Centre; Quảng Trị Province People's Committee; the International Centre, Hanoi; Norwegian People's Aid (NPA) and Mines Advisory Group (MAG).

This report was managed by Rob White, GICHD Advisor, and commissioned by the U.S. Department of State, Bureau of Political and Military Affairs - Weapons Removal and Abatement.

GENEVA INTERNATIONAL CENTRE FOR HUMANITARIAN DEMINING
Long-Term Risk Management Tools and Protocols for Residual Explosive Ordnance Mitigation, Vietnam.
GICHD, Geneva, 2019

VIETNAM

LONG-TERM RISK MANAGEMENT TOOLS AND PROTOCOLS FOR RESIDUAL EXPLOSIVE ORDNANCE MITIGATION

GENEVA INTERNATIONAL CENTRE
FOR HUMANITARIAN DEMINING

2019

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ABBREVIATIONS AND ACRONYMS

CHA	Confirmed hazardous area
CM	Cluster munition
CMR	Cluster munition remnant
CMRS	Cluster munition remnant survey
DoFA	Department of Foreign Affairs of the province of Quảng Trị
EO	Explosive ordnance
EOD	Explosive ordnance disposal
ERW	Explosive remnants of war
GICHD	Geneva International Centre for Humanitarian Demining
HE	High explosive
IHME	Institute of Health and Metrics Evaluation
KV-MAP	Korea-Vietnam Mine Action Project
LTRM	Long-term risk management
LWCC	Legacy of War Coordination Centre
MA	Mine action
MAC	Mine action centre
MAG	Mines Advisory Group
MORE	Management of residual explosive remnants of war
NGO	Non-governmental organisation
NPA	Norwegian People's Aid
NTS	Non-technical survey
PCCA	Post CMRS and clearance assessment
PM	Project manager
PTVN	PeaceTrees Vietnam
QTMAC	Quảng Trị Mine Action Centre
RE	Risk education
RSP	Render safe procedures
SEDP	Socio-economic development plan
SHA	Suspected hazardous area
TFM	Technical field manager
TS	Technical survey
UXO	Unexploded ordnance
VMND	Vietnamese Ministry of National Defence
VNMAC	Vietnam National Mine Action Centre

EXECUTIVE SUMMARY

The Management of Residual Explosive Remnants of War (MORE) framework is a holistic long-term risk management (LTRM) approach for handling the reality of risks posed by explosive ordnance (EO). The current Geneva International Centre for Humanitarian Demining (GICHD) project in Vietnam includes – amongst other objectives – the development and pilot of LTRM processes, tools and protocols in several provinces. Vietnam offers ideal preconditions for the testing of the concept. Not being a signatory of binding conventions, yet with the recently signed national mine action decree, leaves the national authority and national mine action centre with the question of how to identify a tolerable level of risk and the appropriate point in time to change from proactive survey and clearance to reactive risk management. This report gives a retrospective view of the completed project work, presents the results of a first pre-test of the LTRM framework in Quảng Trị province, and discusses implications for further testing and a possible implementation of the framework nationwide.

Based on an initial fact-finding visit in December 2017, the GICHD drafted a concept paper to demonstrate how the LTRM approach in Vietnam could be formulated and applied. This included an indicator-based concept to identify and evaluate the tolerable risk on a national/provincial and/or district level and tools to analyse site-specific risks posed by residual contamination. A second country visit was conducted in November/December 2018 to discuss the proposed concept and tools with the relevant stakeholders. Subsequently, the framework was reviewed based on the feedback collected, and indicators and tools to be used in the pre-test in Quảng Trị province were agreed during a third country visit in February/March 2019.

This first pre-test was conducted in two districts in Quảng Trị province and showed that agreed indicators for the evaluation of the tolerable level of risk and tools to conduct site-specific risk assessments are feasible with regard to data collection and analysis. However, an important insight presented in this report is that the evaluation requires the availability of a basic set of statistical data and resources to collect additional data in the field. The data collected in the pre-test was modelled on using different indicator options and thresholds in order to analyse how this changes the evaluation results. One of the crucial findings of the pre-test was that the choice of options and thresholds needs careful consideration. Evaluation results will not attest to a residual state even if proactive clearance has been completed, if overly stringent variables are applied. Another conclusion of the pre-test worthy of mention, shows that one of the proposed indicators (land use by affected people) does not help to decide whether a district should be considered as having achieved a residual state or not, as people use the land regardless of the potential of an EO threat and its possible effect on their well-being.

On the basis of this report, stakeholders will be able to further discuss the feasibility of the proposed indicators and to make an appropriate choice of variables for further testing and a potential nationwide implementation of the LTRM framework.

BACKGROUND AND RETROSPECTION

Vietnam's explosive ordnance (EO) problem is the result of the conflicts during the last century (First Indochina War and, more importantly, the Vietnam War/Second Indochina War). The nature of the contamination in Vietnam mainly concerns cluster munitions, aircraft bombs and other EO; mines are a minor problem. According to the official impact survey report (National Steering Committee 504, Vietnam Mine Action Centre, 2018), the survey of all provinces was completed in 2013. The official statement mentions that by 2014, 63 out of the 63 provinces/municipalities were contaminated with EO. However, the contamination problem, its handling, and the progress of proactive survey and clearance activities differs remarkably from province to province.

Vietnam's mine action programme has moved from military management to civilian oversight, but operations continue to depend largely on the armed forces. In 2013, Vietnam announced the decision of its prime minister to establish a national mine action centre (Vietnam National Mine Action Centre, VNMAC) to strengthen the management of mine action and provide a focal point for mine action operations. The centre became officially operational in February 2015, but only with the recently released national decree n° 18/2018/ND-CP on the management and implementation of mine action activities (Government of the Socialist Republic of Vietnam, 2019), has responsibility officially been delegated to the VNMAC. This includes accountability for a national mine action strategy and the appropriate planning and allocation of further resources to carry out proactive survey and clearance activities. As Vietnam is not a State Party member of the Mine Ban Treaty and has not acceded to the Convention on Cluster Munitions, it is not obliged to clear its mine/cluster munition contamination by a specific deadline. This implies that the considerations of what signifies "all reasonable effort" with regard to the completion of proactive mine action activities remains with the national authority and relevant stakeholders.

The long-term risk management (LTRM) framework, as compiled by the GICHD, aims to assist national authorities in this process by developing systems and tools that promote and enable evidence-based approaches to deal with EO in a post conflict country, in a residual context. The LTRM project in Vietnam, under the ownership of the VNMAC, has three main objectives:

- **Objective 1**: Study the ageing of explosive remnants of war (ERW) and environmental impact on the functionality of common residual ERW in Vietnam.
- **Objective 2**: Study, develop and pilot the long-term risk management model in order to enhance the LTRM capacity in mine action projects within Program 504 in Vietnam.
- **Objective 3**: Provide recommendations on developing an LTRM programme for mine action by piloting the information management (IM) model in certain localities, to evaluate and gain experience for the development of the IM system (IMS) at national level.

Quảng Trị province, the most heavily affected but also the most active and well-organised province with regard to mine action activities in Vietnam, was chosen for a first pre-test of the framework.

The present report gives an overview of the progress of work and the findings of the pre-test concerning objective 2 of the project. This pre-test aims to visualise implications and recommendations for the further testing of the framework on a larger scale. This chapter focuses on the recapitulation of the core ideas of LTRM and summarises past activities, discussions and decisions taken since the dissemination of the progress report in January 2019 and in preparation of the pre-test conducted in Quảng Trị in March 2019.

CORE IDEAS OF THE PROPOSED LTRM CONCEPT FOR VIETNAM

National standards and relevant treaty frameworks usually require proactive survey and clearance to apply all reasonable effort and achieve a tolerable level of risk with regard to the mine/EO threat. However, there are inevitably diminishing returns in the investment costs of a proactive approach and less effort is needed to maintain the tolerable risk level. This significant phase in the life cycle of a mine action programme marks the transition from proactive survey and clearance to a reactive risk management strategy.

The discussion of when "all reasonable effort" has been applied is equal to the discussion of what the tolerable level of risk is.[1] To identify the tolerable level of risk, not only hard facts such as, for example, the results of a cost-benefit analysis or death probability calculations should be considered, but also the risk perception of affected people which might differ from the real risk caused by the remaining contamination.

This implies that the tolerable level of risk depends on a country-specific or even on an area- specific context. What all reasonable effort stands for has therefore to be considered by national authorities/ government institutions. National guidelines have to focus on the definition of the methodology to be used to identify the tolerable level of risk and should propose appropriate thresholds for its evaluation.

It is important to note that proactive survey and clearance and a reactive risk management strategy do not conflict, but have to be applied in succession or in extension, to ensure all reasonable effort is taken to reduce the risk to a tolerable level. It is also obvious that evidence-based survey to evaluate the extent, type and impact of the contamination (risk identification phase) is mandatory and crucial for both, the proactive and the reactive approach.

Once all reasonable effort has been applied and risk dropped to a tolerable level (e.g. if only a certain extent and type of contamination is left that does not seriously affect the majority of people in their daily life) and a mine action programme changes to a reactive risk management approach, the remaining contamination will only be addressed if the specific type of ammunition (hazard) in conjunction with a specific land use (activity) in a specified area (location) poses a risk that cannot be accepted.

1 The term "tolerable risk" is defined as: *"Risk which is accepted in a given context based on current values of society"*, (United Nations Inter-Agency Coordination Group on Mine Action, 2014).

Illustration 1: In a reactive risk management approach, contamination is only addressed if the combination of the hazard, the location and the activity poses a risk that is not acceptable.

Therefore, it must be understood that the LTRM framework includes two processes. The first process aims to determine the tolerable level of risk and the evaluation of whether this level has been achieved or not (on a district, provincial and/or national level). The second process includes the set-up of the structure, organisation and principles to manage the residual risk.

This is based on the evaluation of site-specific contamination in conjunction with planned activities.

The illustrations on the next two pages give an overview of the two processes as proposed in the case of Vietnam. Illustration 2 shows how the tolerable level of risk is identified and evaluated to decide whether the change from a proactive to a reactive approach is appropriate. Illustration 3 explains how risks posed by residual contamination can be evaluated, once a reactive risk management approach has been applied.

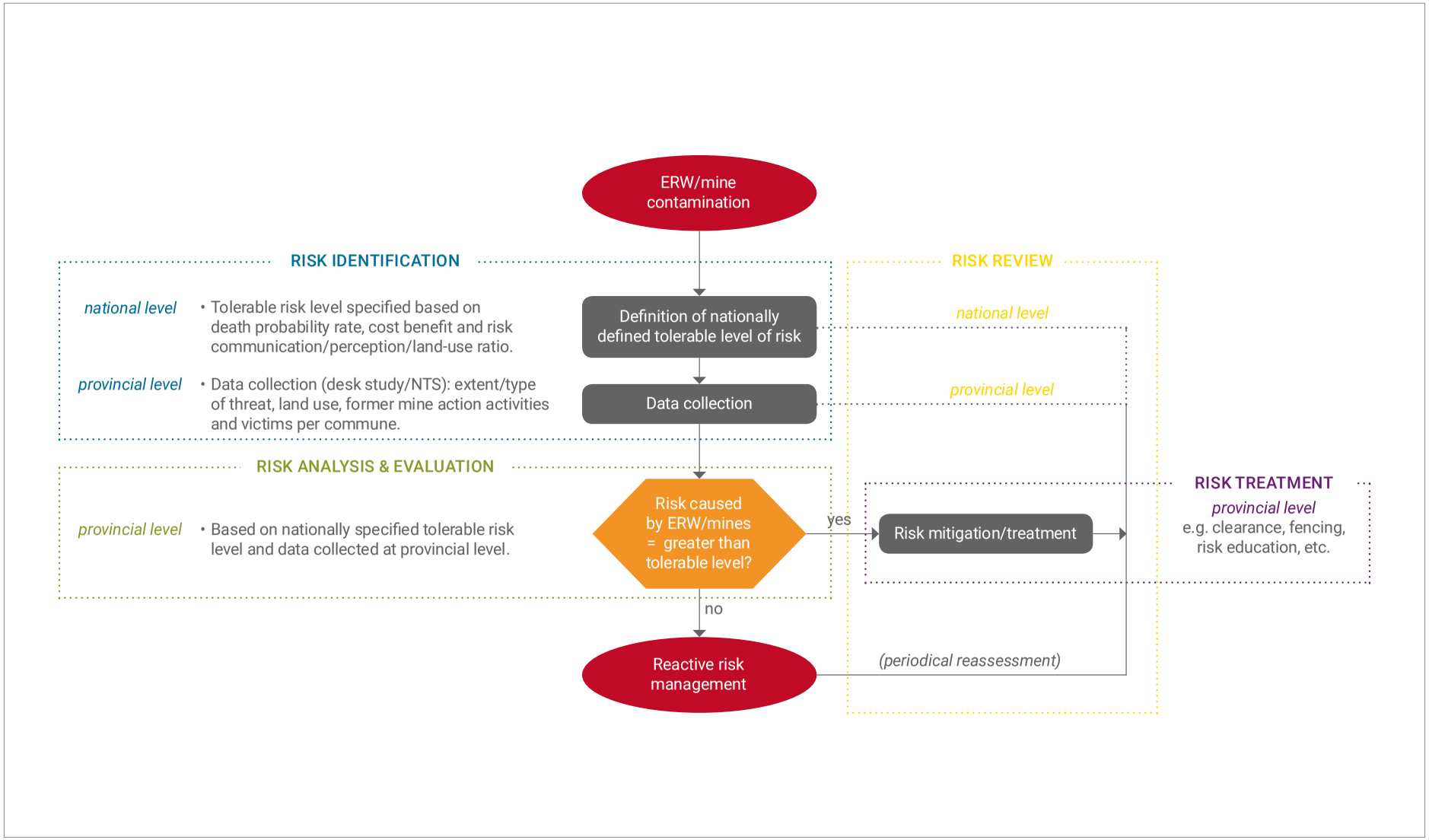


Illustration 2: First process to identify and evaluate the tolerable level of risk, which can lead to the change to a reactive risk management approach.

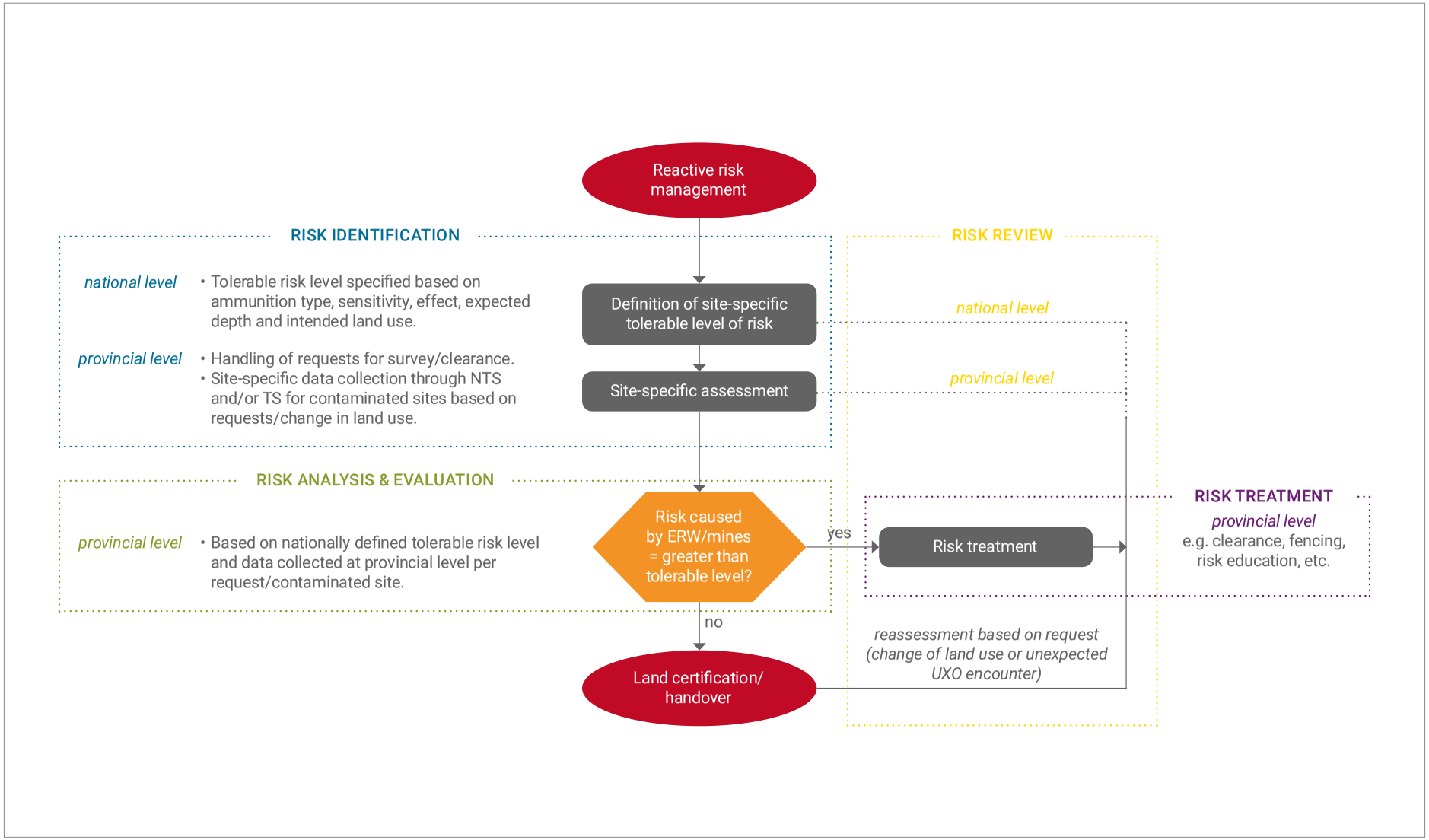


Illustration 3: Second process to evaluate the site-specific risk posed by remaining EO contamination once a reactive risk management approach is applied.

It is important to note that both processes include a risk review loop. The evaluation of the tolerable level of risk might not always give the same result. It is possible that a tolerable level has been achieved and the change to a reactive risk management approach is reasonable today, but the risks posed by the remaining contamination increase above a tolerable level again in a few years, due to changes in the country-specific context (e.g. an increase of EO-related accidents because of resettlement projects, general increase in living standards, etc.). This implies that the thresholds used for the evaluation of the tolerable level of risk and the evaluation itself have to be reconsidered and reviewed on a regular basis (e.g. every five years).

A risk review loop is also important for the handling of site-specific residual contamination in a reactive risk management context. Changes on assessed sites (e.g. the assessment done was for planned construction work down to 3 m but a change in the plans now require construction work down to 5 m) or an unexpected unexploded ordnance (UXO) encounter during activities on the assessed site (e.g. the assessment was based on cluster munitions and UXO < 155 mm, but during the construction work an aircraft bomb is discovered) will require a reassessment and a new evaluation of the risk posed by the residual contamination on that site.

The LTRM framework for Vietnam includes instruments (indicators) to identify and evaluate a tolerable level of risk (first process) as well as tools to evaluate site-specific risks caused by residual contamination (second process). The indicators initially proposed consider the death probability rate (indicator 1), people's risk perception, land use and benefit of former risk education (RE) activities (indicator 2) and a cost-benefit analysis (indicator 3). The tools to evaluate risks posed by residual contamination consist of two forms. Form B1 is proposed to conduct a general risk assessment for a specific site, for evaluating the contamination, location and planned activities in general. Form B2 is used to analyse the situation on a contaminated site more specifically and to propose risk mitigation measures in conjunction with the planned activities. The instruments and tools initially proposed were introduced in previous reports (Geneva International Centre for Humanitarian Demining GICHD, 2018a – 2018f) and were discussed, reviewed and finalised during the last country visit in February/March 2019. The following section gives an overview of the work progress, relevant discussions and decisions taken in preparation of the pre-test in Quảng Trị.

WORK PROGRESS, RELEVANT DISCUSSIONS AND DECISIONS IN PREPARATION OF THE PRE-TEST

The work for objective 2 of the LTRM project in Vietnam consists of 3 phases:

- **Phase 1)**: documentary and field research, draft of LTRM concept, tools and protocols (completed 01/2018).
- **Phase 2)**: presentation and discussion of the proposed concept, collection of feedback, finalisation of framework (completed 02/2019).
- **Phase 3)**: pre-test in Quảng Trị, data evaluation and reporting (completed 06/2019, results presented in the current report).
- **Extended phase 3)**: a national workshop to inform a broader audience on the insights and pilot study of the framework in other provinces in Vietnam (ongoing).

The following table summarises relevant discussions and decisions taken in phase 2) in preparation of the pre-test in Quảng Trị province (phase 3).

Table 1: Overview of discussions and decisions taken in preparation of the pre-test in Quảng Trị.

RELEVANT DISCUSSIONS AND DECISIONS TAKEN IN PROJECT PHASE 3)

1. GENERAL SUBJECTS

Change of wording

- The provincial mine action centre advised that their name has changed from The Legacy of War Coordination Centre (LWCC) to Quảng Trị Mine Action Centre (QTMAC).
- While the field test of the framework in Quảng Trị was initially referred to as a "pilot", it was decided that it should be renamed "pre-test" as it only represents a first small-scale test of proposed instruments and tools.

National framework/responsibilities

With the national decree n° 18/2018/ND-CP on the management and implementation of mine action activities, which came into force on 20 March 2019, the overall responsibility for all mine action activities in Vietnam was officially delegated to the VNMAC. This implies a reinforcement of the VNMAC's influence, including ownership of the LTRM project.

Scope and extent of the pre-test

Instead of pre-testing instruments (indicators) and tools at provincial level (Quảng Trị), it was decided to conduct the pre-test at district level, in two districts of Quảng Trị province. The reasons for this decision are listed as follows:

- As the characteristics, as well as the situation regarding contamination and impact may differ significantly from district to district, it was agreed that it would be more appropriate to evaluate a tolerable level of risk at district level than at an overall provincial level. The different results could then be listed and would indicate how many districts could already be considered as having achieved a residual state. This will help authorities and stakeholders to better allocate resources at district level, in order to achieve a province-wide residual state as fast as possible.
- It was discussed that the LTRM framework should only be applied in areas where at least proactive survey was advanced or has been completed in order to ensure enough data is available for evaluation if the extent and impact of the contamination is within the tolerable level of risk.
- In order to test how the results of the evaluation could differ depending on the situation and proactive work done in a specific district, it was decided to pre-test the LTRM framework in Cam Lộ and Hải Lăng districts. Both districts are heavily contaminated, but the extent and progress of proactive activities carried out, varies. In Cam Lộ, proactive survey has been completed and clearance activities are quite advanced (priority 1 and 2 cluster munition clearance tasks completed). In Hải Lăng, proactive survey is still ongoing and not much clearance has yet been done.
- The pre-test aimed to trial indicators and tools and to compare the influence of different thresholds in order to evaluate if or how they change a district's rating with regard to the achievement of a tolerable level of risk (see also sub-chapter, "Evaluation of the tolerable level of risk"). To obtain this decision-making basis, limited data is sufficient. In order to respect the time frame given for the pre-test, it was therefore decided to limit it to two districts and to collect the necessary additional field data by using a feasible limited sample size.

Scope and extent of the pilot

In addition to the pre-test, of which the results are presented in this report, the VNMAC announced its plan to conduct a follow-up pilot on a larger scale in Quảng Bình and Bình Định provinces. This proposal has to be seen in conjunction with the Korea-Vietnam Mine Action Project (KV-MAP), a survey and clearance project in cooperation with the governments of Korea and Vietnam that is currently ongoing in the two provinces. These resources could be used to collect additional data from the field if required. The current report will support further discussion if it is feasible to pilot the LTRM framework in these two provinces, which is principally a matter of data availability. The pilot in other provinces will illustrate if it is appropriate to use the same indicators and thresholds to identify the tolerable level of risk on a larger scale.

2. EVALUATION OF THE TOLERABLE LEVEL OF RISK

The following explanations give an overview of the proposed ideas, discussions held and decisions taken with regard to the three proposed indicators to evaluate a district, provincial and/or national tolerable level of risk.

Indicator 1: Death probability rate

- Basis for discussion: initially proposed definition of indicator 1 to evaluate the tolerable level or risk: *"The residual state (tolerable level of risk) is achieved, if the number of victims (both injured and fatalities) caused by EO has not been one of the top XX (XX = threshold; e.g. 10, 20, 30…) causes of death within the last 10 years."*
- Discussions with stakeholders: the idea of comparing EO victims with victims of other causes of death was discussed and it was proposed to either make this comparison by using an additional multiplying factor for EO victims (to express the low level of acceptability and high level of impact of such events), or to only look at EO victims at district level, in comparison to victims at provincial level, without considering other causes of death in the province. It was also proposed that the number of EO incidents, instead of victims, should be considered to evaluate the tolerable level of risk. This implies that not only accidents causing casualties but any events involving ammunition (e.g. EO ignited by an animal) should be taken into account.
- Decisions taken: it was agreed that both possibilities (the comparison with other causes of death and the comparison of EO victims at provincial and district level) should be pre-tested to get a better understanding of the indicator and its consequences on the result of the evaluation. Furthermore, it was agreed that the period covering the last 10 years should be considered (= threshold), as reliable data is only available for this period of time. On the other hand, it was decided that EO incidents should not be considered as an indicator, as such data has not been collected in the past and hence no data is available for evaluation. For the purpose of the pre-test, the following options and thresholds of indicator 1 were used:
    - Option A): *"The residual state (tolerable level of risk) is achieved, if the percentage of EO victims (injuries and fatalities)/per population/per year in a district over the last 10 years does not exceed the lowest percentage of EO victims in the whole province over the last 10 years more than XX times.*"*
      * Thresholds used: 0 times/3 times/5 times
    - Option B): *"The residual state (tolerable level of risk) is achieved, if the percentage of EO victims (injuries and fatalities)/per population/per year in a district over the last 10 years does not exceed the average percentage of EO victims in the whole province over the last 10 years more than XX times.*"*
      * Thresholds used: 0 times/3 times/5 times
    - Option C): *"The residual state (tolerable level of risk) is achieved, if the number of EO victims (injuries and fatalities) in a district has not been one of the top XX causes of death* in Vietnam in the last 10 years more than XX times.*"*
      * Thresholds to be tested: top 10 and top 20 causes of death; 0 times/3 times/5 times

Indicator 2: Risk perception, land use and benefit from former RE activities

- Basis for discussion: initially proposed definition of indicator 2 to evaluate the tolerable level or risk: *"The residual state (tolerable level of risk) is achieved, if at least XX%* of the affected population has directly benefitted from RE activities, not more than XX%* of the affected population feels that their well-being is compromised by using the land and at least XX%* of the affected population use the land despite the threat of EO."*
  * XX = different thresholds to be tested.
- Discussions with stakeholders: in general, stakeholders agreed with the proposed indicator, but it was suggested that the indicator be divided into three different ones for better comprehension and to emphasise that different aspects need to be taken into account.
- Decisions taken: it was decided that indicator 2 be divided as follows: indicator 2 (people's perception of risk), 3 (land use) and 4 (benefit from former RE activities). Furthermore, the stakeholders agreed to use different thresholds for the pre-test in order to illustrate how this changes the evaluation results. It was acknowledged that the testing of the indicators requires additional field data collection and that the sample size of the surveyed population would be guided by the resources available, hence it would not necessarily be representative. For the purpose of the pre-test, the definitions and thresholds used for indicators 2, 3 and 4 are described as follows:
  - Indicator 2: *"The residual state (tolerable level of risk) is achieved, if not more than XX%* of the affected population feel that their well-being is compromised by using land that potentially contains EO."*
    * Thresholds used = 40%, 50%, 60%.
  - Indicator 3: *"The residual state (tolerable level of risk) is achieved, if at least XX%* of the affected population use land despite a potential EO threat."*
    * Thresholds used = 80%, 70%, 60%.
  - Indicator 4: *"The residual state (tolerable level of risk) is achieved, if at least XX%* of the affected population have directly** benefitted from RE activities."*
    * Thresholds used = 80%, 70%, 60%.
    ** Direct benefit = at least one person in the interviewed household has already benefitted from direct RE sessions.

Note: For the purpose of the pre-test, the "affected population" is defined as being the population of a specific village that is surrounded by a number of identified confirmed hazardous areas (CHAs).

Indicator 3 (new indicator 5): Cost-benefit analysis

Basis for discussion: the following definition of indicator 3 (new indicator 5) to evaluate the tolerable level of risk was proposed: *"The residual state (tolerable level of risk)* is achieved if the cost to clear identified CHAs down to the required depth exceeds the increased land value for contaminated land in XX years.***

- Discussions with stakeholders: stakeholders did not agree with this indicator and argued that land prices differ significantly and can change very fast in Quảng Trị province, and that prices for clearance activities differ based on the type of land to be cleared (hillside or flat land, dense or no vegetation, etc.).
- Decisions taken: stakeholders decided that the indicator should not be used to evaluate the tolerable level of risk in the chosen pre-test districts and in Quảng Trị province. However, the GICHD informed stakeholders that they plan to include some basic calculations in order to evaluate whether the indicator could work in principle. Therefore, the GICHD requested information on provincial land prices and clearances prices.

3. SITE-SPECIFIC RISK ASSESSMENTS OF RESIDUAL CONTAMINATION

The following explanations give an overview of the proposed ideas, discussions held, and decisions taken with regard to the two proposed forms to assess site-specific risks caused by residual contamination.

Form B1: Mapping of residual contamination and risk-activity-matrix (general risk assessment)

- Basis for discussion: the proposed form B1 aims to map different types of residual contamination at community level, based on a desk study. In addition, the form includes a matrix showing which activities, in combination with which contamination types, cause a threat. It was initially planned that communities be provided with such a map/matrix when the change from proactive survey and clearance to a reactive risk management approach was considered. Such a form/overview would help local authorities to assess the general risks of different land uses and to request clearance if the planned land use signified a threat based on the remaining contamination.
- Discussions with stakeholders: the idea of having maps and a risk-activity matrix per community and handing it out to local authorities was seen as being problematic, as it may encourage people to request clearance more often than is required. The idea that residual contamination only being treated reactively if required, wouldn't be understood by locals, was also discussed. Furthermore, it was noted that the mapping of residual contamination would literally imply mapping the whole province, as residual contamination can be found in most places. During the workshop, a reviewed mapping idea was presented, showing only the likelihood of different types of residual contamination, which stakeholders found more appropriate. It was proposed that the US bombing data be overlaid, in order to calculate the likelihood of possible bomb findings. Another idea was to overlay battlefield maps, if such maps could be made available. The risk-activity matrix was seen as being feasible, in order to assess the general level of risk posed by a specific ammunition type in conjunction with a certain activity, although it was agreed that more ammunition categories and more details should be added to the activity categories.
- Decisions taken: the probability mapping and a reviewed risk-activity matrix (form B1) should be tested on several sites with planned development projects. The form should aim to support professional staff in carrying out risk assessments at the level of specific contaminated sites. The form should not aim to map contamination at community level and should not be handed out to local authorities. The risk-activity matrix should include recommendations for actions (risk mitigation measures) to be taken, if certain contamination in combination with a specific activity pose a threat.

Based on this feedback, form B1 was completely reviewed. The initial form B1 and the final form B1 after review are shown here, with explanations given as to the different changes made. The final form, shown subsequently, (pictures 3, 4 and 6) is the form used for the pre-test in Quảng Trị.

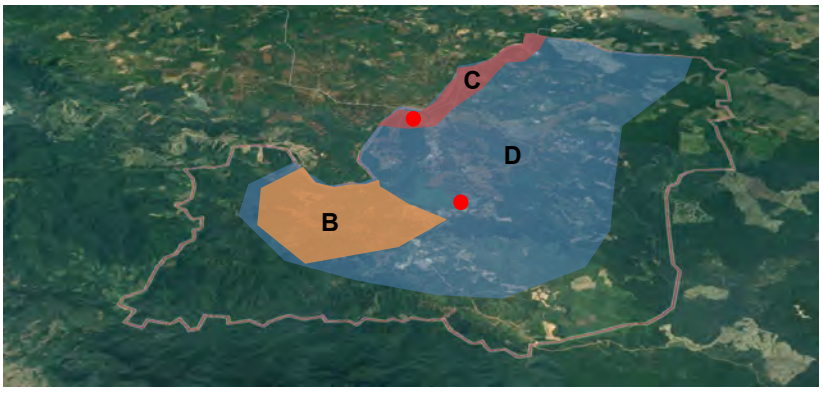
Initial form B1

1

Form B1: Community risk data form

General information			
Commune / District / Province	Cam Chính / Cam Lộ district / Quảng Trị		
Surveyor		Date of survey	
Type of investigation	☒ Desk assessment	☒ Non-technical survey	

Contamination							
A	Landmines	B	Cluster munitions	C	Aircraft bombs	D	Other ERW



Total area Cam Chính: 57 km²

B = approx. 5 km²

C = approx. 1.5 km²
300 hits along main road direction AH16

D = approx. 18 km²

= accident location

D = all activities allowed
B = intrusive activity not allowed
C = deep intrusive activity not allowed

2

Activity risk indication matrix						
	No human activity 1	Surface activity, non-mechanical 2	Surface activity, mechanical 3	Intrusive activity, shallow 4	Intrusive activity, deep 5	Remarks
Landmines A	A1	A2	A3	A4	A5	
Cluster Munitions B	B1	B2	B3	B4	B5	**The contamination map and the activity risk indication matrix should be given to the community.** **Yellow or red combinations should be avoided.**
Aircraft bombs C	C1	C2	C3	C4	C5	
Other ERW D	D1	D2	D3	D4	D5	

1 *The initial form B1 proposed a community-based mapping with four different types of possible residual contamination.*

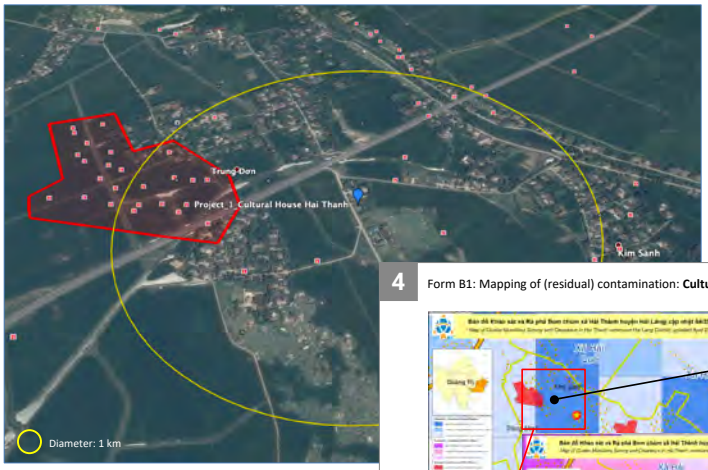
2 *A matrix was proposed to evaluate the risk of different types of residual contamination in combination with different types of activities.*

It was proposed that the form could support the change from proactive survey and clearance to a reactive risk management approach and be handed out to communities/local authorities.

Revised form B1 (used for the pre-test)

3

Form B1: Mapping of (residual) contamination: **Cultural House in Hải Thành**



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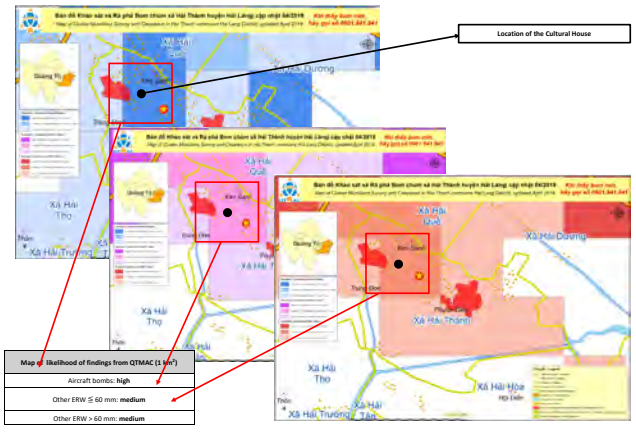
Form B1: Mapping of (residual) contamination: **Cultural House in Hải Thành**



3 *The revised form B1 aims to assess the general risk posed by residual contamination at site-specific level (e.g. on future development sites). The map showing the likelihood of different types of residual contamination is proposed as a starting point for such an assessment. Two different possibilities to map the likelihood (see pictures 3 and 4) of different contamination types are proposed for the pre-test. Both options count the findings of all activities (explosive ordnance disposal [EOD] call-outs and clearance tasks) in a certain grid box. With mapping option 1, the likelihood based on the number of findings is summed up on the second page of the form (see next page, picture 6), mapping option 2 shows the likelihood based on the findings directly on the map, by using different shades of colour.*

4

5

Likelihood of aircraft bombs
high = US bombing data indicates > 20 hits in 1 km diameter / grid box
medium = US bombing data indicates > 10 to 20 hits in 1 km diameter / grid box
low = US bombing data indicates ≤ 10 hits in 1 km diameter / grid box

Likelihood of ERW (without CM) ≤ 60 mm
high = > 20 findings from all activities in 1 km diameter / grid box
medium = > 10 to 20 findings from all activities in 1 km diameter / grid box
low = ≤ 10 findings from all activities in 1 km diameter / grid box

Likelihood of ERW (without CM) > 60 mm
high = > 10 findings from all activities in 1 km diameter / grid box
medium = > 5 to 10 findings from all activities in 1 km diameter / grid box
low = ≤ 5 findings from all activities in 1 km diameter / grid box

Likelihood of aircraft bombs
high = US bombing data indicates > 5 hits in 0.5 km diameter / grid box
medium = US bombing data indicates > 2 to 5 hits in 0.5 km diameter / grid box
low = US bombing data indicates ≤ 2 hits in 0.5 km diameter / grid box

Likelihood of ERW (without CM) ≤ 60 mm
high = > 10 findings from all activities in 0.5 km diameter / grid box
medium = > 5 to 10 findings from all activities in 0.5 km diameter / grid box
low = ≤ 5 findings from all activities in 0.5 km diameter / grid box

Likelihood of ERW (without CM) > 60 mm
high = > 5 findings from all activities in 0.5 km diameter / grid box
medium = > 2 to 5 findings from all activities in 0.5 km diameter / grid box
low = ≤ 2 findings from all activities in 0.5 km diameter / grid box

5

During the pre-test, two different thresholds were tested in order to analyse how they influence the result of the general risk assessment. The thresholds differ in regard of the grid/diameter to be used (1 km versus 0.5 km grid box/diameter) and the number of hits (bombs) and findings (EO) that can be located within that grid box. Three different types of ammunition are analysed: aircraft bombs, explosive ordnance larger than 60 mm and smaller or equal to 60 mm. The separation of EO into two different categories was proposed as the expected penetration depth (which is relevant in conjunction with planned activities) might differ for different calibres. Cluster munition (CM) findings from clearance tasks are not included, as the form and general risk assessment for residual contamination assumes that survey and proactive clearance of CM has been completed or advanced to a high degree.

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General risk assessment for residual contamination

Contamination / Activity matrix							
Contamination	Likelihood	No human activity	Surface activity, non-mechanical	Surface activity, mechanical	Intrusive activity, ≤ 30 cm	Intrusive activity, > 30 cm – 1 m	Intrusive activity, > 1 m
Aircraft bombs	High	0	0	0	0	0	2c
	Medium						
	Low						1a
Other ERW (> 60 mm)	High	0	0	0	1b	2b	2b
	Medium						
	Low				1a	1a	1a
Other ERW (≤ 60 mm)	High	0	0	1b	2a	2a	2a
	Medium						
	Low			1a	1a	1a	1a
Cluster munitions	Confirmed	0	0	1b	2a	2a	2a
Mines	Confirmed	0	2a	2a	2a	2a	2a

Required action					
0	No action required (land use poses no threat).	1a	No action (residual risk). In case of findings = EOD call-out and reassessment.	1b	Site-specific assessment to clarify land use / work steps.
2a	Conduct site-specific assessment to identify the exact perimeter of the planned intrusive work ≤ 30 cm and conduct clearance to that depth (and / or propose other risk mitigation measures).	2b	Conduct site-specific assessment to identify the exact perimeter of the planned intrusive work > 30 cm – 1 m and conduct clearance to the estimated maximum penetration depth of the expected ammunition > 60 mm (and / or propose other risk mitigation measures).	2c	Conduct site-specific assessment to identify the exact perimeter and depth of the planned intrusive work > 1m and conduct clearance to that depth (and / or propose other risk mitigation measures).

Findings from database (findings counted manually)		
Aircraft bombs: **low**	Other ERW ≤ 60 mm: **medium**	Other ERW > 60 mm: **low**

6

The revised risk-activity matrix for a general risk assessment includes more activity categories and a more detailed description of the activities with regard to the depth of the intrusive work. The different ammunition categories (residual contamination caused by aircraft bombs or EO) and likelihood of encounter of the category, leads to a different evaluation of the potential risk in conjunction with the planned activity. In contradiction to the initially proposed form, the revised form and matrix link the evaluation of the risk with recommended actions for risk mitigation. A low likelihood does not require action, a medium or high likelihood requires risk mitigation measures depending on the planned work, which automatically leads to a more detailed site-specific risk assessment (see the following chapter, form B2). The matrix also allows for the evaluation of the risks posed by cluster munitions and mines, should there be findings outside of identified or cleared CHA. However, no likelihood of encounter is calculated in such a case and the risk of further findings is considered as confirmed.

Form B2: Detailed site-specific risk assessment

- Basis for discussion: form B2 is proposed in order to conduct a detailed site-specific risk assessment of residual contamination, based on a detailed desk study and non-technical survey. The first section (general information) is used to describe the planned work steps in detail. The second section offers the possibility for a detailed risk assessment by identifying the "worst-case scenario" and the analysis of the expected ammunition type, its sensitivity, condition (e.g. based on the results of the ageing study, see objective 1 of the LTRM project, page 9 of this report) and penetration depth. A separate section on page 2 is used to discuss the risk acceptability with and without risk mitigation measures and to summarise discussions and agreements with the owner/user/investor on the specific site.
- Discussions with stakeholders: the form for a site-specific, detailed risk assessment of residual contamination and its functionality was understood and agreed in general, although it was suggested that the form be simplified and must be tested first, before a decision could be taken on whether it could be used on a larger scale or not.
- Decisions taken: the form (especially the part of the risk evaluation on page 2) should be simplified and tested on different sites planned for future development work.

Based on this feedback, form B2 was slightly reviewed. The initial form B2 and the final form B2 after review are shown on the next pages with explanations given of the different changes made. The final form, shown subsequently, is the form used for the pre-test in Quảng Trị.

Initial form B2

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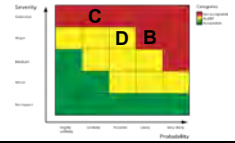
Form B2: Site-specific risk evaluation form

General information			
Project / Contaminated site	Cam Chính/industrial construction site/16.742479, 106.958692		
Investigator		**Date of investigation**	
Type of investigation	☒ Desk assessment	☒ Technical survey	
Expected contamination	B (CM), C (aircraft bombs), D (other ERW)		
Site preparation (process steps)	1) Vegetation cutting 2) Soil cutting with different kind of excavator/dumper down to 2 m 3) Soil cutting down to 5 m on selected areas 4) Construction of buildings		

Risk identification									
Expected ERW category	**Worst expected ammunition type / effect**	**Sensitivity**			**Expected condition**			**Expected depth**	**Expected worst case**	**Probability / Consequence worst case**
		Notable disturbance needed for ignition	Some disturbance needed for ignition	Little disturbance needed for ignition	Not likely to function anymore (ageing)	Partially still functioning (ageing)	Likely still functioning (ageing)			
B Cluster munitions	BLU26 HE FRAG	X				X		0 – 0.4 m	Detonation of an untampered BLU26 during activity 1) and 2)	
C Aircraft bombs	GP AN-M57 HE	X					X	2.5 – 5 m	Detonation of an untampered GP AN-M57 during activity 3)	
D Other ERW	Model O-881A HE FRAG		X				X	0 m	Detonation of an untampered PG-7G during activity 1)	
Comments										• **Extensive:** several deaths / injured • **Major:** 1 death / several injured • **Medium:** several injured • **Minor:** 1 injured • **No impact:** only damage to machines / vehicle • **Highly unlikely:** 1x in 1000 years • **Unlikely:** 1x in 100 years • **Possible:** 1x in 50 years • **Likely:** 1x in 10 years • **Very Likely:** 1x per year

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Risk acceptability without risk mitigation

- Categories B/C pose significant & category D a moderate risk to planned activities.
- Construction work can only take place if risk mitigation measures are applied.

Risk tolerable	Risk partly tolerable	**Risk not tolerable**

Risk acceptability with proposed mitigation measures

- Proposal 1: surface clearance of all ERW and sub-surface clearance of BLU26 or similar objects to a depth of 0.4 m. Sub-surface clearance to a depth of 5 m in selected areas (likelihood of all events changes to highly unlikely).
- Proposal 2: surface clearance of all ERW and sub-surface clearance of GP AN-M57 or similar objects to a depth of 5 m in selected areas. Protective measures for vehicles and machines against the effects of objects similar to a BLU26. No workers are allowed outside of protected machines during work (likelihood of all events changes to highly unlikely).

Residual risk tolerable	Residual risk partly tolerable	Residual risk not tolerable

Cost-benefit calculation

- Expected benefit from construction: approx. USD 50 million over 25 years
- Cost for risk mitigation measures proposal 1: approx. USD 15,000
- Cost for risk mitigation measures proposal 2: approx. USD 200,000

Agreement between stakeholders

- Implementation of risk mitigation measures proposal 1
- Cost for measures are shared between landowner and investor

7

8

The initial form B2 for a detailed, site-specific risk assessment of residual contamination provides a section for the detailed description of the work steps planned for the site. A second section is used to evaluate the credible worst-case scenario for each work step based on the expected ammunition type, its sensitivity, condition and penetration depth. A classical risk matrix with a probability/ consequence axis shows if the risk of a specific planned activity in conjunction with the expected contamination type is acceptable or not.

An additional section is then used to describe the risk evaluation result and to discuss the risk acceptability of the intended land use with the party that plans the activities on the contaminated site.

Revised form B2 (used for the pre-test)

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Form B2: Site-specific risk assessment: **Name of project site**

General information						
District / Commune / Coordinates				**Date of assessment:**		
Assessor company / Team / Name						
Project name / Planned activity			Construction (intrusive activity > 1 – 1.5 m)			
Result of general risk assessment	***Expected contamination:***	Aircraft bombs: low likelihood / other ERW: low likelihood of > 60 mm, medium likelihood of ≤ 60 mm				
	Required action:	2a for ≤ 60 mm (clearance down to 30 cm or other risk mitigation measures)				
Site-specific residual contamination						

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History of the site / Information from NTS	
Planned activities (detailed process steps and construction plans, if available)	

Detailed risk assessment

Expected ERW category	Worst expected ammunition type / effect	Sensitivity	Expected condition	Likelihood of encountering ammunition	Overall rating*	Expected depth	Work steps at risk	Expected worst case
Other ERW ≤ 60 mm	40 mm / HE	X	X	X	X	0 – 30 cm		Explosion of an untampered 40 mm grenade on the surface

Possible measures for risk mitigation:

Stakeholder discussion and decision:

Sensitivity	Notable disturbance needed for ignition		Some disturbance needed for ignition		Little disturbance needed for ignition
Expected condition	Not likely to function anymore		Partially still functioning		Likely still functioning
Likelihood			Medium		High

* Overall rating: 3 x green = **green (no action required)** / 3 x red = **red (action required)** / every other combination = **yellow (discuss risk acceptability with stakeholder)**

9

10

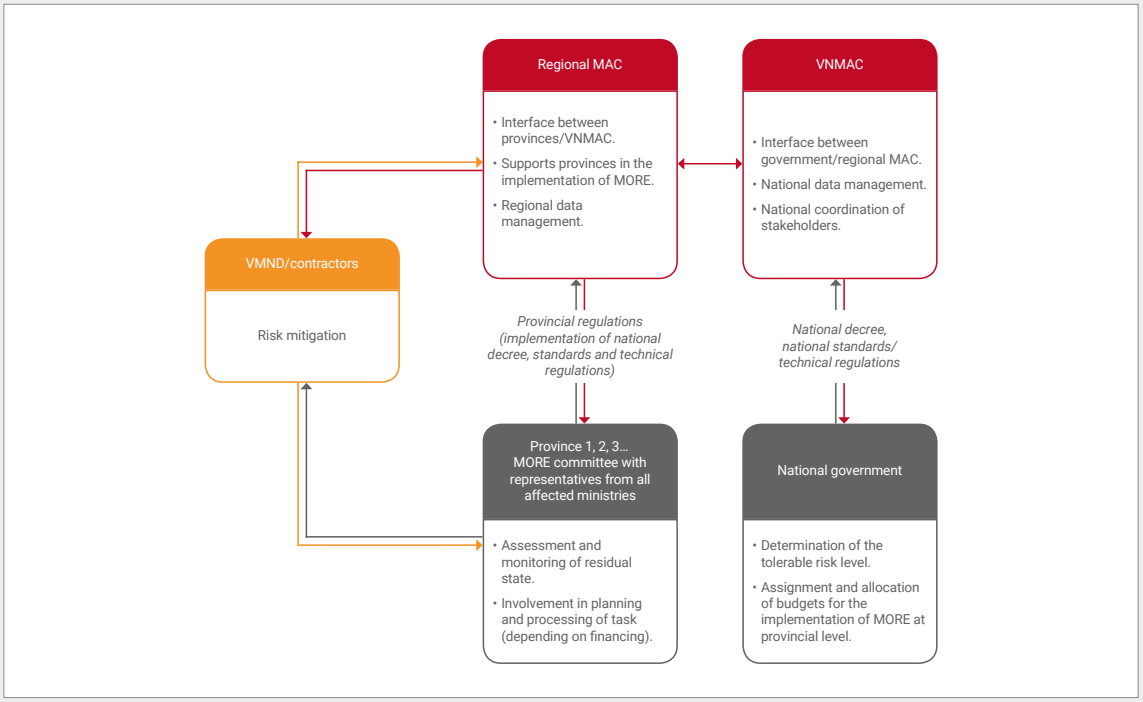
The revised form B2 for a detailed, site-specific risk assessment of residual contamination provides a section for general information in which the result of the general risk assessment (form B1) is repeated and the map of the specific site and its surroundings is shown again.

Separate sections are used to give an overview of the site's history with regard to past conflict, a detailed description of the work steps planned and the intended land use of the site. The detailed risk assessment still includes the evaluation of the expected worst case based on the ammunition type, condition and depth, but also considers the likelihood of encountering the ammunition. This leads to an overall rating in regard to the risk posed by different contamination/ammunition types. A risk matrix is no longer used and the expected worst cases per work step are established, to identify possible risk mitigation measures. A discussion with the relevant party is carried out, to determine whether the risk is acceptable or not with the mitigation measures that are proposed.

4. PROCESSES AND PROTOCOLS

The following explanations give an overview of the discussions held and decisions taken with regard to the processes and protocols needed to implement an LTRM approach.

- Basis for discussion: the first report (Geneva International Centre for Humanitarian Demining, GICHD, 2018a) proposing an LTRM framework for Vietnam also mentioned the need for clear overall processes and supporting protocols to enable national implementation of the framework (see picture below). However, the discussions so far have focused on the LTRM purpose, instruments and tools (e.g. what indicators should be used to evaluate the tolerable risk and what the forms for site-specific risk assessments should look like). The recently released national decree (Government of the Socialist Republic of Vietnam, 2019) that allocates the overall responsibility for mine action in Vietnam to VNMAC, and the experiences from the pre-test and following pilots in other provinces, will help to finalise instruments and tools and shift the discussion towards the processes and protocols required for a potential implementation of the LTRM at national level.



Possible structure, responsibilities and required protocols for the implementation of an LTRM framework in Vietnam.

- Discussions with stakeholders: there was agreement that protocols and guidelines are required to explain to provincial and local authorities how they have to proceed with future development sites. So far, development sites are usually cleared before any construction activities take place. Therefore, one of the required protocols in the LTRM process will have to specify that development sites have to undergo a general and detailed site-specific risk assessment (forms B1 and B2) before any clearance and construction activities are initiated.
- Decisions taken: no decisions were taken in regard to processes and protocols, but it was noted that the implementation of an LTRM framework requires clear guidelines and regulations at both national and provincial levels to ensure that the required process and procedures are understood.

The present chapter explained the core ideas of an LTRM framework, gave an overview of the situation in Vietnam and summarised the work progress and decisions taken with regard to the pre-test of instruments and tools in Quảng Trị province. The next two chapters focus on the pre-test itself and discuss applied data collection and evaluation methodologies as well as the findings of the test.

RESEARCH FRAMEWORK FOR THE PRE-TEST IN QUẢNG TRỊ

Throughout the different phases of the development of the LTRM concept and tools, different research frameworks were developed and used. This chapter gives an overview of the data collection and evaluation methodologies applied for the pre-test in Quảng Trị. The following table summarises what data was required in order to work with the different indicators and how it was collected and evaluated.

INSTRUMENT	PURPOSE	REQUIRED DATA	COLLECTION & EVALUATION	REMARKS
Indicator 1: Death probability rate	Identification and evaluation of the tolerable level of risk.	Population size per year over the last 10 years for Quảng Trị province and Cam Lộ and Hải Lăng districts.	Data collected from national statistics (through Quảng Trị Mine Action Centre [QTMAC]) and evaluated/modelled in a desk assessment.	The population size for 2008 to 2018 was estimated for the evaluation (information was not available). The estimation was done by adding the average growth rate of the subsequent two years (for 2008) and the preceding two years (for 2018).
		EO casualties (fatalities/injuries) over the last 10 years per year for Quảng Trị province and Cam Lộ and Hải Lăng districts.	Data collected from the QTMAC database and evaluated/ modelled in a desk assessment.	No problem encountered during data collection/evaluation.
		Top 20 causes of death over the last 10 years per year for Quảng Trị province and Cam Lộ and Hải Lăng districts.	Data collected from the Institute of Health and Metrics Evaluation (IHME) and evaluated/modelled in a desk assessment.	Initially, it was considered doing the calculation with provincial statistics, but only national statistics were available up to 2017, therefore the time period of 2008 to 2017 was considered for the evaluation.
Indicator 2: Risk perception		Number of people interviewed who feel that their well-being is compromised by the threat of potential explosive ordnance (EO) in Cam Lộ and Hải Lăng districts.	In a first trial, baseline data (people's opinion before any survey/ clearance had been done) was collected in eight villages in two communes in both districts. In a second trial, up-to-date data (people's opinion after survey/clearance was completed to a certain extent) was collected. The data was evaluated/modelled in a desk assessment.	Due to misunderstandings, complete up-to-date data was only collected in Cam Lộ district. Therefore, only the data for Cam Lộ is presented in this report. *Sample size:* Between 29.9% (baseline data) and 28.7% (up-to-date data) of all households in the four selected villages in Cam Lộ district were interviewed.
Indicator 3: Land use		Number of people interviewed using land despite the threat of potential EO in Cam Lộ and Hải Lăng districts.		
Indicator 4: Benefit from risk education (RE) activities		Number of people that benefitted from previous RE activities in Cam Lộ and Hải Lăng districts.		

INSTRUMENT	PURPOSE	REQUIRED DATA	COLLECTION & EVALUATION	REMARKS
Indicator 5: Cost benefit	Identification and evaluation of the tolerable level of risk.	Costs for clearance to different clearance depths in Quảng Trị.	Only national clearance costs for commercial demining down to a depth of 5 m could be made available.	Unfortunately, the key figures and messages with regard to provincial land prices were not available in English in time. Therefore, no basic modelling for indicator 5 could be done.
		Total m^2 of contaminated confirmed hazardous area (CHA) agricultural and construction land.	Only total CHA (all types of land) available in the QTMAC database.	
		Average land price for different land types in Quảng Trị today and in 5 and 10 years, per m^2, for agricultural and building land.	Provincial land prices for different land types for 2009 to 2019 collected from the Quảng Trị Province People's Committee.	
Site-specific risk assessment	Mapping of residual contamination and risk-activity matrix (form B1).	EO findings within a 1 km diameter/1 km^2 and 500 m diameter/0.5 km^2 of 6 different future development sites in Quảng Trị province.	QTMAC/Mines Advisory Group (MAG) established 2 different map types (diameter/grid) by using 2 different thresholds (1 km/0.5 km). Based on these maps, 2 different thresholds of likelihood were tested.	No problem encountered during data collection/evaluation.
	Site-specific risk assessment of residual contamination (form B2).	Detailed information (planned construction/work steps) for 6 different future provincial development sites.	Out of the list provided by QTMAC, a selection of sites with different land uses was chosen. The sites were physically visited for the site-specific risk assessment.	Unfortunately, sufficient details with regard to the planned work steps could not be provided. Also, some of the sites were already under construction when visited.

Table 2: Required data for the pre-test, used data collection and evaluation methods.

CREDIBILITY AND CONSTRAINTS OF THE PRE-TEST

An important point to address in research and in the LTRM project is the credibility of the pre-test in Quảng Trị. Credibility is usually achieved by considering objectivity, reliability and the validity of research.

The researcher and stakeholders have different experiences in both mine action and risk management. In addition, language barriers and the different levels of knowledge and understanding of the LTRM approach must be considered. All these aspects can be an advantage for the objectivity of the pre-test, but may also hamper it because the involved parties are biased. However, the reliability of the pre-test is maintained through transparency throughout the collection of data and evaluation processes. Methodologies and instruments were discussed with stakeholders in advance and are explained in the present report. All information collected is accessible as raw data and helps to retrace the evaluated data presented in this report. By using desk assessments to collect statistical data, and field research to gather the opinions of the affected population through structured interviews, different data collection methods were applied to gather the information required, using the indicators identified. This allowed for data triangulation and increased the validity of the pre-test.

The information collection process which includes the gathering of quantitative and qualitative data and the data evaluation process that is based on the modelling of different data sets and thresholds, aims to clarify whether the proposed instruments and models used are meaningful and potentially scalable. The pre-test in Quảng Trị is not representative but will indicate if the proposed LTRM tools are suitable to be tested and used in Vietnam on a larger scale.

FINDINGS OF THE PRE-TEST IN QUẢNG TRỊ

This chapter explains the findings of the pre-test and starts with the results per indicator including different options and thresholds used, as explained on pages 16 to 22. Subsequently, an overview of the combined evaluation findings for Cam Lộ and Hải Lăng districts are given, and a rating of the results is proposed in order to identify whether the two districts could be seen as having achieved a residual state or not. Furthermore, the results of the test with the general and site-specific risk assessments (forms B1 and B2) are summarised and discussed.

INDICATOR 1

The first option (option A) to be tested for the definition of indicator 1 (death probability rate) was determined as follows: *"A residual state (tolerable level of risk) is achieved, if the percentage of EO victims (injuries and fatalities)/per population/per year in a district over the last 10 years does not exceed the lowest percentage of EO victims in the whole province over the last 10 years (2009 to 2018) more than 0/3/5 times."*

Summary of the results for option A:

- Cam Lộ district has not yet achieved a residual state if any of the thresholds are applied and exceeds the lowest percentage of EO victims in the whole province over the last 10 years in a total of 6 years (2009 to 2012, 2014 and 2015).
- Hải Lăng district has achieved a residual state if a threshold of 5 times is applied. The district has not yet achieved a residual state if a threshold of 0 and 3 times is applied and exceeds the lowest percentage of EO victims in the whole province over the last 10 years in a total of 4 years (2009, 2010, 2011 and 2017).

The second option (option B) to be tested for the definition of indicator 1 sought to evaluate whether *"… the EO victims per population, per year in a district over the last 10 years do not exceed the average percentage of EO victims in the whole province over the last 10 years (2009 – 2018) more than 0/3/5 times."*

Summary of the results for option B:

- Cam Lộ district has not yet achieved a residual state if any of the thresholds are applied and exceeds the average percentage of EO victims in the whole province over the last 10 years in a total of 6 years (2009 to 2012, 2014 and 2015).
- Hải Lăng district has achieved a residual state if a threshold of 5 times is applied. The district has not yet achieved a residual state if a threshold of 0 and 3 times is applied and exceeds the average percentage of EO victims in the whole province over the last 10 years in a total of 4 years (2009, 2010, 2011 and 2017).

The third option foresees the inclusion of statistics of the causes of death in Vietnam and was determined as follows: *"The residual state (tolerable level of risk) is achieved, if the number of EO victims (including injured and fatalities) in a district has not been one of the top 10/top 20 causes of death in Vietnam in the last 10 years (2008 to 2017) more than 0/3/5 times."* Only national statistics (instead of provincial statistics) up to 2017 could be made available and were used for the pre-test.

Summary of the results for option C1 (top 20 causes of death) and C2 (top 10 causes of death):

- Cam Lộ district has achieved a residual state if the top 10 causes of death and any of the thresholds are applied. However, if the top 20 causes of death are taken into account, the district has not achieved a residual state with any of the thresholds and exceeds them in a total of 7 years (2008 – 2012, 2014 and 2015).
- Hải Lăng district has achieved a residual state if the top 10 causes of death and any of the thresholds are applied. However, if the top 20 causes of death are taken into account, the district has only achieved a residual state if a threshold of 5 times is applied and it exceeds the other thresholds of 0 and 3 times in a total of 5 years (2008 – 2011 and 2017).

It should be remembered that the statistical data of causes of death also includes deaths caused by voluntary risk taken (e.g. traffic accidents or self-harm). However, it is not possible in all cases to clearly identify whether a risk has been taken voluntarily or not. For the purpose of the pre-test and to counterbalance a possible adulteration of the result due to the inclusion of voluntary risks, injuries caused by EO were also considered as fatalities.

In general, and with regard to formal procedures, all three options of indicator 1 proved to be feasible as an indicator to evaluate the tolerable level of risk. Options C1 and C2 are the most challenging with regards to data collection and consistency, as statistics of causes of death were only available at national level. To apply options A and B, enough data was available in Quảng Trị, but in other provinces, without a functioning and well-established mine action centre, it could be a challenge to collect the required data.

Option A is the most conservative approach, followed by options B and C. Options A and B only consider and compare the trend of EO victims within a province/district, while option C puts the number of EO victims in a broader context and compares the risk of being killed by explosive ordnance with other health risks. On testing options A and B, Cam Lộ district did not achieve a residual state regardless of the proposed thresholds applied. Hải Lăng however, achieved a residual state if the most tolerant of the proposed thresholds (5 times) was applied. Both districts can be considered as having achieved a residual state, if the EO victims are compared with the top 10 national causes of death, but not if the comparison includes the top 20 causes of death. The raw data for indicator 1, options A to C2, are included in this report in annex A. Stakeholders should discuss and decide whether a more conservative or tolerant option and threshold should be used in further testing.

INDICATORS 2, 3 AND 4

Indicators 2, 3 and 4 focus on the psychological and socio-economic effect of EO-contaminated areas. They are summarised in one sub-chapter because relevant data has been gathered in one field survey, using one questionnaire (see annex C). Indicator 2 measures the risk perception of the affected population (if they feel that their well-being has been compromised due to a potential or real presence of EO), indicator 3 affected people's land use (despite potential or real EO contamination and their risk perception) and indicator 4 measures whether the affected population benefitted from former RE activities.

For the purpose of this pre-test, baseline data (people's risk perception and land use before any survey and clearance activities had taken place) and up-to-date data (people's risk perception and land use after a certain amount of survey and clearance activities had taken place) was collected in four villages, in two communes in Cam Lộ, by interviewing roughly 200 households. This accounts for approximately 29% of all households and 7.5% of the total population of the four villages. The purpose of having baseline and up-to-date data was to test the effectiveness of the proposed indicators and to evaluate whether they help to identify a change in people's behaviour before and after (some) proactive clearance activities have been undertaken. For the pilot and possible implementation of the LTRM framework in other provinces, only up-to-data data reflecting the actual situation would need to be collected.

It was also planned that baseline and up-to-date data for Hải Lăng district would be collected, but due to misunderstandings with regard to the data to be gathered, the available data set is not complete and has therefore not been used for data evaluation and modelling, in order to avoid any potentially incorrect conclusions.

In Cam Lộ district the cluster munition remnant survey (CMRS) has been completed and a lot of clearance activities have already been undertaken. In Hải Lăng, the CMRS is still ongoing and only some clearance activities have been carried out so far. The following maps of the four communes in Cam Lộ and Hải Lăng districts that were chosen for the pre-test, show already cleared areas and remaining CHAs. However, as mentioned in the previous paragraph, the data collected in Hải Lăng during the pre-test was not reliable and not used for this report.

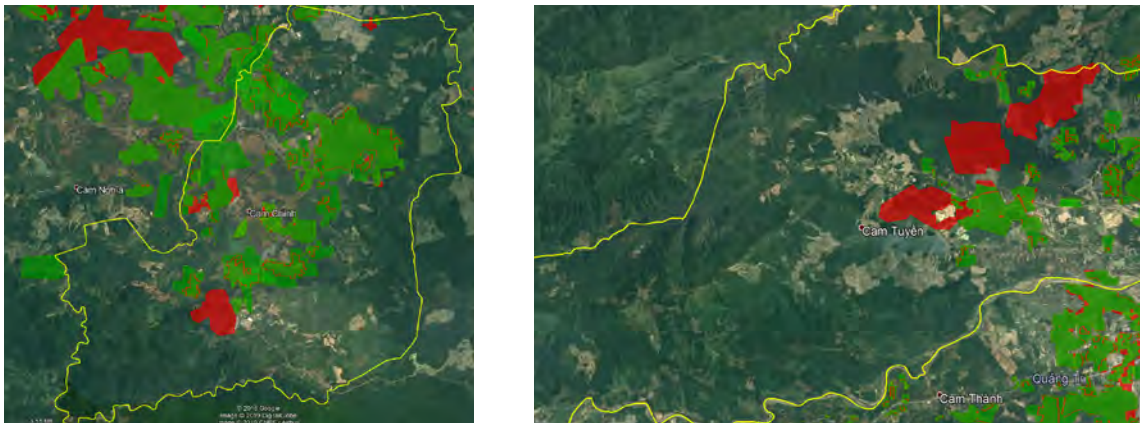


Illustration 4: The surveyed communes Cam Chính and Cam Tuyền in Cam Lộ district: CMRS and most of the clearance completed.

Illustration 5: The communes Hải Thọ and Hải Dương in Hải Lăng district which were also partly used for the pre-test: CMRS ongoing and some clearance activities undertaken.

INDICATOR 2, DEFINITION AND SUMMARY OF THE RESULTS

The definition for indicator 2 (affected people's risk perception) was determined as follows: *"A residual state (tolerable level of risk) is achieved, if not more than 40, 50, 60% (threshold) of the affected population feel that their well-being has been compromised by using the land that potentially contains EO."*

Baseline data (people's risk perception before any survey and clearance activities had taken place):

- Cam Lộ district has not yet achieved a residual state if any of the thresholds are applied, as 99.1% of all interviewed households stated that they felt their well-being was compromised by using the land that potentially contains EO.

Up-to-date data (people's risk perception after completed survey and almost completed clearance activities):

- Cam Lộ district has achieved a residual state if any of the thresholds are applied as only 1.9% of all interviewed households stated that they felt that their well-being was compromised and only 4.2% of all interviewed households said they were not sure if they felt their well-being was compromised in using the land that potentially contains EO.

INDICATOR 3, DEFINITION AND SUMMARY OF THE RESULTS

The definition for indicator 3 (affected people's land use) was determined as follows: *"A residual state (tolerable level of risk) is achieved, if at least 80, 70 or 60% of the affected population use land despite a potential EO threat."*

Baseline data:

- Cam Lộ district has achieved a residual state if any of the thresholds are applied as 92% of all interviewed households stated that they used the land despite a potential EO threat.

Up-to-date data:

- Cam Lộ district has achieved a residual state if any of the thresholds are applied as 100% of all interviewed households stated that they used the land despite a potential EO threat.

INDICATOR 4, DEFINITION AND SUMMARY OF THE RESULTS

The definition for indicator 4 (benefit from former RE activities) was determined as follows: *"A residual state (tolerable level of risk) is achieved, if at least 80, 70 or 60% of the affected population have directly benefitted from RE activities."*

Baseline data:

- Cam Lộ district has achieved a residual state if any of the thresholds are applied as 81.6% of all interviewed households stated that they had benefitted from former RE sessions.

Up-to-date data:

- Cam Lộ district has achieved a residual state if any of the thresholds are applied as 96.7% of all interviewed households stated that they had benefitted from former RE sessions.

The raw data for the baseline and up-to-date survey data for indicators 2, 3 and 4 is included in this report in annex B. In addition to the data required to identify the tolerable level of risk (residual state), some additionally collected data was evaluated by using different filters. The results and relevant remarks for the baseline and up-to-date data are also presented in annex B.

In general, and with regard to formal procedures, all three indicators proved to be feasible for evaluating the tolerable level of risk as all the required data could be collected, although it should be noted that data collection involves time-consuming field survey. It can also be questioned and there should be further discussion on whether indicator 3 (land use) is a reasonable indicator, as baseline and up-to-date data show that more than 90% of the people use the land, regardless of a potential EO threat and whether they feel that their well-being is compromised. It is likely that this is also the case in other districts and provinces.

Indicators 2 and 3 turned out to be the most challenging and complex ones with regard to the understanding of what data should be collected, where and why. The aim of indicators 2 and 3 is to find out how the progress of proactive CMRS and clearance influences people's risk perception and land use. It was therefore decided to do the pre-test not only in a district where proactive survey and clearance had already been completed (Cam Lộ), but also in a district where proactive work had recently started and where only a small amount of work had been done so far (Hải Lăng). This concept was not sufficiently well understood which led to misunderstandings in the collection of data and is the reason why the data for Hải Lăng district has not been used for the evaluation, in order to avoid potential errors in the conclusions drawn. Further discussions and clarification amongst stakeholders are needed for the planned pilot.

INDICATOR 5

The stakeholders decided that the proposed indicator 5 (cost-benefit analysis) should not be considered for the pre-test in Quảng Trị, as the book prices, as published by the provincial government, and market prices might differ considerably, and the land was being used regardless of potential or real contamination. Stakeholders did not feel confident in using this data, as it could lead to inaccurate results which does not reflect the reality. However, the principle of the indicator might still be valid in other locations and under other circumstances. Stakeholders should discuss the applicability of this indicator once again, in the context of the planned pilot in other provinces.

SUMMARY OF OVERALL EVALUATION RESULTS

Using different indicators to evaluate the tolerable level of risk allows for comprehensive decision-making of whether a district should be considered as having achieved a residual state (which implies a change from proactive survey and clearance to a reactive risk management approach) or not. The following table 3 summarises the evaluation results for the different indicators and options and shows how different thresholds influence the overall evaluation results.

	DESCRIPTION	THRESHOLD 1	THRESHOLD 2	THRESHOLD 3
Indicator 1, option A	A residual state is achieved, if the percentage of EO victims (injuries and fatalities)/per population/per year in a district over the last 10 years does not exceed the lowest percentage of EO victims in the whole province over the last 10 years (2009 - 2018) more than 0/3/5 times (see threshold 1 to 3).	**Cam Lộ district**		
		(0 times) Residual state not yet achieved	(3 times) Residual state not yet achieved	(5 times) Residual state not yet achieved
		Hải Lăng district		
		(0 times) Residual state not yet achieved	(3 times) Residual state not yet achieved	(5 times) Residual state achieved
Indicator 1, option B	A residual state is achieved, if the percentage of EO victims (injuries and fatalities)/per population/per year in a district over the last 10 years does not exceed the average percentage of EO victims in the whole province over the last 10 years (2009 - 2018) more than 0/3/5 times (see threshold 1 to 3).	**Cam Lộ district**		
		(0 times) Residual state not yet achieved	(3 times) Residual state not yet achieved	(5 times) Residual state not yet achieved
		Hải Lăng district		
		(0 times) Residual state not yet achieved	(3 times) Residual state not yet achieved	(5 times) Residual state achieved
Indicator 1, option C1 (top 20) and C2 (top 10)	A residual state is achieved, if the number of EO victims (injuries and fatalities) in a district has not been one of the top 10/top 20 causes of death in Vietnam in the last 10 years (2008 - 2017) more than 0/3/5 times (see threshold 1 to 3).	**Cam Lộ district**		
		(Top 20, 0 times) Residual state not achieved	(Top 20, 3 times) Residual state not achieved	(Top 20, 5 times) Residual state not achieved
		(Top 10, 0 times) Residual state achieved	(Top 10, 3 times) Residual state achieved	(Top 10, 5 times) Residual state achieved
		Hải Lăng district		
		(Top 20, 0 times) Residual state not achieved	(Top 20, 3 times) Residual state not achieved	(Top 20, 5 times) Residual state achieved
		(Top 10, 0 times) Residual state achieved	(Top 10, 3 times) Residual state achieved	(Top 10, 5 times) Residual state achieved

	DESCRIPTION	THRESHOLD 1	THRESHOLD 2	THRESHOLD 3
Indicator 2 (up-to-date data)	A residual state is achieved, if not more than 40, 50, 60% (see threshold 1 to 3) of the affected population feel that their well-being is compromised by using the land that potentially contains EO.	**Only data for Cam Lộ district was evaluated**		
		(40%) Residual state is achieved	(50%) Residual state is achieved	(60%) Residual state is achieved
Indicator 3 (up-to-date data)	A residual state is achieved, if at least 80, 70, 60% (see threshold 1 to 3) of the affected population use land despite a potential EO threat.	**Only data for Cam Lộ district was evaluated**		
		(80%) Residual state is achieved	(70%) Residual state is achieved	(60%) Residual state is achieved
Indicator 4 (up-to-date data)	A residual state is achieved, if at least 80, 70, 60% (see threshold 1 to 3) of the affected population have directly benefitted from RE activities.	**Only data for Cam Lộ district was evaluated**		
		(80%) Residual state is achieved	(70%) Residual state is achieved	(60%) Residual state is achieved

Table 3: Summary of evaluation results for Cam Lộ and Hải Lăng districts, using the four different indicators with different options and thresholds.

Table 4, below, simplifies the results and summarises the overall evaluation of results per district, indicator and threshold used. For indicator 1, option C2 is the most tolerant option to evaluate the tolerable risk, followed by option C1. The most stringent evaluation option for indicator 1 is option A. For all indicators and options used, threshold 1 signifies the most stringent, and threshold 3 the most tolerant method to identify the tolerable level of risk. The overview includes a proposal for an overall rating of the results and possible further actions. The rating used is conservative and proposes a change from proactive survey and clearance to a reactive risk management approach only if all indicators are "green". In all other cases, it is recommended that proactive activities continue, at least to a certain extent. The overview shows that the most tolerant option C2 for indicator 1 might be the most reasonable option for evaluating the residual state. All proactive survey and most of the clearance has been completed in Cam Lộ and this indicates that the district is "green". To consider the district as "orange" based on a conservative judgement of accident figures having dropped significantly over the last few years, might not be appropriate. However, this needs to be discussed further amongst stakeholders.

CAM LỘ DISTRICT												
	Threshold 1				Threshold 2				Threshold 3			
Indicator 1, option A	No residual state				No residual state				No residual state			
Indicator 1, option B	No residual state				No residual state				No residual state			
Indicator 1, option C1 (top 20)	No residual state				No residual state				No residual state			
Indicator 1, option C2 (top 10)	Residual state				Residual state				Residual state			
Indicator 2	Residual state				Residual state				Residual state			
Indicator 3	Residual state				Residual state				Residual state			
Indicator 4	Residual state				Residual state				Residual state			
Overall rating (with option A – C2 for indicator 1)	**A**	**B**	**C1**	**C2**	**A**	**B**	**C1**	**C2**	**A**	**B**	**C1**	**C2**

HẢI LĂNG DISTRICT												
	Threshold 1				Threshold 2				Threshold 3			
Indicator 1, option A	No residual state				No residual state				Residual state			
Indicator 1, option B	No residual state				No residual state				Residual state			
Indicator 1, option C1 (top 20)	No residual state				No residual state				Residual state			
Indicator 1, option C2 (top 10)	Residual state				Residual state				Residual state			
Indicator 2	Not evaluated				Not evaluated				Not evaluated			
Indicator 3	Not evaluated				Not evaluated				Not evaluated			
Indicator 4	Not evaluated				Not evaluated				Not evaluated			
Overall rating (with option A – C2 for indicator 1)	**A**	**B**	**C1**	**C2**	**A**	**B**	**C1**	**C2**	**A**	**B**	**C1**	**C2**

COLOUR CODE FOR OVERALL RATING AND PROPOSED ACTION (PROPOSAL)				
All indicators green	1 indicator red	2 indicators red	3 indicators red	All indicators red
No further proactive activities required, change to reactive risk management approach.	Analyse evaluation results in detail and focus on further proactive activities accordingly.	Analyse evaluation results in detail and focus on further proactive activities accordingly.	Analyse evaluation results in detail and focus on further proactive activities accordingly.	Further proactive activities required, reassess situation in 5 years.

Table 4: Simplified overview of evaluation results per district, indicator/option and threshold including a proposal for an overall rating and related further actions.

SITE-SPECIFIC RISK ASSESSMENT OF RESIDUAL CONTAMINATION

Once a district/province has achieved a residual state, residual contamination should be managed based on intended land use. Whenever the residual EO contamination poses a threat to the planned land use, the specific location should be analysed in detail and risk mitigation measures should be considered. For this purpose, two different forms were proposed. Form B1 allows a general risk assessment to be carried out based on the likelihood of encountering different types of ammunition in a specific area. The result of this general risk assessment indicates whether the expected residual EO threat poses a relevant risk to the planned activities or not. Form B2 is based on the results of form B1 and analyses the EO risk of a specific site in detail by considering the characteristics of the planned land use and the ammunition that can be expected to be found.

For the purpose of the pre-test and in order to examine whether the instruments fulfil their function, six different future provincial development sites were chosen and the EO risk for the planned activities on these sites was analysed with the proposed forms B1 and B2.

In order to see how the result of the general risk assessment can be influenced, two different mapping methods and thresholds were tested on two of the six development sites. The illustrations on the next two pages illustrate the different mapping alternatives whilst the table on page 37 shows the differences in the assessment result.

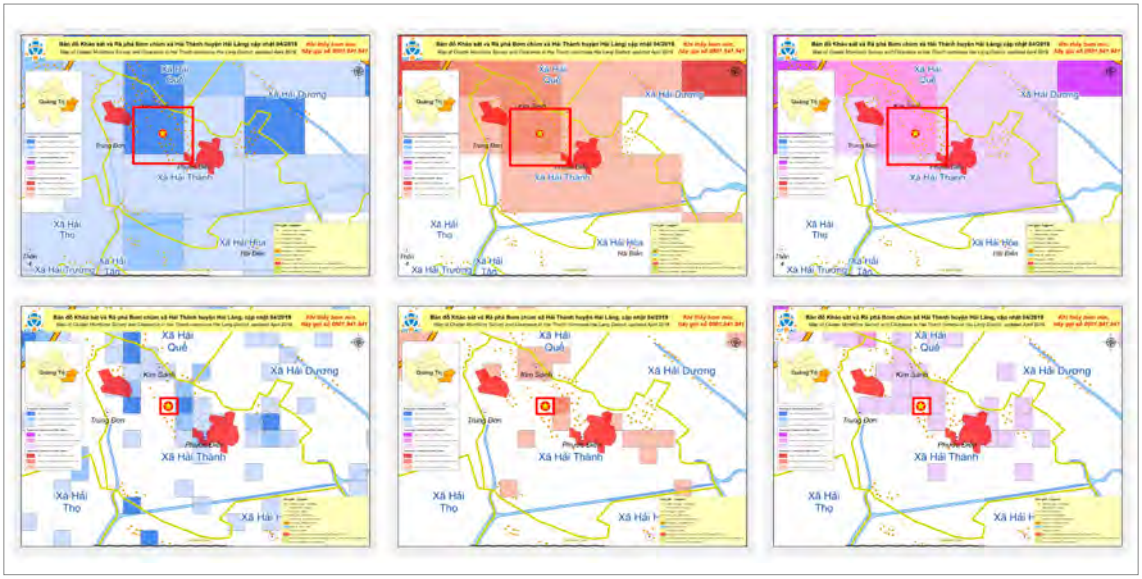


Illustration 6: Grid-based likelihood maps for a future development project in Hải Thành (Hải Lăng district). Likelihood of aircraft bombs is shown in blue, EO > 60 mm in red and EO ≤ 60 mm in purple. The first row shows the result if a 1 km grid box is applied, the second row if a 0.5 km grid box is used. The darkest shading indicates the highest likelihood, the lightest shading the lowest likelihood. The red squares mark the area considered for the risk assessment.

Illustration 7: Diameter-based likelihood maps for the same development project in Hải Thành (Hải Lăng district) based on a 1 km (image on the left) and a 500 m diameter (image on the right). The likelihood of encountering aircraft bombs, EO > 60 mm and EO ≤ 60 mm is calculated by counting the findings in the relevant diameter.

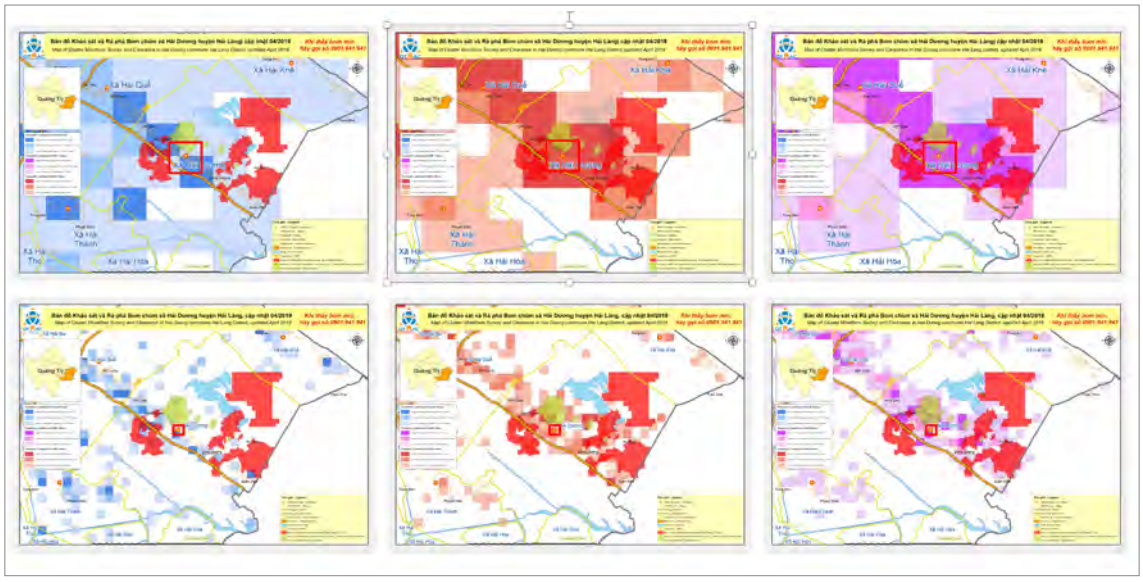


Illustration 8: Grid-based likelihood maps for two nearby future development projects in Hải Dương (Hải Lăng district). The first row again shows the result if a 1 km grid box is applied, the second row if a 0.5 km grid box is used. The red squares mark the area considered for the risk assessment.

Illustration 9: Diameter-based likelihood maps for the same two nearby development projects in Hải Dương (Hải Lăng district) by using a 1 km (image on the left) and a 500 m threshold (image on the right).

The estimation of the likelihood of encountering residual contamination is based on the assumption that the CMRS is completed and that most of the CM have been cleared. Therefore, CM findings (to estimate the likelihood of encountering further CM) were only considered if they were recorded outside of known (cleared or uncleared) cluster strikes. The likelihood for other ammunition was estimated by counting all known EO findings within the relevant perimeter (diameter/grid box); this includes EO findings from EOD call-out and clearance tasks. To analyse possible residual contamination from aircraft bombs, the hits recorded in US bombing data were counted. Although it is known that this data is not accurate, it was assumed that this could give an initial idea of the likelihood of encountering aircraft bombs. The applied thresholds for a high/medium/low likelihood were shown on page 20. To simplify matters, these thresholds were maintained in the pre-test.

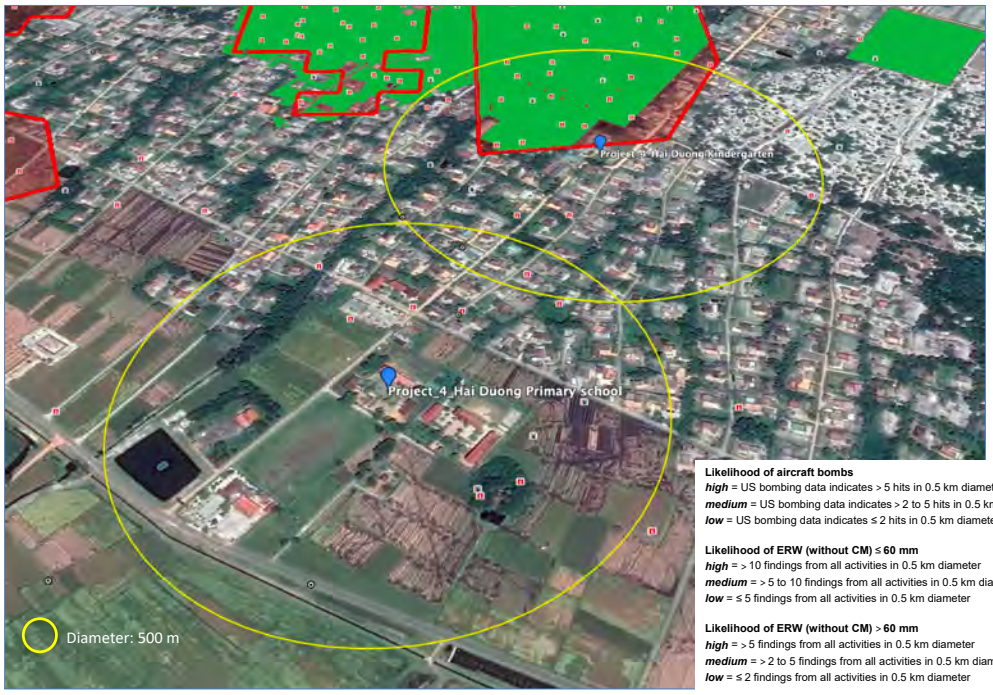
The following table shows the differences in the assessment results when using the two different mapping methods and diameter/grid box thresholds. However, the different results do not allow a clear general statement with regard to what method and threshold is more conservative or tolerant. Either the grid-based or the diameter-based method led to a more or less conservative result. With regard to the two different thresholds used, it seems that the smaller threshold (0.5 km grid box/ diameter) in general leads to a more tolerant but also more appropriate result.

PROJECT	MAPPING METHOD	THRESHOLD	LIKELIHOOD OF BOMBS	LIKELIHOOD OF > 60 MM	LIKELIHOOD OF ≤ 60 MM
Development project in Hải Thành (Cultural House)	Diameter	1 km	low	medium	low
	Diameter	0.5 km	low	low	low
	Grid box	1 km	low	low	low
	Grid box	0.5 km	low	low	low
Development project a) in Hải Dương (kindergarten)	Diameter	1 km	low	high	high
	Diameter	0.5 km	medium	high	medium
	Grid box	1 km	medium	high	high
	Grid box	0.5 km	low	medium	high
Development project b) in Hải Dương (primary school)	Diameter	1 km	low	high	high
	Diameter	0.5 km	low	high	high
	Grid box	1 km	medium	high	high
	Grid box	0.5 km	low	medium	high

Table 5: The table shows that the choice of either a diameter or a grid-based mapping method and the choice of different thresholds influence the result of the general risk assessment.

In addition to the different mapping methods and distance thresholds used, the pre-test in Quảng Trị also aimed to test the usefulness and usability of the specific forms with which a general and site-specific risk assessment of residual contamination can be made. In order to get a glimpse of the results achieved, the completed forms for development projects a) and b) in Hải Dương – the construction/extension of a kindergarten and a primary school – are presented and explained in the following pages; these provide a good example for the other assessed sites. The completed forms of all the assessed sites are attached in annex D. For the sake of convenience, only the forms with the diameter mapping method using a threshold of either 500 m or 1 km are included in the report.

Form B1: Mapping of (residual) contamination: **Hải Dương kindergarten and primary school**

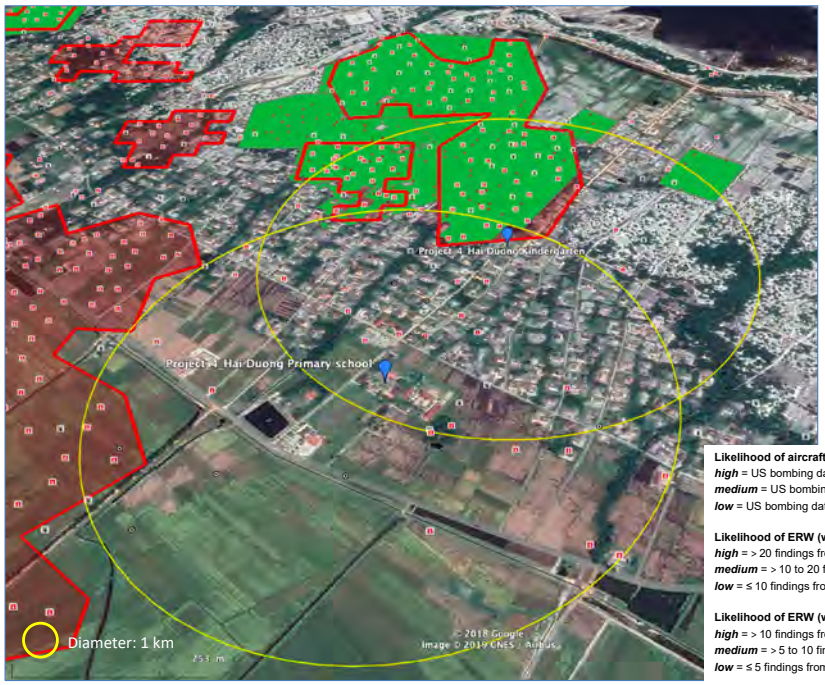


Likelihood of aircraft bombs
high = US bombing data indicates > 5 hits in 0.5 km diameter
medium = US bombing data indicates > 2 to 5 hits in 0.5 km diameter
low = US bombing data indicates ≤ 2 hits in 0.5 km diameter

Likelihood of ERW (without CM) ≤ 60 mm
high = > 10 findings from all activities in 0.5 km diameter
medium = > 5 to 10 findings from all activities in 0.5 km diameter
low = ≤ 5 findings from all activities in 0.5 km diameter

Likelihood of ERW (without CM) > 60 mm
high = > 5 findings from all activities in 0.5 km diameter
medium = > 2 to 5 findings from all activities in 0.5 km diameter
low = ≤ 2 findings from all activities in 0.5 km diameter

Form B1: Mapping of (residual) contamination: **Hải Dương kindergarten and primary school**



Likelihood of aircraft bombs
high = US bombing data indicates > 20 hits in 1 km diameter
medium = US bombing data indicates > 10 to 20 hits in 1 km diameter
low = US bombing data indicates ≤ 10 hits in 1 km diameter

Likelihood of ERW (without CM) ≤ 60 mm
high = > 20 findings from all activities in 1 km diameter
medium = > 10 to 20 findings from all activities within 1 km diameter
low = ≤ 10 findings from all activities within 1 km diameter

Likelihood of ERW (without CM) > 60 mm
high = > 10 findings from all activities in 1 km diameter
medium = > 5 to 10 findings from all activities within 1 km diameter
low = ≤ 5 findings from all activities within 1 km diameter

Illustration 10: Diameter mapping for the general risk assessment (form B1, first page) with a 0.5 km (above) and a 1 km (below) threshold used for the development project in Hải Dương (kindergarten and primary school). The number of aircraft bomb hits and EO findings > 60 mm and ≤ 60 mm results in a high/medium or low likelihood of encountering the relevant ammunition in the chosen diameter.

General risk assessment for residual contamination (completed, primary school)

Contamination / Activity matrix							
Contamination	Likelihood	No human activity	Surface activity, non-mechanical	Surface activity, mechanical	Intrusive activity, ≤ 30 cm	Intrusive activity, > 30 cm – 1 m	Intrusive activity, > 1 m
Aircraft bombs	High	0	0	0	0	0	2c
	Medium						
	Low						1a
Other ERW (> 60 mm)	High	0	0	0	1b	2b	2b
	Medium						
	Low				1a	1a	1a
Other ERW (≤ 60 mm)	High	0	0	1b	2a	2a	2a
	Medium						
	Low			1a	1a	1a	1a
Cluster munitions	Confirmed	0	0	1b	2a	2a	2a
Mines	Confirmed	0	2a	2a	2a	2a	2a

Required action					
0	No action required (land use poses no threat).	1a	No action (residual risk). In case of findings = EOD call-out and reassessment.	1b	Site-specific assessment to clarify land use / work steps.
2a	Conduct site-specific assessment to identify the exact perimeter of the planned intrusive work ≤ 30 cm and conduct clearance to that depth (and / or propose other risk mitigation measures).	2b	Conduct site-specific assessment to identify the exact perimeter of the planned intrusive work > 30 cm – 1 m and conduct clearance to the estimated maximum penetration depth of the expected ammunition > 60 mm (and / or propose other risk mitigation measures).	2c	Conduct site-specific assessment to identify the exact perimeter and depth of the planned intrusive work > 1m and conduct clearance to that depth (and / or propose other risk mitigation measures).

Findings from database (findings counted manually)			
Primary school	Aircraft bombs: **medium**	Other ERW (> 60 mm): **medium**	Other ERW (≤ 60 mm): **high**
Kindergarten	Aircraft bombs: **low**	Other ERW (> 60 mm): **high**	Other ERW (≤ 60 mm): **high**

General risk assessment for residual contamination

Contamination / Activity matrix							
Contamination	Likelihood	No human activity	Surface activity, non-mechanical	Surface activity, mechanical	Intrusive activity, ≤ 30 cm	Intrusive activity, > 30 cm – 1 m	Intrusive activity, > 1 m
Aircraft bombs	High	0	0	0	0	0	2c
	Medium						
	Low						1a
Other ERW (> 60 mm)	High	0	0	0	1b	2b	2b
	Medium						
	Low				1a	1a	1a
Other ERW (≤ 60 mm)	High	0	0	1b	2a	2a	2a
	Medium						
	Low			1a	1a	1a	1a
Cluster munitions	Confirmed	0	0	1b	2a	2a	2a
Mines	Confirmed	0	2a	2a	2a	2a	2a

Required action					
0	No action required (land use poses no threat).	1a	No action (residual risk). In case of findings = EOD call-out and reassessment.	1b	Site-specific assessment to clarify land use / work steps.
2a	Conduct site-specific assessment to identify the exact perimeter of the planned intrusive work ≤ 30 cm and conduct clearance to that depth (and / or propose other risk mitigation measures).	2b	Conduct site-specific assessment to identify the exact perimeter of the planned intrusive work > 30 cm – 1 m and conduct clearance to the estimated maximum penetration depth of the expected ammunition > 60 mm (and / or propose other risk mitigation measures).	2c	Conduct site-specific assessment to identify the exact perimeter and depth of the planned intrusive work > 1 m and conduct clearance to that depth (and / or propose other risk mitigation measures).

Findings from database (findings counted manually)			
Primary school	Aircraft bombs: **low**	Other ERW (> 60 mm): **high**	Other ERW (≤ 60 mm): **high**
Kindergarten	Aircraft bombs: **low**	Other ERW (> 60 mm): **high**	Other ERW (≤ 60 mm): **high**

Illustration 11: The general risk assessment (form B1, second page) using the 0.5 km (above) and 1 km (below) diameter. The result (framed in blue) doesn't change for the kindergarten and requires a site-specific risk assessment to identify areas where intrusive work is planned in order to mitigate the risk of encountering EO > 60 mm / ≤ 60 mm. The result for the primary school changes slightly when different diameters are applied. Both a medium and high likelihood of encountering EO > 60 mm leads to further action (site-specific assessment), therefore this difference is not relevant. However, the different result for the likelihood of aircraft bombs has an influence. If the likelihood is "low" (as is the case for the 1 km threshold) no action will be taken, if the likelihood is "medium" or "high" (500 m threshold) a site-specific risk assessment with the formulation of risk mitigation measures is required.

Form B2: Site-specific risk assessment: **Hải Dương kindergarten**

General information					
District / Commune / Coordinates	Hải Lăng	Hải Dương	107.337432 / 16.728176	**Date of assessment:**	09 April 19
Assessor company / Team / Name	MAG	TFM, Head Office		Henry Marriner	
Project name / Planned activity	Building 6 classrooms	Construction (intrusive activity > 1 m)			
Result of general risk assessment	***Expected contamination:***	Aircraft bombs: low likelihood / other ERW: high likelihood of > 60 mm and ≤ 60 mm			
	Required action:	2b for > 60 mm (clearance down to 1m / max penetration depth or other risk mitigation measures) 2a for ≤ 60mm (clearance down to 30 cm or other risk mitigation measures)			
Site-specific residual contamination					

History of the site / Information from NTS	The kindergarten is located on the edge of a built-up area in Hải Lăng district. During the war the infrastructure was considerably less developed and the area was predominately woodland and rice paddy fields. Heavy ground fighting left widespread and consistent contamination from small arms UXO throughout the immediate vicinity. Some sporadic bombing occurred but over 50 years on and bomb finds are rare due to previous clearance efforts. Immediately adjacent to the kindergarten is a CHA, previously cleared by MAG, where fade-out will have significantly reduced the likelihood of any UXO within the first 30 cm of soil, but where contamination deeper than 30 cm cannot be discounted.
Planned activities (detailed process steps and construction plans, if available)	One large building is planned, to accommodate six classrooms. Work will require heavy machinery to transit the grass area and dig foundations, up to 1 m deep.

Detailed risk assessment

Expected ERW category	Worst expected ammunition type / effect	Sensitivity			Expected condition			Likelihood of encountering ammunition		Overall rating*	Expected depth	Work steps at risk	Expected worst case
Other ERW ≤ 60 mm	40 mm / HE			X			X	X		X	0 – 30 cm		Explosion of an untampered 40 mm grenade on the surface.
Other ERW > 60 mm	105 mm / HE / Phosphor		X				X	X		X	15 cm – 80 cm		Unplanned explosion following unsanctioned movement by workers.

Possible measures for risk mitigation:

Given the proximity to several other CHAs (cleared to the north, and uncleared to the west) the inspecting officer would recommend technical survey (in line with current country policy – NPA) to a depth of 30 cm, to assess the presence of any shallowly buried small munitions in a surrounding area of 100 m from the centre of the building site. If contamination is found, further battle area clearance is conducted to make the area safe for use.

Risk assessment has awarded a "high" rating for UXO larger than 60 mm. Since the proposed work is required to a depth of 1 m the detectors used should be calibrated to a depth of 1 m. The recommendation is to sweep the exact location of the proposed foundations with a detector configured to the required depth. Clearance can then be conducted on a case by case basis.

Domestic EOD teams (MAG / NPA / PeaceTrees Vietnam / Quảng Trị military) are on standby and coordinated by QTMAC in the event that any suspect items are discovered by the local population.

All construction workers should have limited working knowledge of "suspected UXO" so that on discovery, construction workers can cease all operations, avoid moving or tampering with the object and call QTMAC for immediate assessment and, if required, RSP and removal.

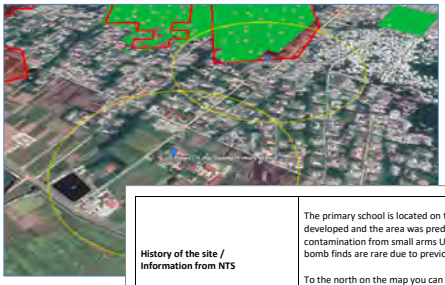
Stakeholder discussion and decision:

Sensitivity	Notable disturbance needed for ignition		Some disturbance needed for ignition		Little disturbance needed for ignition
Expected condition	Not likely to function anymore		Partially still functioning		Likely still functioning
Likelihood			Medium		High

* Overall rating: 3 x green = **green (no action required)** / 3 x red = **red (action required)** / every other combination = **yellow (discuss risk acceptability with stakeholder)**

Illustration 12: Form B2 for the kindergarten based on the general risk assessment using a 1 km diameter. The first page contains general information and repeats the findings of the general risk assessment. The second page gives more specific information about the planned work and the worst expected ammunition in the categories that are likely to be encountered (in this case EO > 60 mm / ≤ 60 mm). The proposed risk mitigation measures include TS and potential follow-up clearance down to 30 cm, and a search down to 1 m in specified areas where deep intrusive work is planned. Page 3 offers space to support the provided information with pictures and relevant stakeholder discussions with regard to the planned risk mitigation measures.

Form B2: Site-specific risk assessment: **Hải Dương primary school**

General information					
District / Commune / Coordinates	Hải Lăng	Hải Dương	107.335416 / 16.72484	**Date of assessment:**	09 April 19
Assessor company / Team / Name	MAG	TFM, Head Office		Henry Marriner	
Project name / Planned activity	Building 8 classrooms		Construction (intrusive activity > 1 m)		
Result of general risk assessment	***Expected contamination:***	Aircraft bombs: medium likelihood / Other ERW: medium likelihood of ≤ 60 mm and high likelihood > 60 mm			
	Required action:	2c for aircraft bombs (clearance to specified depth for the intended land use (and / or other risk mitigation measures) 2b for > 60 mm (clearance down to 1 m / max penetration depth or other risk mitigation measures) 2a for ≤ 60 mm (clearance down to 30 cm or other risk mitigation measures)			
Site-specific residual contamination					

History of the site / Information from NTS	The primary school is located on the edge of a built-up area in Hải Lăng district. During the war the infrastructure was considerably less developed and the area was predominately woodland and rice paddy fields. Heavy ground fighting left widespread and consistent contamination from small arms UXO throughout the immediate vicinity. Some sporadic bombing occurred, but over 50 years on and bomb finds are rare due to previous clearance efforts. To the north on the map you can see CHAs previously cleared by MAG; these areas are now clear but the presence of cluster munitions in such close proximity could indicate more cluster munition contamination to the south in the agricultural areas, where the lack of buildings has not required the need for technical survey – and subsequent confirmation of cluster munitions (if present at all).
Planned activities (detailed process steps and construction plans, if available)	Three separate buildings are planned to accommodate eight classrooms. Work will require heavy machinery to transit the grass area and dig foundations, up to 1 m deep.

Detailed risk assessment

Expected ERW category	Worst expected ammunition type / effect	Sensitivity			Expected condition			Likelihood of encountering ammunition		Overall rating*	Expected depth	Work steps at risk	Expected worst case
Aircraft bombs	Mk82			X		X			X	X	0.5 m – 2 m		Unplanned explosion following unsanctioned movement by workers.
Other ERW ≤ 60 mm	40 mm / HE			X			X	X		X	0 – 30 cm		Explosion of an untampered 40 mm grenade on the surface.
Other ERW > 60 mm	105 mm / HE / Phosphor		X				X	X		X	15 cm – 80 cm		Unplanned explosion following unsanctioned movement by workers.

Possible measures for risk mitigation:
Given the proximity to several other CHAs (cleared to the north and uncleared to the west) the inspecting officer would recommend technical survey (in line with current country policy – NPA) to a depth of 30 cm, to assess the presence of any shallowly buried small munitions in a surrounding area of 100 m from the centre of the building site. If contamination is found, further battle area clearance is conducted to make the area safe for use.
The risk assessment has awarded a "medium" rating for UXO larger than 60 mm (requiring clearance up to a depth of 1 m) but since aircraft bombs also have a "medium" rating, the recommendation is to sweep the exact location of the proposed foundations with a detector configured to a depth of 1 m. Clearance can then be conducted on a case by case basis.
Domestic EOD teams (MAG / NPA / PeaceTrees Vietnam / Quảng Trị military) are on standby and coordinated by QTMAC in the event that any suspect items are discovered by the local population.
All construction workers should have limited working knowledge of "suspected UXO" so that on discovery, construction workers can cease all operations, avoid moving or tampering with the object and call QTMAC for immediate assessment and, if required, RSP and removal.

Stakeholder discussion and decision:

Sensitivity		Notable disturbance needed for ignition		Some disturbance needed for ignition	Little disturbance needed for ignition
Expected condition		Not likely to function anymore		Partially still functioning	Likely still functioning
Likelihood				Medium	High

* Overall rating: 3 x green = **green (no action required)** / 3 x red = **red (action required)** / every other combination = **yellow (discuss risk acceptability with stakeholder)**



Illustration 13: Form B2 for the primary school based on the general risk assessment using a 0.5 km diameter. In this example, the expected worst case for all three ammunition categories has to be evaluated. The proposed risk mitigation measures include TS as well as potential follow-up clearance down to 30 cm, and a search down to 1 m in specified areas where deep intrusive work is planned.

In general, both mapping methods (diameter and grid box) and distance thresholds used (0.5 km/1 km), as well as the forms themselves proved to be useful and easy to understand and complete. However, it is recommended that diameter mapping and a 0.5 km threshold be used as this leads to more accurate estimations of the likelihood of encountering a certain category of ammunition. The different thresholds used to distinguish the likelihood categories – low, medium and high (number of aircraft bomb hits and EO findings) – were not discussed before the pre-test, but the tested margin seemed to be useful and reasonable. With regard to the site-specific risk assessment, it should be noted that a professional risk evaluation can only be carried out if detailed information of planned activities (work steps) is available and a field visit to the specific site is undertaken. Stakeholders need to discuss and decide what mapping method and threshold should be used to further test the forms in the planned pilot.

This chapter evaluated the findings per indicator and gave an overview of the overall evaluation results in order to assess whether the proposed indicators work in principle, and if the pre-tested districts could already be considered as having achieved a residual state by using these indicators. Furthermore, the forms used for the general and site-specific risk assessments were tested, explained and discussed (forms B1 and B2). The following chapter summarises the key points that still need to be discussed in order to prepare a larger test (pilot) of the proposed indicators and tools.

IMPLICATIONS AND RECOMMENDATIONS FOR FURTHER TESTS

The following paragraphs summarise the key issues emerging from the pre-test. These points need to be addressed and discussed amongst stakeholders before further testing and before a potential nationwide implementation of the LTRM framework can be considered.

GENERAL REMARKS

Understanding of the LTRM framework: the pre-test and especially the field survey to gather information for indicators 2, 3 and 4 showed that the LTRM concept and its purpose is not yet thoroughly understood by everyone. The aim of the framework is to find out to what extent proactive survey and clearance is needed until the risk posed by an EO threat drops below a tolerable level and a certain area (e.g. a district) can be declared as having achieved a residual state, which can be handled by reactive risk management (site-specific risk assessments based on location, land use and contamination type). This implies that it might not be necessary to clear all contamination proactively. The proposed indicators and thresholds make it possible to evaluate whether the residual state has been achieved at any time during ongoing proactive survey and clearance. The same extent of proactive activities might not be necessary in every area/district in order to achieve a residual state. It depends on people's perception, knowledge and approach to the risk.

Key discussions with stakeholders revealed objections from some that the LTRM framework was tested in one of the most heavily affected provinces in Vietnam and that it might lead to inaccurate conclusions if some districts in Quảng Trị are declared as having achieved a residual state. However, it must be remembered that Quảng Trị is also one of the most active provinces in mine action, in which proactive survey and clearance is advanced, and relevant, high quality data is available. Furthermore, the LTRM framework is still in the test phase and the results of the pre-test in Quảng Trị have not yet lead to any final conclusions, but rather provide crucial insights for further discussions and the enhancement of the framework.

The advantage of the LTRM framework is its holistic approach and the use of different indicators, which makes it possible to consider the socio-economic, psychological and financial impacts of an EO threat. By using different indicators, the result of an evaluation will often produce a mixed outcome (some indicators "red", some indicators "green") and not lead to an immediate and complete change to reactive risk management. Mixed results will help to better understand the impact of an EO threat and implemented activities and hence allow for better allocation and prioritisation of further proactive measures.

It is therefore important and recommended that further testing of the framework includes districts where proactive activities are ongoing but have not yet been completed. This was also planned for the pre-test by applying the framework in Cam Lộ (proactive survey and clearance completed) and in Hải Lăng district (proactive survey and clearance ongoing). However, based on differing interpretations of the purpose of the LTRM framework, the collection of field data led to some misunderstandings and as a result, the data collected in Hải Lăng has not been used for this report, due to insufficient confidence about the accuracy of the data set. It has also been suggested that less contaminated districts/provinces be included in the further testing. This will allow better insights into how the intensity of contamination and the extent of completed proactive survey and clearance influence evaluation results.

Availability of data: to evaluate whether a district/province has achieved a residual state, the availability of data is crucial. The data required has been listed in table 2 on page 24 and 25 and includes information about the type and extent of the EO threat (SHA/CHA), people's perception of the risk, as well as accident/victim statistics and a recording of past proactive activities, including RE. Only if this data is available can the proposed indicators be used. This implies that an authority/institution at a certain level manages and coordinates mine action issues. In order to limit the effort needed for data collection, it is recommended that for further testing, districts/provinces are chosen where at least a part of the required data is already available.

Processes and protocols: it is also suggested that the establishment of processes and protocols is included with further testing of the LTRM framework, as it is important that roles and responsibilities are clarified. The LTRM concept includes basic ideas for processes and protocols (see page 23), but it must be understood that the responsibility for establishing the necessary regulatory framework is with the national authorities, in consultation with provincial authorities. The timely development and implementation of a regulatory framework is not only required to evaluate the tolerable risk/residual state in further districts/provinces, but is also crucial for the implementation of general and site-specific risk assessments. Authorities and stakeholders at all levels need to know that a risk assessment is required to analyse whether risk mitigation measures are needed and which are most appropriate, in order to enable the intended land use. This demands clear responsibilities, processes and procedures.

REMARKS INDICATOR 1 (DEATH PROBABILITY RATE)

The pre-test showed that some options of indicator 1 and proposed thresholds might be too stringent. Indicator options A and B led to the result that the tested district (Cam Lộ district) cannot be considered as having achieved a residual state (because indicator 1 is "red"), despite a high number of completed proactive clearance tasks and green indicators 2, 3 and 4. On the other hand, the indicator was "green" (with the most tolerant threshold) for Hải Lăng district where proactive clearance is still ongoing. This might not be an appropriate judgement as it would imply that more clearance is needed in a district where proactive clearance has actually been completed. Indicator options A and B demand a "zero/near zero tolerance" for EO victims, which might not be achieved even with completed proactive area clearance, as scattered UXO and the wrong way of handling of it may always lead to a certain number of victims.

It is therefore recommended that further testing works with indicator 1 option C2 which compares EO victims with the top 10 causes of death in Vietnam, or to review options A and B and thresholds used in order to make it more tolerant. For option C2, the most stringent threshold (explosive ordnance is not one of the top 10 causes of death in the last 10 years) should be used, and provincial statistics related to causes of death, instead of national statistics should be analysed, if available.

REMARKS INDICATOR 2 (PEOPLE'S RISK PERCEPTION/WELL-BEING COMPROMISED)

Indicator 2 is significant and should be used to evaluate the psychological effect of a potential EO threat. With the data collected in Cam Lộ, it was obvious that the extent of proactive survey and completed clearance influences people's risk perception and the effect on their well-being. However, the misunderstandings that arose during the collection of field data also showed that the questions used to gather the relevant information must be considered very carefully, translations must be accurate, survey teams need to understand the purpose of the survey in detail, and questions need to be asked orally in exactly the same way that they are phrased in written form.

For the further testing, it is recommended that this indicator is used with the most stringent threshold (not more than 40% of affected people feel that their well-being is compromised). The phrasing of the appropriate questions for collecting the required information needs to be given more attention and the survey has to be planned and carried out carefully. This requires sufficient preparation time and training for survey staff. In addition, it is suggested that guidelines for the definition of the expected sample size be established, for further field survey. For the pre-test (in Cam Lộ), the sample size was guided by the availability of resources and included 7.5% of the population of four villages, in two out of eight communes in the district. Compared with the district population, this accounts for approximately 0.45% and is not a representative sample size. A realistic sample size should consider both – statistical requirements and feasibility.

REMARKS INDICATOR 3 (LAND USE)

The pre-test has shown that over 90% of the affected population interviewed use land regardless of a potential EO threat, their well-being being compromised and regardless of proactive activities undertaken (including survey, clearance and RE). This percentage increases to 100% in Cam Lộ after clearance has been completed. The increase of 10% is not significant enough to make a difference with regards the proposed thresholds, and it should also be mentioned that the reasons for the 10% not using the land are mostly unrelated to a potential EO threat (see also explanations given in annex B, page 59). It is likely that the situation in other districts is similar, as it is generally acknowledged that people use contaminated land. Thus, indicator 3 is always "green" and does not allow for any conclusion as to whether an area/district can be considered as having achieved a residual state or not.

It is recommended that the indicator be tested in one or two more districts and/or provinces to confirm the result. If the outcome remains the same, the proposal is to skip this indicator as a way to evaluate the tolerable level of risk/residual state in Vietnam. However, the principle of the indicator might still be valid in other locations and under other circumstances.

REMARKS INDICATOR 4 (BENEFIT FROM FORMER RE ACTIVITIES)

The evaluation of the survey data showed that over 90% of the population interviewed benefitted from former RE, but this does not seem to influence land use and people's well-being being compromised (see also explanations given in annex B, page 59). Thus, it is questionable whether the indicator is useful for evaluating whether an area/district has achieved a residual state or not.

However, it is recommended that the indicator be used, as all people living in a contaminated area should have the possibility of benefitting from RE, at least and specifically until proactive clearance has been completed to some degree. Guidelines are needed for the expected sample size (see also recommendations in indicator 2, page 45). Furthermore, it is proposed that there should be an attempt to establish whether there is any correlation between accident figures and the benefit from former RE. If not, it is suggested that the most tolerant threshold (at least 60% of the affected population have benefitted from former RE activities) be used for further testing. If there is a correlation, a more stringent threshold should be applied. A more detailed assessment of a possible correlation between RE activities and people's behaviour and perception could also give important insights for future RE activities (e.g. focus on safe methods of cultivating land when it is contaminated).

REMARKS INDICATOR 5 (COST-BENEFIT ANALYSIS OF CLEARANCE COSTS AND LAND PRICES)

During the discussions and preparation of the pre-test (see also remarks page 17), stakeholders decided that this indicator should not be used for the pre-test in Quảng Trị. However, the principle of the indicator might still be valid in other locations and under other circumstances. As the indicators 1 to 4 consider either the socio-economic, psychological or physical impacts of (potential) EO threats, but none of the indicators include estimations of the precise financial impact of an EO threat, it is therefore recommended that stakeholders discuss the applicability of the indicator further, in the context of the planned pilot in other provinces.

GENERAL AND SITE-SPECIFIC RISK ASSESSMENT (FORMS B1 AND B2)

The precondition for the performance of general and site-specific risk assessments as proposed, is the availability of data. This includes information with regard to the contamination in the surrounding areas of sites that are to be assessed, and availability of detailed information about the planned work/use of the potentially contaminated sites. The two main purposes of the proposed tools are, to be able to develop appropriate and tailored risk mitigation measures for sites on which intrusive work exceeds the standard clearance depth for cluster munitions, and to be able to handle potentially contaminated sites that have not been assessed/cleared in a systematic way during proactive clearance. This implies the existence of a database unit, in order to collect information about contamination and mine action activities, and which is able to model the required maps that allow the assessment of the likelihood of encountering a certain type of ammunition.

The pre-tested forms B1 and B2, mapping methods and thresholds proved to be useful, but in order to work with adequate and appropriate accuracy, the diameter mapping method and smaller threshold (500 m) is recommended for further testing. The proposed threshold for what should be considered as a high/medium/low likelihood of encountering a certain category of ammunition should still be discussed amongst stakeholders, but the tested threshold seemed to be appropriate.

It is also worth considering enhancing the mapping used, by adding a layer with information about known battlefields (information could possibly be requested from US databases). As an international expert had the lead in the pre-test of the forms in this instance, it is furthermore suggested that they be tested with mainly national staff during the next test phase.

CONCLUSION

The current report aims to summarise the long-term risk management (LTRM) framework, to reflect the work done and discussions held so far, as well as to give detailed information on the findings and implications of the completed pre-test in Quảng Trị. This pre-test has been an important step in the assessment as to whether the proposed concept and tools are feasible and appropriate to be used in Vietnam. In general, this can be confirmed and the overall methodology to evaluate the tolerable risk/residual state, as well as tools to assess site-specific risks, have proven to be achievable. However, it is also obvious that more work and further testing are needed, in order to be able to make the final decisions with regard to the applicability of the LTRM framework to a set of comprehensive and differentiated data.

The results of the pre-test, in addition to explanations and recommendations given in this report, will help stakeholders decide what the most appropriate and adequate options and thresholds are for the further testing of the indicators: 1 (death probability rate), 2 (risk perception/impact on well-being) and 4 (benefit from previous risk education [RE] activities) to evaluate the tolerable level of risk. However, the pre-test also showed that the assessment of land use (indicator 3) might not be an appropriate method for Vietnam to evaluate whether an area/district can be considered as having achieved a residual state. Furthermore, stakeholders are encouraged to resume an initial testing of indicator 5 (cost-benefit analysis) as this would add an additional dimension to the evaluation methodology (financial impact of an explosive ordnance [EO] threat). The pre-test of the tools to evaluate site-specific EO risks (forms B1 and B2) impeding development and other projects, showed that the availability of data with regard to the contamination of the surroundings, and information with regard to the planned project is crucial for an effective risk assessment. This is also true for the evaluation of the tolerable risk associated with the proposed indicators. Only with the required data is it possible to assess whether a residual state has been achieved or not.

With regard to further testing, consideration should be given to choosing districts/provinces with different levels of contamination in order to test how this influences the evaluation results. Furthermore, the next phase of testing and finalising the methodology and tools requires more attention to processes and protocols. Roles, responsibilities and processes need to be clear and documented, once the LTRM framework is ready to be implemented.

Stakeholders' understanding of the LTRM framework was expected due to the discussions held throughout the development of the concept. But the pre-test showed that there are still different interpretations of the purpose and benefit of the LTRM framework. Stakeholders are therefore encouraged to discuss the insights presented in this report in detail, in order to achieve a common understanding and agreement of the way forward and the next steps to be addressed.

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ANNEXES

Annex A) Raw data for indicator 1

Annex B) Raw data for indicators 2, 3 and 4

Annex C) Survey form used for indicators 2, 3 and 4

Annex D) Completed forms B1 and B2 for 6 future development sites

ANNEX A) RAW DATA FOR INDICATOR 1

Quang Tri

Year	Population size	Injuries	Fatalities	Total	Percentage / Population	Lowest percentage	Average percentage
2009	598568	15	8	23	0.003842555	0	0.001747361
2010	601665	22	6	28	0.00465375		
2011	604719	8	4	12	0.00198439		
2012	608172	13	2	15	0.00246641		
2013	613403	2	2	4	0.0006521		
2014	616570	11	1	12	0.00194625		
2015	619948	4	3	7	0.00112913		
2016	623528	1	1	2	0.00032076		
2017	627276	3	0	3	0.00047826		
2018	630940	0	0	0	0		

Cam Lo

Year	Population size	Injuries	Fatalities	Total	Percentage / Population	Above (red) or below (green) lowest provincial percentage	Above (red) or below (green) average provincial percentage
2009	44264	0	1	1	0.00225917	0.00225917	0.00225917
2010	44285	2	0	2	0.0045162	0.0045162	0.0045162
2011	44456	2	0	2	0.00449883	0.00449883	0.00449883
2012	44720	1	0	1	0.00223614	0.00223614	0.00223614
2013	44886	0	0	0	0	0	0
2014	45160	2	0	2	0.0044287	0.0044287	0.0044287
2015	45527	1	0	1	0.0021965	0.0021965	0.0021965
2016	45980	0	0	0	0	0	0
2017	46412	0	0	0	0	0	0
2018	47081	0	0	0	0	0	0
						Overall rating	Overall rating

Threshold 1
The indicator is "green" if the percentage of EO victims (injuries and fatalities) / per population / per year in a district over the last 10 years does **not exceed the lowest percentage** of EO victims in the whole province over the last 10 years more than 0 times.

Threshold 1
The indicator is "green" if the percentage of EO victims (injuries and fatalities) / per population / per year in a district over the last 10 years does **not exceed the average percentage** of EO victims in the whole province over the last 10 years more than 0 times

Above (red) or below (green) lowest provincial percentage	Above (red) or below (green) average provincial percentage
0.00225917	0.00225917
0.0045162	0.0045162
0.00449883	0.00449883
0.00223614	0.00223614
0	0
0.0044287	0.0044287
0.0021965	0.0021965
0	0
0	0
0	0
Overall rating	Overall rating

Threshold 2
The indicator is "green" if the percentage of EO victims (injuries and fatalities) / per population / per year in a district over the last 10 years does **not exceed the lowest percentage** of EO victims in the whole province over the last 10 years more than 3 times.

Threshold 2
The indicator is "green" if the percentage of EO victims (injuries and fatalities) / per population / per year in a district over the last 10 years does **not exceed the average percentage** of EO victims in the whole province over the last 10 years more than 3 times.

Above (red) or below (green) lowest provincial percentage	Above (red) or below (green) average provincial percentage
0.00225917	0.00225917
0.0045162	0.0045162
0.00449883	0.00449883
0.00223614	0.00223614
0	0
0.0044287	0.0044287
0.0021965	0.0021965
0	0
0	0
0	0
Overall rating	Overall rating

Threshold 3
The indicator is "green" if the percentage of EO victims (injuries and fatalities) / per population / per year in a district over the last 10 years does **not exceed the lowest percentage** of EO victims in the whole province over the last 10 years more than 5 times.

Threshold 3
The indicator is "green" if the percentage of EO victims (injuries and fatalities) / per population / per year in a district over the last 10 years does **not exceed the average percentage** of EO victims in the whole province over the last 10 years more than 5 times.

Hai Lang

Year	Population size	Injuries	Fatalities	Total	Percentage / Population	Above (red) or below (green) lowest provincial percentage	Above (red) or below (green) average provincial percentage
2009	85983	3	1	4	0.00465208	0.00465208	0.00465208
2010	85768	3	4	7	0.00816155	0.00816155	0.00816155
2011	86223	3	0	3	0.003457935	0.003457935	0.003457935
2012	86396	0	0	0	0	0	0
2013	86757	0	0	0	0	0	0
2014	86965	0	0	0	0	0	0
2015	85625	0	0	0	0	0	0
2016	84839	0	0	0	0	0	0
2017	84802	2	0	2	0.00235843	0.00235843	0.00235843
2018	84391	0	0	0	0	0	0
						Overall rating	**Overall rating**

Threshold 1
The indicator is "green" if the percentage of EO victims (injuries and fatalities) / per population / per year in a district over the last 10 years does **not exceed the lowest percentage** of EO victims in the whole province over the last 10 years more than 0 times.

Threshold 1
The indicator is "green" if the percentage of EO victims (injuries and fatalities) / per population / per year in a district over the last 10 years does **not exceed the average percentage** of EO victims in the whole province over the last 10 years more than 0 times.

Above (red) or below (green) lowest provincial percentage	Above (red) or below (green) average provincial percentage
0.00465208	0.00465208
0.00816155	0.00816155
0.003457935	0.003457935
0	0
0	0
0	0
0	0
0	0
0.00235843	0.00235843
0	0
Overall rating	**Overall rating**

Threshold 2
The indicator is "green" if the percentage of EO victims (injuries and fatalities) / per population / per year in a district over the last 10 years does **not exceed the lowest percentage** of EO victims in the whole province over the last 10 years more than 3 times.

Threshold 2
The indicator is "green" if the percentage of EO victims (injuries and fatalities) / per population / per year in a district over the last 10 years does **not exceed the average percentage** of EO victims in the whole province over the last 10 years more than 3 times.

Above (red) or below (green) lowest provincial percentage	Above (red) or below (green) average provincial percentage
0.00465208	0.00465208
0.00816155	0.00816155
0.003457935	0.003457935
0	0
0	0
0	0
0	0
0	0
0.00235843	0.00235843
0	0
Overall rating	**Overall rating**

Threshold 3
The indicator is "green" if the percentage of EO victims (injuries and fatalities) / per population / per year in a district over the last 10 years does **not exceed the lowest percentage** of EO victims in the whole province over the last 10 years more than 5 times.

Threshold 3
The indicator is "green" if the percentage of EO victims (injuries and fatalities) / per population / per year in a district over the last 10 years does **not exceed the average percentage** of EO victims in the whole province over the last 10 years more than 5 times.

2008

Rank	Cause of death or injury	Measure	Value	Percentage
1	Cardiovascular diseases	Deaths per 100,000	189.6081994	0.189608199
2	Neoplasms		102.8673745	0.102867375
3	Respiratory infections and tuberculosis		43.42761994	0.04342762
4	Chronic respiratory diseases		34.50005692	0.034500057
5	Diabetes and kidney diseases		33.41182562	0.033411826
6	Unintentional injuries		32.78380841	0.032783808
7	Neurological disorders		30.00863083	0.030008631
8	Digestive diseases		27.53086167	0.027530862
9	Transport injuries		26.84123052	0.026841231
10	Other non-communicable diseases		14.97928546	0.014979285
11	HIV/AIDS and sexually transmitted infections		11.9923509	0.011992351
12	Maternal and neonatal disorders		11.09159718	0.011091597
13	Self-harm and interpersonal violence		9.478306629	0.009478307
14	Other infectious diseases		6.070899367	0.006070899
15	Enteric infections		4.900985569	0.004900986
16	Neglected tropical diseases and malaria		1.875067844	0.001875068
17	Substance use disorders		1.825456276	0.001825456
18	Nutritional deficiencies		1.321902896	0.001321903
19	Skin and subcutaneous diseases		1.174406153	0.001174406
20	Musculoskeletal disorders		0.642731898	0.000642732

EO victims Quảng Trị	Population size	Percentage	EO victims per 100,000
72	595493	0.12102264	121 (Rank 2)
			Result with top 20 threshold
			Result with top 10 threshold

EO victims Cam Lộ	Population size	Percentage	Hypothetical EO victims per 100,000
5	44168	0.01132041	11.32041 (Rank 12)
			Result with top 20 threshold
			Result with top 10 threshold

EO victims Hải Lăng	Population size	Percentage	Hypothetical EO victims per 100,000
11	85971	0.01279501	12.79501 (Rank 11)
			Result with top 20 threshold
			Result with top 10 threshold

2009

Rank	Cause of death or injury	Measure	Value	Percentage
1	Cardiovascular diseases	Deaths per 100,000	191.2816051	0.191281605
2	Neoplasms		104.5641727	0.104564173
3	Respiratory infections and tuberculosis		42.77423469	0.042774235
4	Chronic respiratory diseases		34.55588906	0.034555889
5	Diabetes and kidney diseases		33.96202105	0.033962021
6	Unintentional injuries		32.97271876	0.032972719
7	Neurological disorders		30.71250096	0.030712501
8	Digestive diseases		27.87812967	0.02787813
9	Transport injuries		26.77042553	0.026770426
10	Other non-communicable diseases		14.71951105	0.014719511
11	HIV/AIDS and sexually transmitted infections		11.39845858	0.011398459
12	Maternal and neonatal disorders		10.74470728	0.010744707
13	Self-harm and interpersonal violence		9.504402314	0.009504402
14	Other infectious diseases		5.841530399	0.00584153
15	Enteric infections		4.67861338	0.004678613
16	Substance use disorders		1.882581091	0.001882581
17	Neglected tropical diseases and malaria		1.861149972	0.00186115
18	Nutritional deficiencies		1.313337265	0.001313337
19	Skin and subcutaneous diseases		1.207874597	0.001207875
20	Musculoskeletal disorders		0.652718674	0.000652719

EO victims Quảng Trị	Population size	Percentage	EO victims per 100,000
23	598568	0.003842555	3.84255 (Rank 16)
			Result with top 20 threshold
			Result with top 10 threshold

EO victims Cam Lộ	Population size	Percentage	Hypothetical EO victims per 100,000
1	44264	0.00225917	2.25917 (Rank 16)
			Result with top 20 threshold
			Result with top 10 threshold

EO victims Hải Lăng	Population size	Percentage	Hypothetical EO victims per 100,000
4	85983	0.00465208	4.65208 (Rank 16)
			Result with top 20 threshold
			Result with top 10 threshold

2010

Rank	Cause of death or injury	Measure	Value	Percentage
1	Cardiovascular diseases	Deaths per 100,000	192.452127	0.192452127
2	Neoplasms		106.0352513	0.106035251
3	Respiratory infections and tuberculosis		41.88694586	0.041886946
4	Chronic respiratory diseases		34.57070943	0.034570709
5	Diabetes and kidney diseases		34.47897876	0.034478979
6	Unintentional injuries		32.61793486	0.032617935
7	Neurological disorders		31.36500453	0.031365005
8	Digestive diseases		28.21457178	0.028214572
9	Transport injuries		26.58130935	0.026581309
10	Other non-communicable diseases		14.43546592	0.014435466
11	HIV/AIDS and sexually transmitted infections		11.49500555	0.011495006
12	Maternal and neonatal disorders		10.34467058	0.010344671
13	Self-harm and interpersonal violence		9.463217184	0.009463217
14	Other infectious diseases		5.525051471	0.005525051
15	Enteric infections		4.482420382	0.00448242
16	Substance use disorders		1.930970412	0.00193097
17	Neglected tropical diseases and malaria		1.861563146	0.001861563
18	Nutritional deficiencies		1.294475292	0.001294475
19	Skin and subcutaneous diseases		1.239847958	0.001239848
20	Musculoskeletal disorders		0.661006414	0.000661006

EO victims Quảng Trị	Population size	Percentage	EO victims per 100,000
28	601665	0.00465375	4.65375 (Rank 15)
			Result with top 20 threshold
			Result with top 10 threshold

EO victims Cam Lộ	Population size	Percentage	Hypothetical EO victims per 100,000
2	44285	0.0045162	4.5162 (Rank 15)
			Result with top 20 threshold
			Result with top 10 threshold

EO victims Hải Lăng	Population size	Percentage	Hypothetical EO victims per 100,000
7	85768	0.00816155	8.16155 (Rank 14)
			Result with top 20 threshold
			Result with top 10 threshold

2011

Rank	Cause of death or injury	Measure	Value	Percentage
1	Cardiovascular diseases	Deaths per 100,000	193.7320924	0.191281605
2	Neoplasms		108.4276847	0.104564173
3	Respiratory infections and tuberculosis		41.0884477	0.042774235
4	Diabetes and kidney diseases		35.38419927	0.034555889
5	Chronic respiratory diseases		34.81427856	0.033962021
6	Unintentional injuries		32.4728562	0.032972719
7	Neurological disorders		32.08804006	0.030712501
8	Digestive diseases		28.69366108	0.02787813
9	Transport injuries		26.23142557	0.026770426
10	Other non-communicable diseases		14.1424668	0.014719511
11	HIV/AIDS and sexually transmitted infections		12.57223438	0.011398459
12	Maternal and neonatal disorders		9.831198847	0.010744707
13	Self-harm and interpersonal violence		9.42212375	0.009504402
14	Other infectious diseases		5.245733581	0.00584153
15	Enteric infections		4.310305779	0.004678613
16	Substance use disorders		1.975888855	0.001882581
17	Neglected tropical diseases and malaria		1.823091291	0.00186115
18	Skin and subcutaneous diseases		1.277579601	0.001313337
19	Nutritional deficiencies		1.190634687	0.001207875
20	Musculoskeletal disorders		0.671871425	0.000652719

EO victims Quảng Trị	Population size	Percentage	EO victims per 100,000
12	604719	0.00198439	1.98439 (Rank 16)
			Result with top 20 threshold
			Result with top 10 threshold

EO victims Cam Lộ	Population size	Percentage	Hypothetical EO victims per 100,000
2	44456	0.00449883	4.49883 (Rank 15)
			Result with top 20 threshold
			Result with top 10 threshold

EO victims Hải Lăng	Population size	Percentage	Hypothetical EO victims per 100,000
3	86223	0.003457935	3.45793 (Rank 16)
			Result with top 20 threshold
			Result with top 10 threshold

2012

Rank	Cause of death or injury	Measure	Value	Percentage
1	Cardiovascular diseases	Deaths per 100,000	195.3220802	0.191281605
2	Neoplasms		110.8596963	0.104564173
3	Respiratory infections and tuberculosis		40.239631	0.042774235
4	Diabetes and kidney diseases		36.41951245	0.034555889
5	Chronic respiratory diseases		35.07837654	0.033962021
6	Neurological disorders		32.76198712	0.032972719
7	Unintentional injuries		32.24800272	0.030712501
8	Digestive diseases		29.08421059	0.02787813
9	Transport injuries		25.8811771	0.026770426
10	Other non-communicable diseases		13.73845936	0.014719511
11	HIV/AIDS and sexually transmitted infections		13.01678856	0.011398459
12	Self-harm and interpersonal violence		9.414317275	0.010744707
13	Maternal and neonatal disorders		9.20581159	0.009504402
14	Other infectious diseases		5.136593432	0.00584153
15	Enteric infections		4.148752251	0.004678613
16	Substance use disorders		2.036133305	0.001882581
17	Neglected tropical diseases and malaria		1.789857267	0.00186115
18	Skin and subcutaneous diseases		1.317229922	0.001313337
19	Nutritional deficiencies		1.117131485	0.001207875
20	Musculoskeletal disorders		0.683661058	0.000652719

EO victims Quảng Trị	Population size	Percentage	EO victims per 100,000
15	608172	0.00246641	2.46641 (Rank 16)
			Result with top 20 threshold
			Result with top 10 threshold

EO victims Cam Lộ	Population size	Percentage	Hypothetical EO victims per 100,000
1	44720	0.00223614	2.23614 (Rank 16)
			Result with top 20 threshold
			Result with top 10 threshold

EO victims Hải Lăng	Population size	Percentage	Hypothetical EO victims per 100,000
0	86396	0	0 (Rank beyond top 20)
			Result with top 20 threshold
			Result with top 10 threshold

2013

Rank	Cause of death or injury	Measure	Value	Percentage
1	Cardiovascular diseases	Deaths per 100,000	197.4306127	0.191281605
2	Neoplasms		113.5170007	0.104564173
3	Respiratory infections and tuberculosis		39.50295866	0.042774235
4	Diabetes and kidney diseases		37.56577089	0.034555889
5	Chronic respiratory diseases		35.44462091	0.033962021
6	Neurological disorders		33.46591999	0.032972719
7	Unintentional injuries		32.47609355	0.030712501
8	Digestive diseases		29.4740756	0.02787813
9	Transport injuries		25.51616151	0.026770426
10	Other non-communicable diseases		13.32874809	0.014719511
11	HIV/AIDS and sexually transmitted infections		12.89913345	0.011398459
12	Self-harm and interpersonal violence		9.43582639	0.010744707
13	Maternal and neonatal disorders		8.576324602	0.009504402
14	Other infectious diseases		5.104927009	0.00584153
15	Enteric infections		4.017628722	0.004678613
16	Substance use disorders		2.105261915	0.001882581
17	Neglected tropical diseases and malaria		1.788476948	0.00186115
18	Skin and subcutaneous diseases		1.358192372	0.001313337
19	Nutritional deficiencies		1.065640346	0.001207875
20	Musculoskeletal disorders		0.696173079	0.000652719

EO victims Quảng Trị	Population size	Percentage	EO victims per 100,000
4	613403	0.0006521	0.6521 (Rank beyond top 20)
			Result with top 20 threshold
			Result with top 10 threshold

EO victims Cam Lộ	Population size	Percentage	Hypothetical EO victims per 100,000
0	44886	0	0 (Rank beyond top 20)
			Result with top 20 threshold
			Result with top 10 threshold

EO victims Hải Lăng	Population size	Percentage	Hypothetical EO victims per 100,000
0	86757	0	0 (Rank beyond top 20)
			Result with top 20 threshold
			Result with top 10 threshold

2014

Rank	Cause of death or injury	Measure	Value	Percentage
1	Cardiovascular diseases	Deaths per 100,000	200.0543694	0.191281605
2	Neoplasms		116.3567437	0.104564173
3	Respiratory infections and tuberculosis		38.88597599	0.042774235
4	Diabetes and kidney diseases		38.81670245	0.034555889
5	Chronic respiratory diseases		35.89809334	0.033962021
6	Neurological disorders		34.16970059	0.032972719
7	Unintentional injuries		32.1692173	0.030712501
8	Digestive diseases		29.8655833	0.02787813
9	Transport injuries		25.22588289	0.026770426
10	Other non-communicable diseases		12.93461364	0.014719511
11	HIV/AIDS and sexually transmitted infections		12.6526623	0.011398459
12	Self-harm and interpersonal violence		9.292334415	0.010744707
13	Maternal and neonatal disorders		7.94418633	0.009504402
14	Other infectious diseases		4.960069929	0.00584153
15	Enteric infections		3.912248497	0.004678613
16	Substance use disorders		2.178435764	0.001882581
17	Neglected tropical diseases and malaria		1.76271386	0.00186115
18	Skin and subcutaneous diseases		1.403618894	0.001313337
19	Nutritional deficiencies		1.029754699	0.001207875
20	Musculoskeletal disorders		0.709384329	0.000652719

EO victims Quảng Trị	Population size	Percentage	EO victims per 100,000
12	616570	0.00194625	1.94625 (Rank 17)
			Result with top 20 threshold
			Result with top 10 threshold

EO victims Cam Lộ	Population size	Percentage	Hypothetical EO victims per 100,000
2	45160	0.0044287	4.4287 (Rank 15)
			Result with top 20 threshold
			Result with top 10 threshold

EO victims Hải Lăng	Population size	Percentage	Hypothetical EO victims per 100,000
0	86965	0	0 (Rank beyond top 20)
			Result with top 20 threshold
			Result with top 10 threshold

2015

Rank	Cause of death or injury	Measure	Value	Percentage
1	Cardiovascular diseases	Deaths per 100,000	202.4453047	0.191281605
2	Neoplasms		1.002980651	0.104564173
3	Diabetes and kidney diseases		40.04620251	0.042774235
4	Respiratory infections and tuberculosis		38.22584913	0.034555889
5	Chronic respiratory diseases		36.27880866	0.033962021
6	Neurological disorders		34.81878281	0.032972719
7	Unintentional injuries		32.33119011	0.030712501
8	Digestive diseases		30.12086336	0.02787813
9	Transport injuries		24.90036582	0.026770426
10	Other non-communicable diseases		12.60804954	0.014719511
11	HIV/AIDS and sexually transmitted infections		12.37987986	0.011398459
12	Self-harm and interpersonal violence		9.317360541	0.010744707
13	Maternal and neonatal disorders		7.329939902	0.009504402
14	Other infectious diseases		4.545321717	0.00584153
15	Enteric infections		3.828131989	0.004678613
16	Substance use disorders		2.254828284	0.001882581
17	Neglected tropical diseases and malaria		1.771351543	0.00186115
18	Skin and subcutaneous diseases		1.449117356	0.001313337
19	Nutritional deficiencies		1.002980651	0.001207875
20	Musculoskeletal disorders		0.722103163	0.000652719

EO victims Quảng Trị	Population size	Percentage	EO victims per 100,000
7	619948	0.00112913	1.12913 (Rank 19)
			Result with top 20 threshold
			Result with top 10 threshold

EO victims Cam Lộ	Population size	Percentage	Hypothetical EO victims per 100,000
1	45527	0.0021965	2.1965 (Rank 17)
			Result with top 20 threshold
			Result with top 10 threshold

EO victims Hải Lăng	Population size	Percentage	Hypothetical EO victims per 100,000
0	85625	0	0 (Rank beyond top 20)
			Result with top 20 threshold
			Result with top 10 threshold

2016

Rank	Cause of death or injury	Measure	Value	Percentage
1	Cardiovascular diseases	Deaths per 100,000	205.7100099	0.191281605
2	Neoplasms		122.413169	0.104564173
3	Diabetes and kidney diseases		41.49264837	0.042774235
4	Respiratory infections and tuberculosis		37.62342893	0.034555889
5	Chronic respiratory diseases		36.84663618	0.033962021
6	Neurological disorders		35.57309008	0.032972719
7	Unintentional injuries		32.52508676	0.030712501
8	Digestive diseases		30.41690071	0.02787813
9	Transport injuries		24.51453844	0.026770426
10	Other non-communicable diseases		12.23420019	0.014719511
11	HIV/AIDS and sexually transmitted infections		12.09016224	0.011398459
12	Self-harm and interpersonal violence		9.347320747	0.010744707
13	Maternal and neonatal disorders		6.762634731	0.009504402
14	Other infectious diseases		4.412348482	0.00584153
15	Enteric infections		3.754011952	0.004678613
16	Substance use disorders		2.328488191	0.001882581
17	Neglected tropical diseases and malaria		1.770378252	0.00186115
18	Skin and subcutaneous diseases		1.498540183	0.001313337
19	Nutritional deficiencies		0.98706769	0.001207875
20	Musculoskeletal disorders		0.736433447	0.000652719

EO victims Quảng Trị	Population size	Percentage	EO victims per 100,000
2	623528	0.00032076	0.32076 (Rank beyond top 20)
			Result with top 20 threshold
			Result with top 10 threshold

EO victims Cam Lộ	Population size	Percentage	Hypothetical EO victims per 100,000
0	45980	0	0 (Rank beyond top 20)
			Result with top 20 threshold
			Result with top 10 threshold

EO victims Hải Lăng	Population size	Percentage	Hypothetical EO victims per 100,000
0	84839	0	0 (Rank beyond top 20)
			Result with top 20 threshold
			Result with top 10 threshold

2017

Rank	Cause of death or injury	Measure	Value	Percentage
1	Cardiovascular diseases	Deaths per 100,000	209.2113236	0.191281605
2	Neoplasms		125.4591897	0.104564173
3	Diabetes and kidney diseases		42.49501924	0.042774235
4	Chronic respiratory diseases		37.38842277	0.034555889
5	Respiratory infections and tuberculosis		37.20066071	0.033962021
6	Neurological disorders		36.27846094	0.032972719
7	Unintentional injuries		32.61320858	0.030712501
8	Digestive diseases		30.80303471	0.02787813
9	Transport injuries		24.14150591	0.026770426
10	HIV/AIDS and sexually transmitted infections		12.02853543	0.014719511
11	Other non-communicable diseases		11.85761634	0.011398459
12	Self-harm and interpersonal violence		9.355826995	0.010744707
13	Maternal and neonatal disorders		6.287618025	0.009504402
14	Other infectious diseases		4.311339321	0.00584153
15	Enteric infections		3.729795302	0.004678613
16	Substance use disorders		2.379789409	0.001882581
17	Neglected tropical diseases and malaria		1.804393858	0.00186115
18	Skin and subcutaneous diseases		1.547866357	0.001313337
19	Nutritional deficiencies		1.001095942	0.001207875
20	Musculoskeletal disorders		0.747683268	0.000652719

EO victims Quảng Trị	Population size	Percentage	EO victims per 100,000
3	627276	0.00047826	0.47826 (Rank beyond top 20)
			Result with top 20 threshold
			Result with top 10 threshold

EO victims Cam Lộ	Population size	Percentage	Hypothetical EO victims per 100,000
0	46412	0	0 (Rank beyond top 20)
			Result with top 20 threshold
			Result with top 10 threshold

EO victims Hải Lăng	Population size	Percentage	Hypothetical EO victims per 100,000
2	84802	0.00235843	2.35843 (Rank 17)
			Result with top 20 threshold
			Result with top 10 threshold

Overall baseline and up-to-date data for indicator 2 (risk perception), indicator 3 (land use) and indicator 4 (benefit from previous RE) on using different thresholds

Threshold 60% / 60% / 60%

Data set	Total interviewees (=households)	Feel that their well-being is compromised by using the land because of potential ERW			Threshold: not more than...	Use the land (despite potential effect on well-being)		Threshold: at least...	Former beneficiary of RE		Threshold: at least...
		yes	not sure	no		yes	no		yes	no	
Baseline	223	221	2	0	60%	205	18	60%	182	41	60%
		99.1%	0.9%	0%		92%	8%		81.6%	18.4%	
Up-to-date	214	4	9	201	60%	214	0	60%	207	7	60%
		1.9%*	4.2%*	93.9%		100%	0%		96.7%	3.3%	

Threshold 50% / 70% / 70%

Data set	Total interviewees (=households)	Feel that their well-being is compromised by using the land because of potential ERW			Threshold: not more than...	Use the land (despite potential effect on well-being)		Threshold: at least...	Former beneficiary of RE		Threshold: at least...
		yes	not sure	no		yes	no		yes	no	
Baseline	223	221	2	0	50%	205	18	70%	182	41	70%
		99.1%	0.9%	0%		92%	8%		81.6%	18.4%	
Up-to-date	214	4	9	201	50%	214	0	70%	207	7	70%
		1.9%*	4.2%*	93.9%		100%	0%		96.7%	3.3%	

Threshold 40% / 80% / 80%

Data set	Total interviewees (=households)	Feel that their well-being is compromised by using the land because of potential ERW			Threshold: not more than...	Use the land (despite potential effect on well-being)		Threshold: at least...	Former beneficiary of RE		Threshold: at least...
		yes	not sure	no		yes	no		yes	no	
Baseline	223	221	2	0	40%	205	18	80%	182	41	80%
		99.1%	0.9%	0%		92%	8%		81.6%	18.4%	
Up-to-date	214	4	9	201	40%	214	0	80%	207	7	80%
		1.9%*	4.2%*	93.9%		100%	0%		96.7%	3.3%	

* yes/not sure answers are added up for the overall result

ANNEX B) RAW DATA FOR INDICATORS 2, 3 AND 4

Raw baseline and up-to-date data for indicator 2 (risk perception), indicator 3 (land use) and indicator 4 (benefit from previous RE) in Cam Lộ: application of different filters, data analysis and interpretation

All interviewees (households interviewed)

Data set	Total interviewed households	Feel that their well-being is compromised by using the land because of potential ERW			Use the land (despite potential effect on well-being)		Former beneficiary of RE	
		yes	not sure	no	yes	no	yes	no
Baseline	223	221	0	2	205	18	182	41
		99.1%	0%	0.9%	92%	8%	81.6%	18.4%
Up-to-date	214	4	9	201	214	0	207	7
		1.9%	4.2%	93.9%	100%	0%	96.7%	3.3%

Only women

Data set	Total interviewed households	Feel that their well-being is compromised by using the land because of potential ERW			Use the land (despite potential effect on well-being)		Former beneficiary of RE	
		yes	not sure	no	yes	no	yes	no
Baseline	92	92	0	0	82	10	69	23
		100%	0%	0%	89.1%	10.9%	75%	25%
Up-to-date	89	0	1	88	89	0	84	5
		0%	1.1%	98.9%	100%	0%	94.4%	5.6%

Only men separated

Data set	Total interviewed households	Feel that their well-being is compromised by using the land because of potential ERW			Use the land (despite potential effect on well-being)		Former beneficiary of RE	
		yes	not sure	no	yes	no	yes	no
Baseline	131	129	0	2	123	8	113	18
		98.5%	0%	1.5%	93.9%	6.1%	86.3%	13.7%
Up-to-date	125	4	8	113	125	0	123	2
		3.2%	6.4%	90.4%	100%	0%	98.4%	1.6%

Only 14 to 35 year-olds

Data set	Total interviewed households	Feel that their well-being is compromised by using the land because of potential ERW			Use the land (despite potential effect on well-being)		Former beneficiary of RE	
		yes	not sure	no	yes	no	yes	no
Baseline	25	25	0	0	17	8	22	3
		100%	0%	0%	68%	32%	88%	12%
Up-to-date	22	0	2	20	22	0	22	0
		0%	9%	91%	100%	0%	100%	0%

Only 36 to 50 year-olds

Data set	Total interviewed households	Feel that their well-being is compromised by using the land because of potential ERW			Use the land (despite potential effect on well-being)		Former beneficiary of RE	
		yes	not sure	no	yes	no	yes	no
Baseline	60	60	0	0	54	6	46	14
		100%	0%	0%	90%	10%	76.7%	23.3%
Up-to-date	57	3	2	52	57	0	54	3
		5.3%	3.5%	91.2%	100%	0%	94.7%	5.3%

Only 51 to 89 year-olds

Data set	Total interviewed households	Feel that their well-being is compromised by using the land because of potential ERW			Use the land (despite potential effect on well-being)		Former beneficiary of RE	
		yes	not sure	no	yes	no	yes	no
Baseline	138	136	0	2	134	4	121	17
		98.5%	0%	1.5%	97.1%	2.9%	87.7%	12.3%
Up-to-date	135	1	5	129	57	0	131	4
		0.7%	3.7%	95.6%	100%	0%	97%	3%

ANNEX B) RAW DATA FOR INDICATORS 2, 3 AND 4

Residents for more than 50 years only

Data set	Total interviewed households	Feel that their well-being is compromised by using the land because of potential ERW			Use the land (despite potential effect on well-being)		Former beneficiary of RE	
		yes	not sure	no	yes	no	yes	no
Baseline	50	49	0	1	47	3	38	12
		98%	0%	2%	96%	4%	76%	24%
Up-to-date	98	0	4	94	98	0	97	1
		0%	4.1%	95.9%	100%	0%	99%	1%

Residents for 19 to 50 years only

Data set	Total interviewed households	Feel that their well-being is compromised by using the land because of potential ERW			Use the land (despite potential effect on well-being)		Former beneficiary of RE	
		yes	not sure	no	yes	no	yes	no
Baseline	154	153	0	1	143	11	128	26
		99.4%	0%	0.6%	92.9%	7.1%	83.1%	16.9%
Up-to-date	111	4	5	102	111	0	105	6
		3.6%	4.5%	91.9%	100%	0%	94.5%	5.5%

Residents for less than 19 years only

Data set	Total interviewed households	Feel that their well-being is compromised by using the land because of potential ERW			Use the land (despite potential effect on well-being)		Former beneficiary of RE	
		yes	not sure	no	yes	no	yes	no
Baseline	19	19	0	0	15	4	16	3
		100%	0%	0%	78.9%	21.1%	84.2%	15.8%
Up-to-date	5	0	0	5	5	0	5	0
		0%	0%	100%	100%	0%	100%	0%

Data interpretation

> Baseline data: before survey and clearance has been implemented.
> Up-to-date data: survey and most of clearance completed.

- *Feel their well-being has been compromised:* whatever filter is used, at least 98% of people feel compromised if the baseline data is considered. The small proportion of people not feeling affected are men who are more than 50 years-old. Considering the up-to-date data and whatever filter is used, over 90% of people do not feel compromised. The highest proportion of people still feeling affected or not being sure about feeling affected can be found amongst men and amongst the 36 to 50 year-olds.
- *Use of land despite potential effect on well-being:* whatever filter is used, more than 68% of people are using the land when considering the baseline data. The lowest proportion of land use can be found among people who have been residents for less than 19 years or who are 14 to 35 years-old. However, it should be noted that people who do not use the land give the reason that they don't own the land / don't need the land, and not that they're not using it because they are afraid of explosive ordnance. With regard to the up-to-date data, 100% of people use the land, regardless of the filter applied.
- *Beneficiary of former RE:* for the baseline data, the highest proportion of benefit from previous RE can be found amongst the 14 to 35 year-olds (88%). The lowest proportion of benefit from RE can be found amongst women (75%). For the up-to-date data, the highest proportion is recorded for the 14 to 35 year-olds (100%) and the lowest proportion for women (94.4%).
- *Correlations:*
  - No correlation can be found between benefit from former RE or feeling affected, and land use (as the absence of land use always means that people do not own or do not need the land but never that they're not using it because they feel affected).
  - No correlation can be found between benefit from former RE and feeling affected (more or less everyone feels affected regardless of any benefit from former RE).

ANNEX C) SURVEY FORM USED FOR INDICATORS 2, 3 AND 4

NPA VIETNAM
Post CMRS and clearance assessment form (PCCA)

Survey identification and village information			
Survey ID		Survey date	
Surveyor		District	
Commune		Village	
No. of village residents		No. of village households	
Status of activities conducted			
NTS conducted TS conducted Clearance conducted	By ☐ _____ ☐ Completed Date_____ ☐ Ongoing ☐ Not started By ☐ _____ ☐ Completed Date_____ ☐ Ongoing ☐ Not started By ☐ _____ ☐ Completed Date_____ ☐ Ongoing ☐ Not started		
Village (approx. size in Sq m)		CMRS CHA size in Sq m Clearance size in Sq m	_____ _____
Name of person interviewed			
Gender	☐ M ☐ F	Age	
What is your occupation or main income?	☐ Agriculture ☐ Government employee ☐ Private business ☐ Manual work ☐ Student ☐ Other, specify:		
How long have you been living / working here (year)?		No. of people in household	
1. Has your household benefitted from risk education activities or not?	☐ Yes. How many times?: ☐ No		
2. Do you think your land or the land that you are using contains CM or other UXO?	☐ Yes ☐ No, I know it does not contain any CM or UXO ☐ Not sure		
2a. If yes, how do you know?	☐ Physical evidence I have encountered ☐ Somebody else told me ☐ Not sure		
2b. If yes, is it a CM or another type of UXO?	☐ CM ☐ UXO ☐ Not sure		
2c. If yes, what happened to the item?	☐ Reported ☐ Removed it myself ☐ No action taken		
2d. If you reported it, to whom did you report it?	☐ Local authority Specify: _____ ☐ Hotline Number: _____ ☐ MA operator Specify: _____		
2e. Has your land been cleared of CM or UXO?	☐ Yes, specify: ☐ No ☐ Not sure		

ANNEX C) SURVEY FORM USED FOR INDICATORS 2, 3 AND 4

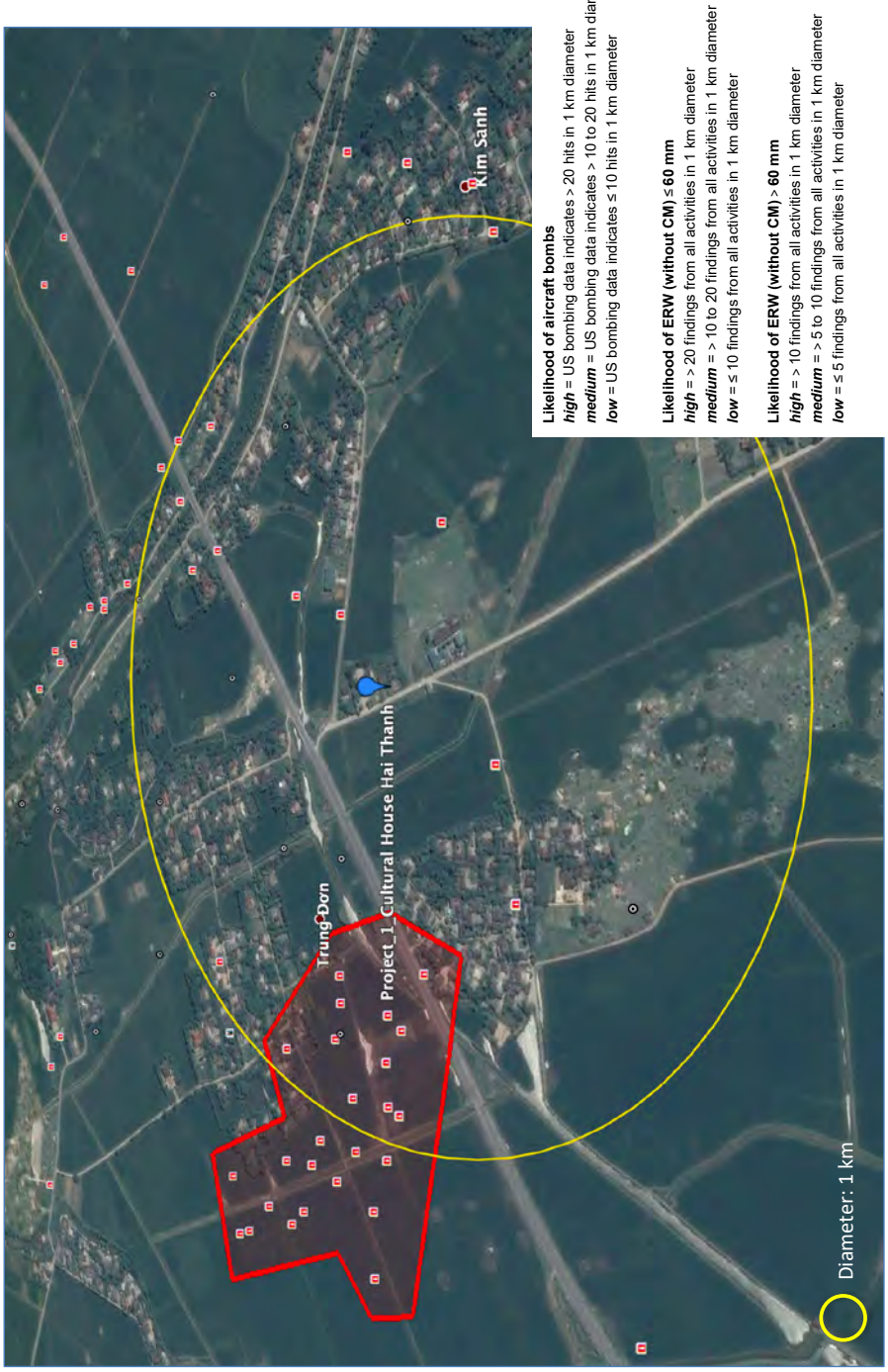
3. Do you think it is dangerous or not, to use land that contains CM and / or UXO?	☐ Dangerous ☐ Not dangerous ☐ Not sure
4. Are you using or not using land that contains CM and / or UXO?	☐ Yes, I am using the land ☐ No, I am not using the land
4a. If yes: how do you use the land?	☐ Residential ☐ Agricultural/Pastoral ☐ Community/Public ☐ Natural resources ☐ Infrastructure ☐ Access/Roads ☐ Services ☐ Other, specify:
4b. If yes: how do you work on the land?	☐ Manually ☐ With machinery
4c. If no: why don't you use the land? (Several answers possible)	☐ Because of ERW ☐ Land not needed ☐ Doesn't own land ☐ Other, specify:
5. Do you feel afraid or not, to use land you think contains CM or UXO?	☐ Yes ☐ No ☐ Not sure
5.1 Do you feel afraid or not, to use your land because of the potential of it containing CM or UXO?	☐ Yes ☐ No ☐ Not sure
5a. If yes: which of the listed activities do you think are dangerous?	☐ Walking ☐ Digging/Ploughing ☐ Raking ☐ Chopping wood ☐ Burning ☐ Using machinery ☐ Other, specify:
5b. If yes: would you use the land differently, if you didn't feel afraid to use it?	☐ Yes. Specify use: ☐ No

6. How do you feel about the CMRS or clearance activities that have been conducted on your land or in your village?	☐ Satisfied ☐ Not satisfied	If not satisfied please explain why?	
7. Are you confident that the land you are now using is safe to use?	☐ Yes ☐ No	If no, specify why:	

ANNEX D) COMPLETED FORMS B1 AND B2 FOR 6 FUTURE DEVELOPMENT SITES

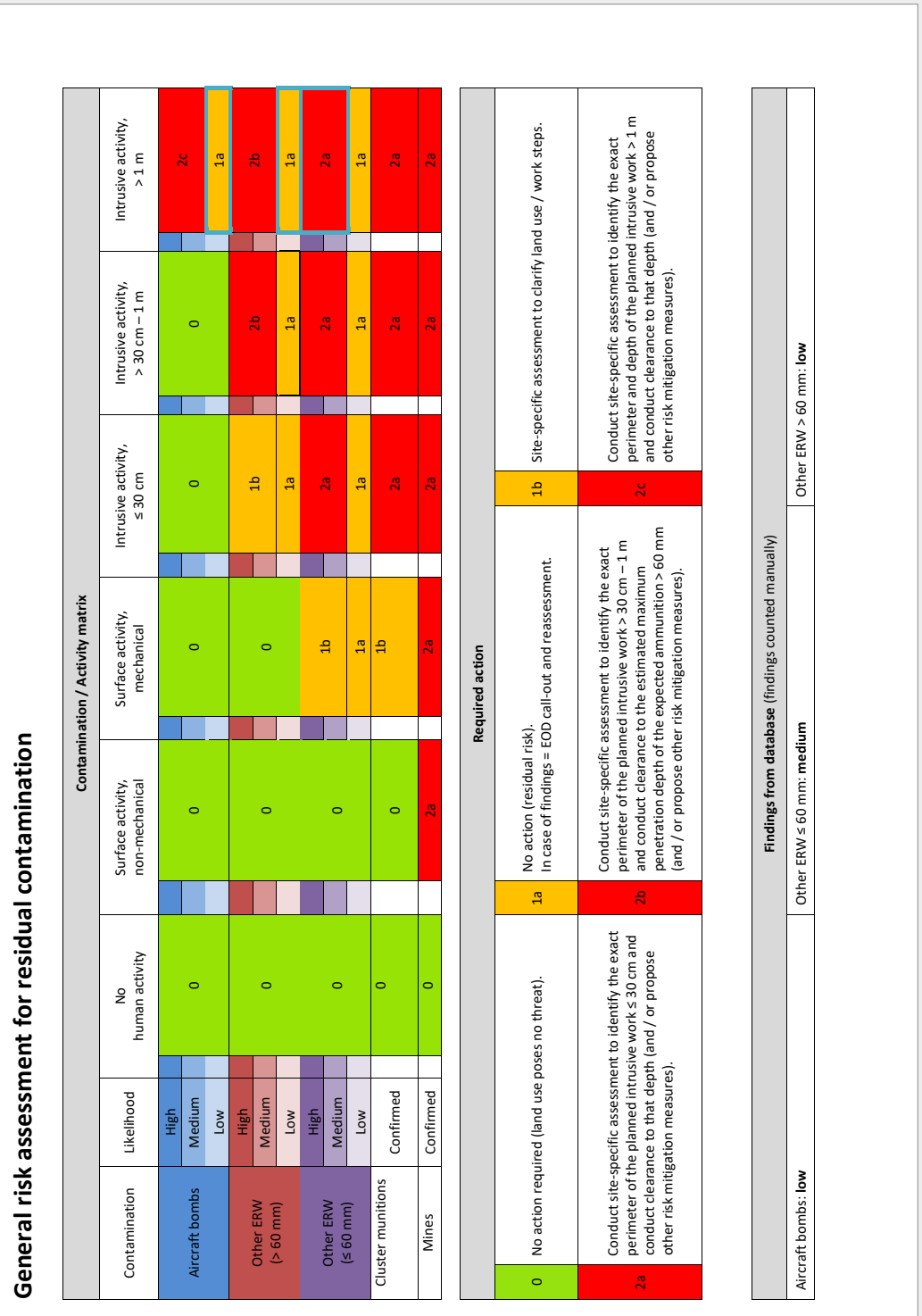
TEST DEVELOPMENT SITE 1) DIAMETER MAPPING METHOD, THRESHOLD 1 KM; FORM B1 (GENERAL RISK ASSESSMENT)

Form B1: Mapping of (residual) contamination: **Cultural House in Hải Thành**



ANNEX D) COMPLETED FORMS B1 AND B2 FOR 6 FUTURE DEVELOPMENT SITES

TEST DEVELOPMENT SITE 1) DIAMETER MAPPING METHOD, THRESHOLD 1 KM; FORM B1 (GENERAL RISK ASSESSMENT)



General risk assessment for residual contamination

Contamination / Activity matrix

Contamination	Likelihood	No human activity	Surface activity, non-mechanical	Surface activity, mechanical	Intrusive activity, ≤ 30 cm	Intrusive activity, > 30 cm – 1 m	Intrusive activity, > 1 m
Aircraft bombs	High	0	0	0	0	0	2c
	Medium						1a
	Low						
Other ERW (> 60 mm)	High	0	0	0	1b	2b	2b
	Medium						
	Low				1a	1a	
Other ERW (≤ 60 mm)	High	0	0	1b	2a	2a	2a
	Medium						
	Low			1a	1a	1a	1a
Cluster munitions	Confirmed	0	0	1b	2a	2a	2a
Mines	Confirmed	0	2a	2a	2a	2a	2a

Required action

0	No action required (land use poses no threat).	1a	No action (residual risk). In case of findings = EOD call-out and reassessment.
		1b	Site-specific assessment to clarify land use / work steps.
2a	Conduct site-specific assessment to identify the exact perimeter of the planned intrusive work ≤ 30 cm and conduct clearance to that depth (and / or propose other risk mitigation measures).	2b	Conduct site-specific assessment to identify the exact perimeter of the planned intrusive work > 30 cm – 1 m and conduct clearance to the estimated maximum penetration depth of the expected ammunition > 60 mm (and / or propose other risk mitigation measures).
		2c	Conduct site-specific assessment to identify the exact perimeter and depth of the planned intrusive work > 1 m and conduct clearance to that depth (and / or propose other risk mitigation measures).

Findings from database (findings counted manually)

Aircraft bombs: **low**	Other ERW ≤ 60 mm: **medium**
	Other ERW > 60 mm: **low**

Form B2: Site-specific risk assessment: **Cultural House in Hải Thành**

General information					
District / Commune / Coordinates	Hải Lăng	Hải Thành	107.300205/16.714649	**Date of assessment:**	20 March 2019
Assessor company / Team / Name	MAG	TFM, Head Office		Henry Marriner	
Project name / Planned activity	Communal Cultural House, 250 seats	Construction (intrusive activity > 1 – 1.5 m)			
Result of general risk assessment	***Expected contamination:***	Aircraft bombs: low likelihood / other ERW: low likelihood for > 60 mm, medium likelihood for ≤ 60 mm			
	Required action:	2a for ≤ 60 mm (clearance down to 30 cm or other risk mitigation measures)			
Site-specific residual contamination					

ANNEX D) COMPLETED FORMS B1 AND B2 FOR 6 FUTURE DEVELOPMENT SITES

TEST DEVELOPMENT SITE 1) FORM B2 (SITE-SPECIFIC RISK ASSESSMENT)

<table>
<tr><td colspan="2">History of the site / Information from NTS</td><td colspan="12">US bombing during the war as well as heavy ground fighting (with small arms contamination from both US and Vietnamese munitions). Previous survey effort by NPA / Project Renew to west of planned development site – visible on map as red area (CHA 0541). Other historical finds and UXO-related incidents visible with roughly even distribution in the general vicinity of the building site.</td></tr>
<tr><td colspan="2">Planned activities (detailed process steps and construction plans, if available)</td><td colspan="12">Planned activities now underway (see attached photograph) – most intrusive activity is the use of heavy plant machinery to dig foundations 1 - 1.5 m deep with fortified buried concrete struts. General foot traffic and vehicular motion is frequent on the adjacent road and immediate vicinity. Ground penetration is localised in the template of the cultural building plan with no intrusion into surrounding area.</td></tr>
<tr><td colspan="14">Detailed risk assessment</td></tr>
<tr><td>Expected ERW category</td><td>Worst expected ammunition type / effect</td><td colspan="3">Sensitivity</td><td colspan="3">Expected condition</td><td colspan="2">Likelihood of encountering ammunition</td><td>Overall rating*</td><td>Expected depth</td><td>Work steps at risk</td><td>Expected worst case</td></tr>
<tr><td>Other ERW ≤ 60 mm</td><td>40 mm / HE</td><td></td><td></td><td>X</td><td></td><td></td><td>X</td><td>X</td><td></td><td>X</td><td>0 – 30 cm</td><td></td><td>Explosion of an untampered 40 mm grenade on the surface</td></tr>
<tr><td colspan="14">Possible measures for risk mitigation:
Prior to commencement of any work, and time allowing, the inspecting officer would recommend technical survey (in line with current country policy – NPA) to a depth of 30 cm to assess the presence of shallowly buried small munitions in a surrounding area of 100 m from the centre of the building site. If contamination is found, further battle area clearance would be conducted to make the area safe for use.

In reality work has already begun, therefore, the proposed risk mitigation is very much in keeping with the current provincial policy – domestic EOD teams (MAG / NPA / PeaceTrees Vietnam / Quảng Trị military) are on standby and coordinated by QTMAC in the event that any suspect items are discovered by the local population.
All construction workers should have limited working knowledge of “suspected UXO” so that on discovery, construction workers can cease all operations, avoid moving or tampering with the object and call QTMAC for immediate assessment and, if required, RSP and removal.</td></tr>
</table>

ANNEX D) COMPLETED FORMS B1 AND B2 FOR 6 FUTURE DEVELOPMENT SITES

TEST DEVELOPMENT SITE 1) FORM B2 (SITE-SPECIFIC RISK ASSESSMENT)

Sensitivity	Notable disturbance needed for ignition		Some disturbance needed for ignition	Little disturbance needed for ignition
Expected condition	Not likely to function anymore		Partially still functioning	Likely still functioning
Likelihood			Medium	High

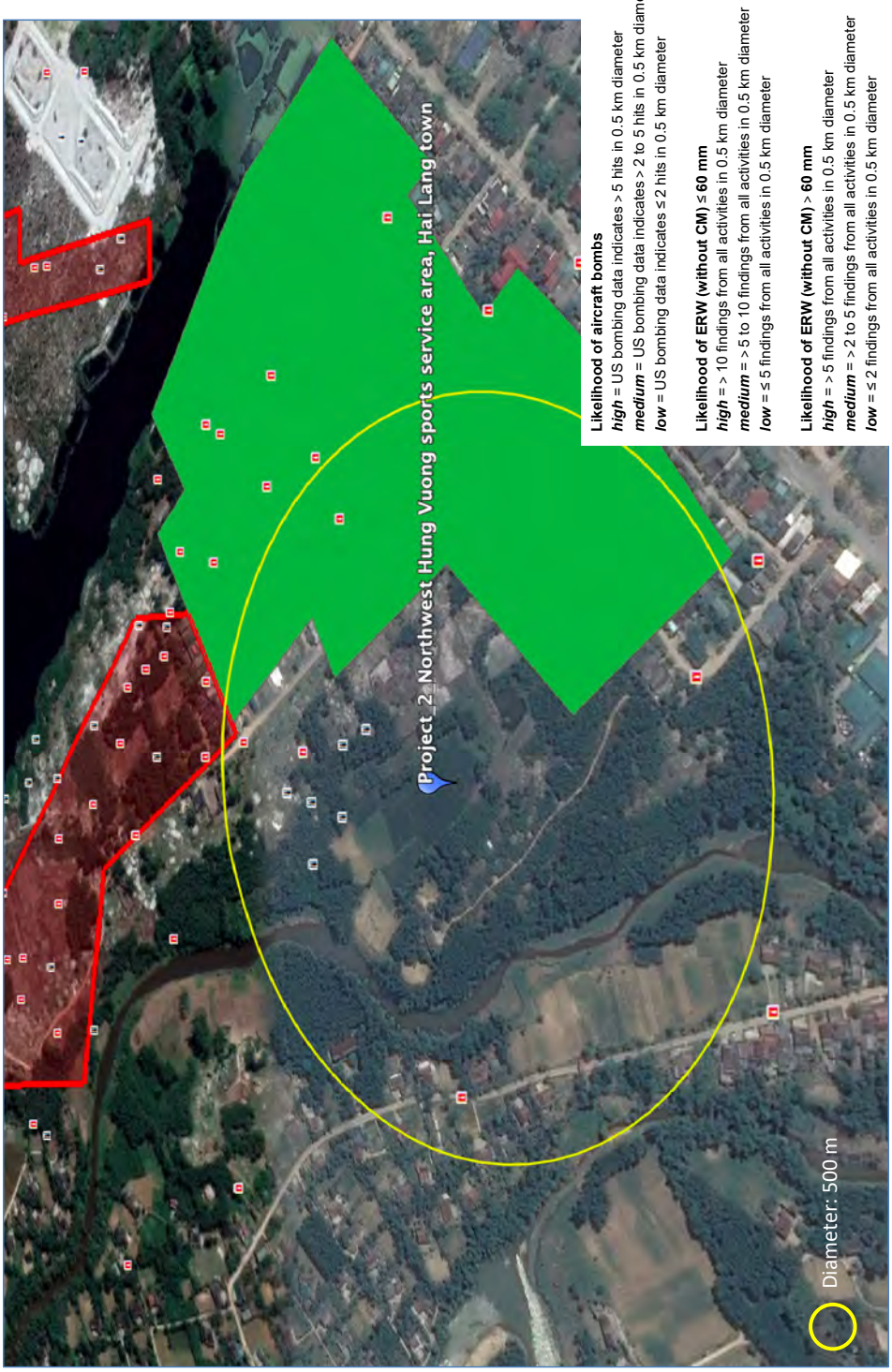
* Overall rating: 3 x green = **green (no action required)** / 3 x red = **red (action required)** / every other combination = **yellow (discuss risk acceptability with stakeholder)**

Stakeholder discussion and decision:

ANNEX D) COMPLETED FORMS B1 AND B2 FOR 6 FUTURE DEVELOPMENT SITES

TEST DEVELOPMENT SITE 2) DIAMETER MAPPING METHOD, THRESHOLD 500 M; FORM B1 (GENERAL RISK ASSESSMENT)

Form B1: Mapping of (residual) contamination: **Northwest Hùng Vương sports service area, Hải Lăng town**



ANNEX D) COMPLETED FORMS B1 AND B2 FOR 6 FUTURE DEVELOPMENT SITES

TEST DEVELOPMENT SITE 2) DIAMETER MAPPING METHOD, THRESHOLD 500 M; FORM B1 (GENERAL RISK ASSESSMENT)

General risk assessment for residual contamination

Contamination / Activity matrix

Contamination	Likelihood	No human activity	Surface activity, non-mechanical	Surface activity, mechanical	Intrusive activity, ≤ 30 cm	Intrusive activity, > 30 cm – 1 m	Intrusive activity, > 1 m
Aircraft bombs	High	0	0	0	0	0	2c
	Medium						
	Low						1a
Other ERW (> 60 mm)	High	0	0	0	1b	2b	2b
	Medium						
	Low				1a	1a	1a
Other ERW (≤ 60 mm)	High	0	0	1b	2a	2a	2a
	Medium						
	Low			1a	1a	1a	1a
Cluster munitions	Confirmed	0	0	1b	2a	2a	2a
Mines	Confirmed	0	2a	2a	2a	2a	2a

Required action

0	No action required (land use poses no threat).	1a	No action (residual risk). In case of findings = EOD call-out and reassessment.
1b	Site-specific assessment to clarify land use / work steps.		
2a	Conduct site-specific assessment to identify the exact perimeter of the planned intrusive work ≤ 30 cm and conduct clearance to that depth (and / or propose other risk mitigation measures).	2b	Conduct site-specific assessment to identify the exact perimeter of the planned intrusive work > 30 cm – 1 m and conduct clearance to the estimated maximum penetration depth of the expected ammunition > 60 mm (and / or propose other risk mitigation measures).
2c	Conduct site-specific assessment to identify the exact perimeter and depth of the planned intrusive work > 1m and conduct clearance to that depth (and / or propose other risk mitigation measures).		

Findings from database (findings counted manually)

Aircraft bombs: **low**	Other ERW > 60 mm: **low**
	Other ERW ≤ 60 mm: **high**

TEST DEVELOPMENT SITE 2) FORM B2 (SITE-SPECIFIC RISK ASSESSMENT)

Form B2: Site-specific risk assessment: **Northwest Hùng Vương sports service area, Hải Lăng town**

General information					
District / Commune / Coordinates	Hải Lăng	Hải Lăng town	107.245448/16.696373	**Date of assessment:**	02 April 2019
Assessor company / Team / Name	MAG	TFM, Head Office		Henry Marriner	
Project name / Planned activity	The Infrastructure of Techmart development area - service and sports Northwest Hùng Vương road, Hải Lăng. Category: road	Construction (intrusive activity > 30 cm – 1m)			
Result of general risk assessment	***Expected contamination:***	Aircraft bombs: low likelihood/other ERW: low likelihood of > 60 mm and high likelihood of ≤ 60 mm			
	Required action:	2a for ≤ 60 mm (clearance down to 30 cm or other risk mitigation measures)			
Site-specific residual contamination					

TEST DEVELOPMENT SITE 2) FORM B2 (SITE-SPECIFIC RISK ASSESSMENT)

History of the site / Information from NTS	Hải Lăng town saw frequent bombing runs by the US during the war; through the course of infrastructure expansion many have been discovered and removed. There was also heavy ground fighting resulting in widespread contamination from cluster munitions and other UXO. Due to the high population, these areas have been prioritised by international NGOs. Three areas surrounding the proposed site are marked on the map, these have been confirmed to contain UXO and only the one in green (encroaching the 500 m radius) has been cleared (to a depth of 30 cm).
Planned activities (detailed process steps and construction plans, if available)	This proposal is still very much in the early stages – currently the area is made up of residential buildings (very small, one level, little to no foundations) and garden areas. As a result, the inspecting team was unable to gain physical access to the exact proposed building point, instead circling the 500 m radius and observing the current level of infrastructure. With information available at this point it is understood that the site will be converted into sports fields – this will require ploughing and laying of turf, using light machinery. It is unknown at this stage if larger building work will be required or indeed if it is planned.

Detailed risk assessment

Expected ERW category	Worst expected ammunition type / effect	Sensitivity			Expected condition			Likelihood of encountering ammunition		Overall rating*	Expected depth	Work steps at risk	Expected worst case
Other ERW ≤ 60 mm	40 mm / HE			X			X	X		X	0 – 30 cm		Unplanned explosion on the surface during work.

Possible measures for risk mitigation:

We currently do not know the size of the area required for conversion to the sports ground; regardless, the exact footprint should undergo technical survey (if it has not already – data unavailable) to establish the extent of contamination (if any). Following TS, battle area clearance can be conducted to a depth of 30 cm including 50 m fade-out for any cluster munitions discovered.

If building work is required, then a detector calibrated for a deeper search (up to 1 m) should be swept over the foundation footprint. Domestic EOD teams (MAG / NPA / PeaceTrees Vietnam / Quảng Trị military) are on standby and coordinated by QTMAC in the event that any suspect items are discovered by the local population.

All construction workers should have limited working knowledge of "suspected UXO" so that on discovery, construction workers can cease all operations, avoid moving or tampering with the object and call QTMAC for immediate assessment and, if required, RSP and removal.

Stakeholder discussion and decision:

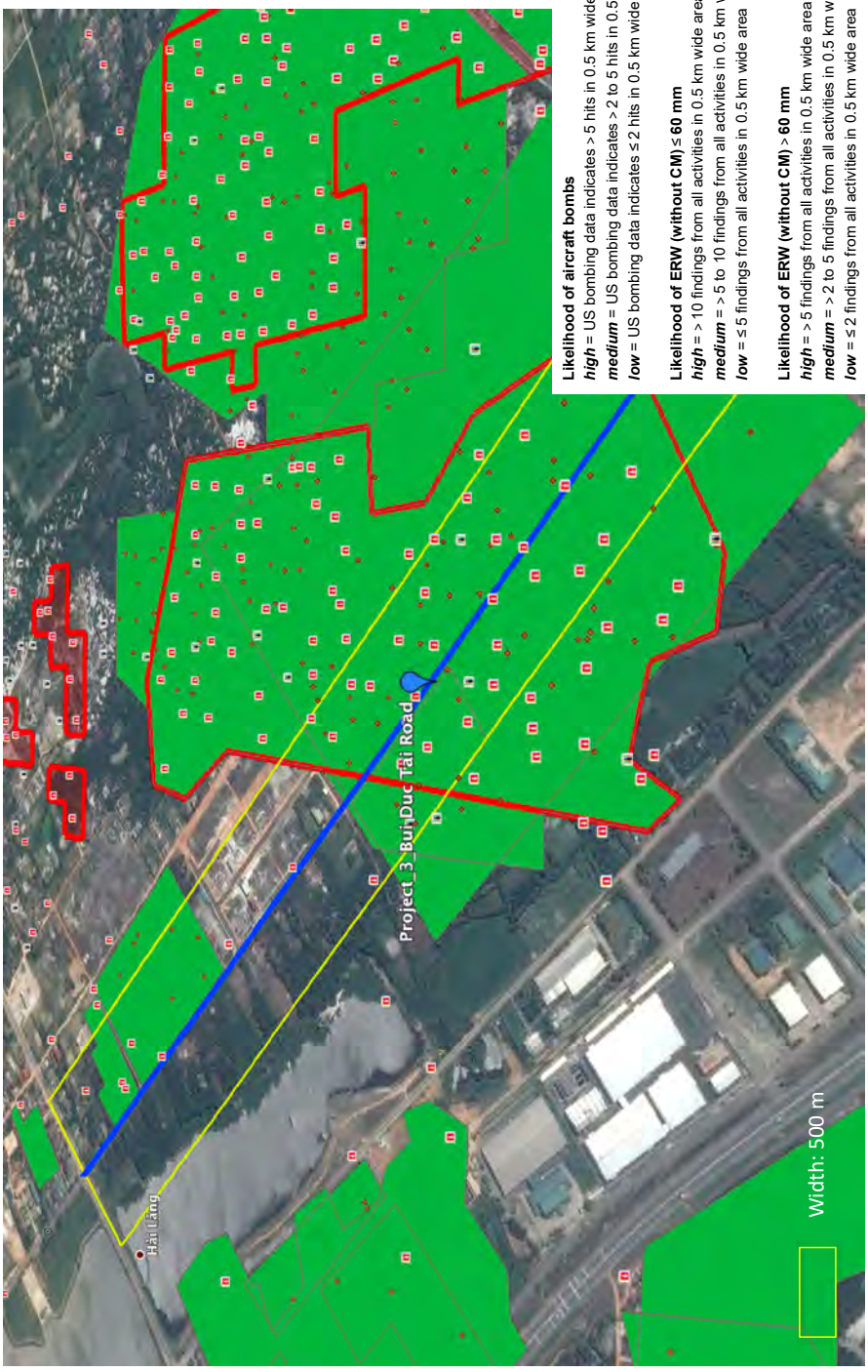
Sensitivity		Notable disturbance needed for ignition		Some disturbance needed for ignition		Little disturbance needed for ignition
Expected condition		Not likely to function anymore		Partially still functioning		Likely still functioning
Likelihood				Medium		High

* Overall rating: 3 x green = **green (no action required)** / 3 x red = **red (action required)** / every other combination = **yellow (discuss risk acceptability with stakeholder)**

ANNEX D) COMPLETED FORMS B1 AND B2 FOR 6 FUTURE DEVELOPMENT SITES

TEST DEVELOPMENT SITE 3) DIAMETER MAPPING METHOD, THRESHOLD 500 M; FORM B1 (GENERAL RISK ASSESSMENT)

Form B1: Mapping of (residual) contamination: **Bùi Dục Tài Road, Hải Lăng town**



ANNEX D) COMPLETED FORMS B1 AND B2 FOR 6 FUTURE DEVELOPMENT SITES

TEST DEVELOPMENT SITE 3) DIAMETER MAPPING METHOD, THRESHOLD 500 M; FORM B1 (GENERAL RISK ASSESSMENT)

General risk assessment for residual contamination

Contamination / Activity matrix

Contamination	Likelihood	No human activity	Surface activity, non-mechanical	Surface activity, mechanical	Intrusive activity, ≤ 30 cm	Intrusive activity, > 30 cm – 1 m	Intrusive activity, > 1 m
Aircraft bombs	High	0	0	0	0	0	2c
	Medium						1a
	Low					2b	2b
Other ERW (> 60 mm)	High	0	0	0	1b		1a
	Medium				1a	1a	2a
	Low					2a	
Other ERW (≤% 60 mm)	High	0	0	1b	2a		1a
	Medium			1a	1a	1a	2a
	Low			1b	2a	2a	
Cluster munitions	Confirmed	0	0				2a
Mines	Confirmed	0	2a	2a	2a	2a	2a

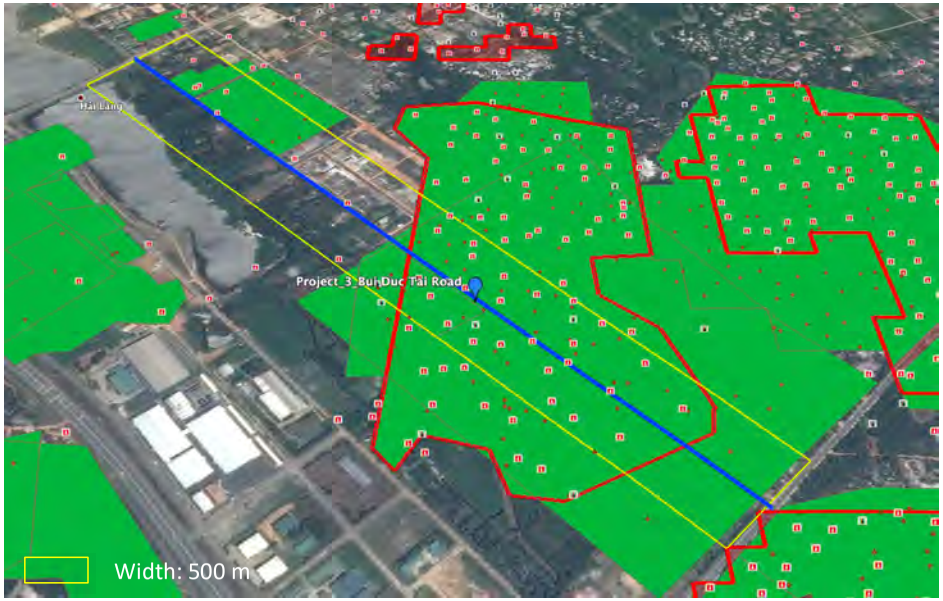
Required action

0	No action required (land use poses no threat).	1a	No action (residual risk). In case of findings = EOD call-out and reassessment.
1b	Site-specific assessment to clarify land use / work steps.		
2a	Conduct site-specific assessment to identify the exact perimeter of the planned intrusive work ≤ 30 cm and conduct clearance to that depth (and / or propose other risk mitigation measures).	2b	Conduct site-specific assessment to identify the exact perimeter of the planned intrusive work > 30 cm – 1 m and conduct clearance to the estimated maximum penetration depth of the expected ammunition > 60 mm (and / or propose other risk mitigation measures).
2c	Conduct site-specific assessment to identify the exact perimeter and depth of the planned intrusive work > 1m and conduct clearance to that depth (and / or propose other risk mitigation measures).		

Findings from database (findings counted manually)

Aircraft bombs: **low**	Other ERW (> 60 mm): **high**
Other ERW (≤ 60 mm): **high**	

Form B2: Site-specific risk assessment: **Bùi Dục Tài Road, Hải Lăng town**

General information					
District / Commune / Coordinates	Hải Lăng	Hải Lăng town	107.259282/16.684532	**Date of assessment:**	27 March 2019
Assessor company / Team / Name	MAG	TFM, Head Office		Henry Marriner	
Project name / Planned activity	Upgrade and expand Bùi Dục Tài Road (from Hùng Vương Road to 3/2 Road)		Construction (intrusive activity > 30cm – 1m)		
Result of general risk assessment	***Expected contamination:***	Aircraft bombs: low likelihood / other ERW: high likelihood of > 60 mm and ≤ 60 mm			
	Required action:	2b for > 60 mm (clearance down to 1 m / max penetration depth or other risk mitigation measures) 2a for ≤ 60 mm (clearance down to 30 cm or other risk mitigation measures)			
Site-specific residual contamination					

TEST DEVELOPMENT SITE 3) FORM B2 (SITE-SPECIFIC RISK ASSESSMENT)

History of the site / Information from NTS	Some sporadic bombing from US air assets (minimal) with heavy and intense ground fighting. Widespread and consistent UXO contamination from submunitions and small arms ammunition. Several confirmed hazardous areas (CHAs) visible on map outlined in red; green fill indicates previously cleared land by MAG operators to a depth of 30 cm. Other historical finds and UXO-related incidents visible with roughly even distribution in general vicinity of the planned road expansion.
Planned activities (detailed process steps and construction plans, if available)	Planned activities have commenced but have been temporarily suspended for an undisclosed period of time – reason for suspension unclear. In original state, roadway is a compacted earth path wide enough for one-way flow of traffic with a grass verge on either side. Modified road is a solid tarmac and widened roadway to allow two-way traffic flow (pictures of both current states attached). When completed, road will also have a large breeze block curb either side to prevent incursion by mud and other organic debris during the rainy season.

Detailed risk assessment

Expected ERW category	Worst expected ammunition type / effect	Sensitivity			Expected condition			Likelihood of encountering ammunition		Overall rating*	Expected depth	Work steps at risk	Expected worst case
Other ERW ≤ 60 mm	40 mm / HE			X			X	X		X	0 – 30 cm		Unplanned explosion on the surface during work.
Other ERW > 60 mm	105 mm / HE / Phosphor		X				X	X		X	15 cm – 80 cm		Unplanned explosion following unsanctioned movement by workers.

Possible measures for risk mitigation:

For this task the planned intrusive work will be along the exact border of the road, no expected impact to surrounding area (500 m border visible on map). Risk mitigation employed should be along the compacted earth section of the road (partially completed area has already been laid with tarmac, thereby negating any surface influence on buried ordnance). Using a mobile detector, such as a scorpion calibrated to a depth of 80 cm, would provide an accurate read-out of any buried objects for later excavation and investigation (as required).

Domestic EOD teams (MAG / NPA / PeaceTrees Vietnam / Quảng Trị military) are on standby and coordinated by QTMAC in the event that any suspect items are discovered by the local population.

All construction workers should have limited working knowledge of “suspected UXO” so that on discovery, construction workers can cease all operations, avoid moving or tampering with the object and call QTMAC for immediate assessment and, if required, RSP and removal.

TEST DEVELOPMENT SITE 3) FORM B2 (SITE-SPECIFIC RISK ASSESSMENT)

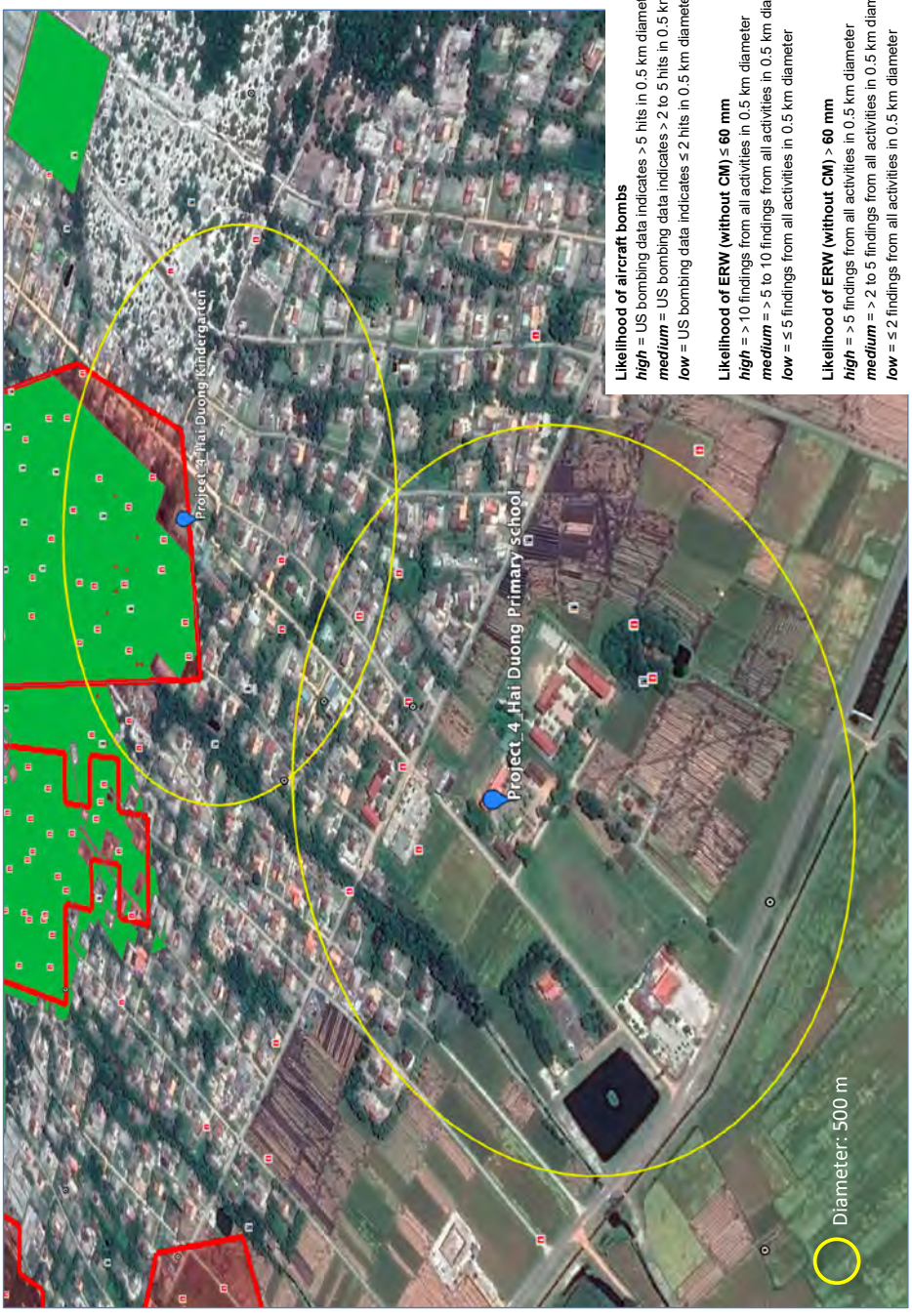
Stakeholder discussion and decision:

Sensitivity	(green)	Notable disturbance needed for ignition	(yellow)	Some disturbance needed for ignition	(red)	Little disturbance needed for ignition
Expected condition	(green)	Not likely to function anymore	(yellow)	Partially still functioning	(red)	Likely still functioning
Likelihood			(yellow)	Medium	(red)	High
* Overall rating: 3 x green = **green (no action required)** / 3 x red = **red (action required)** / every other combination = **yellow (discuss risk acceptability with stakeholder)**						

ANNEX D) COMPLETED FORMS B1 AND B2 FOR 6 FUTURE DEVELOPMENT SITES

TEST DEVELOPMENT SITE 4) DIAMETER MAPPING METHOD, THRESHOLD 500 M; FORM B1 (GENERAL RISK ASSESSMENT)

Form B1: Mapping of (residual) contamination: **Hải Dương kindergarten and primary school**



ANNEX D) COMPLETED FORMS B1 AND B2 FOR 6 FUTURE DEVELOPMENT SITES

TEST DEVELOPMENT SITE 4) DIAMETER MAPPING METHOD, THRESHOLD 500 M; FORM B1 (GENERAL RISK ASSESSMENT)

General risk assessment for residual contamination (completed, primary school)

Contamination / Activity matrix							
Contamination	Likelihood	No human activity	Surface activity, non-mechanical	Surface activity, mechanical	Intrusive activity, ≤ 30 cm	Intrusive activity, > 30 cm – 1 m	Intrusive activity, > 1 m
Aircraft bombs	High	0	0	0	0	0	2c
	Medium						
	Low						1a
Other ERW (> 60 mm)	High	0	0	0	1b	2b	2b
	Medium						
	Low				1a	1a	1a
Other ERW (≤ 60 mm)	High	0	0	1b	2a	2a	2a
	Medium						
	Low			1a	1a	1a	1a
Cluster munitions	Confirmed	0	0	1b	2a	2a	2a
Mines	Confirmed	0	2a	2a	2a	2a	2a

Required action					
0	No action required (land use poses no threat).	1a	No action (residual risk). In case of findings = EOD call-out and reassessment.	1b	Site-specific assessment to clarify land use / work steps.
2a	Conduct site-specific assessment to identify the exact perimeter of the planned intrusive work ≤ 30 cm and conduct clearance to that depth (and / or propose other risk mitigation measures).	2b	Conduct site-specific assessment to identify the exact perimeter of the planned intrusive work > 30 cm – 1 m and conduct clearance to the estimated maximum penetration depth of the expected ammunition > 60 mm (and / or propose other risk mitigation measures).	2c	Conduct site-specific assessment to identify the exact perimeter and depth of the planned intrusive work > 1m and conduct clearance to that depth (and / or propose other risk mitigation measures).

Findings from database (findings counted manually)			
Primary school	Aircraft bombs: **medium**	Other ERW (> 60 mm): **medium**	Other ERW (≤ 60 mm): **high**
Kindergarten	Aircraft bombs: **low**	Other ERW (> 60 mm): **high**	Other ERW (≤ 60 mm): **high**

Form B2: Site-specific risk assessment: **Hải Dương primary school**

General information					
District / Commune / Coordinates	Hải Lăng	Hải Dương	107.335416 / 16.72484	**Date of assessment:**	09 April 19
Assessor company / Team / Name	MAG	TFM, Head Office		Henry Marriner	
Project name / Planned activity	Building 8 classrooms		Construction (intrusive activity > 1 m)		
Result of general risk assessment	***Expected contamination:***	Aircraft bombs: medium likelihood / Other ERW: medium likelihood of ≤ 60 mm and high likelihood > 60 mm			
	Required action:	2c for aircraft bombs (clearance to specified depth for the intended land use (and / or other risk mitigation measures) 2b for > 60 mm (clearance down to 1 m / max penetration depth or other risk mitigation measures) 2a for ≤ 60 mm (clearance down to 30 cm or other risk mitigation measures)			
Site-specific residual contamination					

ANNEX D) COMPLETED FORMS B1 AND B2 FOR 6 FUTURE DEVELOPMENT SITES

TEST DEVELOPMENT SITE 4) FORM B2 (SITE-SPECIFIC RISK ASSESSMENT)

History of the site / Information from NTS	The primary school is located on the edge of a built-up area in Hải Lăng district. During the war the infrastructure was considerably less developed and the area was predominately woodland and rice paddy fields. Heavy ground fighting left widespread and consistent contamination from small arms UXO throughout the immediate vicinity. Some sporadic bombing occurred, but over 50 years on and bomb finds are rare due to previous clearance efforts. To the north on the map you can see CHAs previously cleared by MAG; these areas are now clear but the presence of cluster munitions in such close proximity could indicate more cluster munition contamination to the south in the agricultural areas, where the lack of buildings has not required the need for technical survey – and subsequent confirmation of cluster munitions (if present at all).
Planned activities (detailed process steps and construction plans, if available)	Three separate buildings are planned to accommodate eight classrooms. Work will require heavy machinery to transit the grass area and dig foundations, up to 1 m deep.

Detailed risk assessment

Expected ERW category	Worst expected ammunition type / effect	Sensitivity			Expected condition			Likelihood of encountering ammunition		Overall rating*	Expected depth	Work steps at risk	Expected worst case
Aircraft bombs	Mk82			X		X			X	X	0.5 m – 2 m		Unplanned explosion following unsanctioned movement by workers.
Other ERW ≤ 60 mm	40 mm / HE			X			X	X		X	0 – 30 cm		Explosion of an untampered 40 mm grenade on the surface.
Other ERW > 60 mm	105 mm / HE / Phosphor		X				X	X		X	15 cm – 80 cm		Unplanned explosion following unsanctioned movement by workers.

Possible measures for risk mitigation:

Given the proximity to several other CHAs (cleared to the north and uncleared to the west) the inspecting officer would recommend technical survey (in line with current country policy – NPA) to a depth of 30 cm, to assess the presence of any shallowly buried small munitions in a surrounding area of 100 m from the centre of the building site. If contamination is found, further battle area clearance is conducted to make the area safe for use.

The risk assessment has awarded a "medium" rating for UXO larger than 60 mm (requiring clearance up to a depth of 1 m) but since aircraft bombs also have a "medium" rating, the recommendation is to sweep the exact location of the proposed foundations with a detector configured to a depth of 1 m. Clearance can then be conducted on a case by case basis.

Domestic EOD teams (MAG / NPA / PeaceTrees Vietnam / Quảng Trị military) are on standby and coordinated by QTMAC in the event that any suspect items are discovered by the local population.

All construction workers should have limited working knowledge of "suspected UXO" so that on discovery, construction workers can cease all operations, avoid moving or tampering with the object and call QTMAC for immediate assessment and, if required, RSP and removal.

ANNEX D) COMPLETED FORMS B1 AND B2 FOR 6 FUTURE DEVELOPMENT SITES

TEST DEVELOPMENT SITE 4) FORM B2 (SITE-SPECIFIC RISK ASSESSMENT)

Stakeholder discussion and decision:

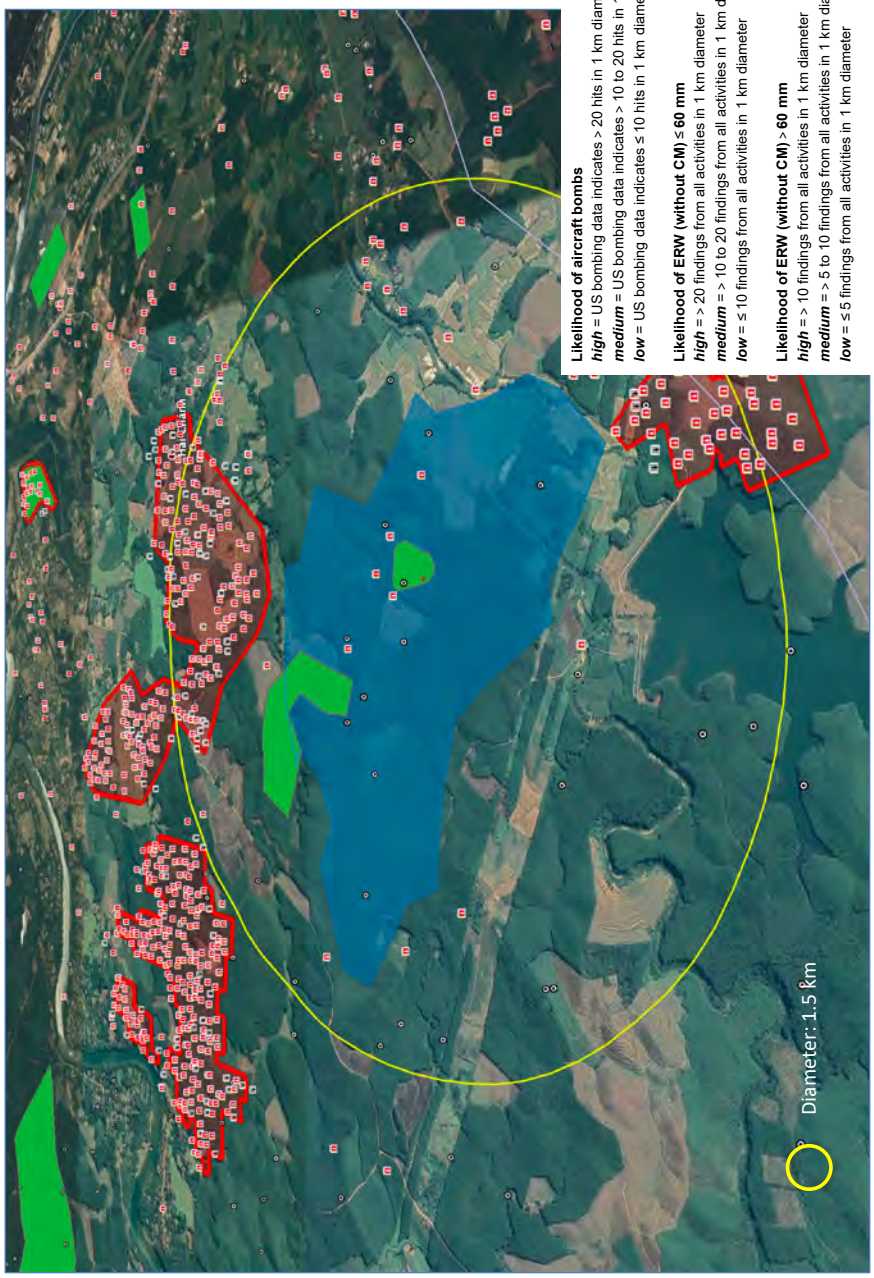
Sensitivity	(green) Notable disturbance needed for ignition	(yellow) Some disturbance needed for ignition	(red) Little disturbance needed for ignition
Expected condition	(green) Not likely to function anymore	(yellow) Partially still functioning	(red) Likely still functioning
Likelihood		(yellow) Medium	(red) High

* Overall rating: 3 x green = **green (no action required)** / 3 x red = **red (action required)** / every other combination = **yellow (discuss risk acceptability with stakeholder)**

ANNEX D) COMPLETED FORMS B1 AND B2 FOR 6 FUTURE DEVELOPMENT SITES

TEST DEVELOPMENT SITE 5) DIAMETER MAPPING METHOD, THRESHOLD 1 KM; FORM B1 (GENERAL RISK ASSESSMENT)

Form B1: Mapping of (residual) contamination: **Perennial crop area, Hải Chánh/Hài Trường**



ANNEX D) COMPLETED FORMS B1 AND B2 FOR 6 FUTURE DEVELOPMENT SITES

TEST DEVELOPMENT SITE 5) DIAMETER MAPPING METHOD, THRESHOLD 1 KM; FORM B1 (GENERAL RISK ASSESSMENT)

General risk assessment for residual contamination

Contamination / Activity matrix

Contamination	Likelihood	No human activity	Surface activity, non-mechanical	Surface activity, mechanical	Intrusive activity, ≤ 30 cm	Intrusive activity, > 30 cm – 1 m	Intrusive activity, > 1 m
Aircraft bombs	High	0	0	0	0	0	2c
	Medium						1a
	Low						
Other ERW (> 60 mm)	High	0	0	0	1b	2b	2b
	Medium				1a	1a	1a
	Low						
Other ERW (≤ 60 mm)	High	0	0	1b	2a	2a	2a
	Medium			1a	1a	1a	1a
	Low						
Cluster munitions	Confirmed	0	0	1b	2a	2a	2a
Mines	Confirmed	0	2a	2a	2a	2a	2a

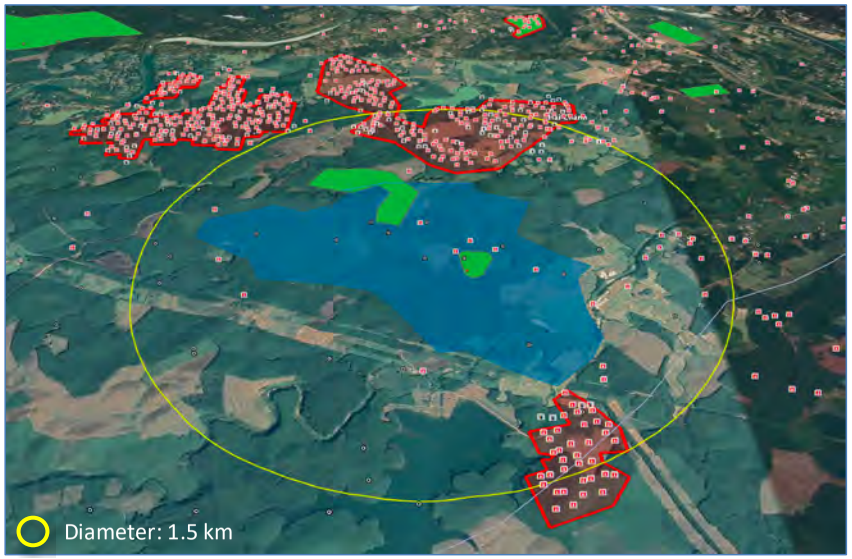
Required action

0	No action required (land use poses no threat).	**1a**	No action (residual risk). In case of findings = EOD call-out and reassessment.
1b	Site-specific assessment to clarify land use / work steps.		
2a	Conduct site-specific assessment to identify the exact perimeter of the planned intrusive work ≤ 30 cm and conduct clearance to that depth (and / or propose other risk mitigation measures).	**2b**	Conduct site-specific assessment to identify the exact perimeter of the planned intrusive work > 30 cm – 1 m and conduct clearance to the estimated maximum penetration depth of the expected ammunition > 60 mm (and / or propose other risk mitigation measures).
2c	Conduct site-specific assessment to identify the exact perimeter and depth of the planned intrusive work > 1 m and conduct clearance to that depth (and / or propose other risk mitigation measures).		

Findings from database (findings counted manually)

Aircraft bombs: **medium**	Other ERW (> 60 mm): **low**
Other ERW (≤ 60 mm): **high**	

Form B2: Site-specific risk assessment: **Perennial crop area, Hải Chánh/Hài Trường**

General information					
District / Commune / Coordinates	Hải Lăng	Hải Chánh/Hài Trường	No coordinates provided	**Date of assessment:**	11 April 2019
Assessor company / Team / Name	MAG	TFM, Head Office		Henry Marriner	
Project name / Planned activity	Change purpose to perennial land in some locations in Hải Chánh, Hài Trường, Hải Phú and Hải Sơn communes		Planting/Ploughing (intrusive activity > 30 cm – 1 m)		
Result of general risk assessment	***Expected contamination:***	Aircraft bombs: medium likelihood Other ERW: low likelihood of > 60 mm and high likelihood of ≤ 60 mm			
	Required action:	0 for aircraft bombs (site-specific assessment to clarify land use / work steps) 2a for ≤ 60 mm (clearance down to 30 cm or other risk mitigation measures)			
Site-specific residual contamination					

TEST DEVELOPMENT SITE 5) FORM B2 (SITE-SPECIFIC RISK ASSESSMENT)

History of the site / Information from NTS	Hài Trường commune is located in the very south of Hải Lăng district along the Huế border. Ground fighting during the war left sporadic UXO contamination and, due to the low amount of infrastructure built since the end of the war, there has been a relatively low number of EOD spot tasks conducted in the area. US bombing was also frequent in the area. To the north and south there are previously surveyed (but uncleared) confirmed hazardous areas (CHAs) seen as red shaded areas. These surveyed areas support the "high" assessment for UXO under 60 mm calibre.
Planned activities (detailed process steps and construction plans, if available)	The intention is to return the blue-shaded area to perennial land with planting and ploughing to a depth between 30 cm – 1 m. Currently, the area has no buildings or infrastructure, with the exception of a few dirt roads. Consequently, this assessment finds that the most intrusive activity would be the uprooting of larger trees, although this activity has not yet been confirmed or even suggested.

Detailed risk assessment

Expected ERW category	Worst expected ammunition type / effect	Sensitivity			Expected condition			Likelihood of encountering ammunition		Overall rating*	Expected depth	Work steps at risk	Expected worst case
Aircraft bombs	Mk82			X		X			X	X	0. 5 m – 2 m		Unplanned explosion following unsanctioned movement by workers.
Other ERW ≤ 60 mm	40 mm/HE			X			X	X		X	0 – 30 cm		Explosion of an untampered 40 mm grenade on the surface.

Possible measures for risk mitigation:

As seen in the sight overview, there are several uncleared CHAs in the immediate vicinity. Their presence could indicate further bombing runs and small arms contamination. The inspecting officer would recommend technical survey (in line with current country policy – NPA) to a depth of 30 cm to assess the presence of any shallowly buried small munitions. If contamination is found, further battle area clearance should be conducted to make the area safe for use.

Area is far too large, and the likelihood of aircraft bombs is not prevalent enough to warrant wide-scale deep clearance – this would take a very long time. Instead, local authorities should be notified before any deep work (foundations etc.) are developed. These should be checked first with deep search in the immediate footprint of planned buildings.

Domestic EOD teams (MAG / NPA / PeaceTrees Vietnam / Quảng Trị military) are on standby and coordinated by QTMAC in the event that any suspect items are discovered by the local population.

All construction workers should have limited working knowledge of "suspected UXO" so that on discovery, construction workers can cease all operations, avoid moving or tampering with the object and call QTMAC for immediate assessment and, if required, RSP and removal.

ANNEX D) COMPLETED FORMS B1 AND B2 FOR 6 FUTURE DEVELOPMENT SITES

TEST DEVELOPMENT SITE 5) FORM B2 (SITE-SPECIFIC RISK ASSESSMENT)

Stakeholder discussion and decision:

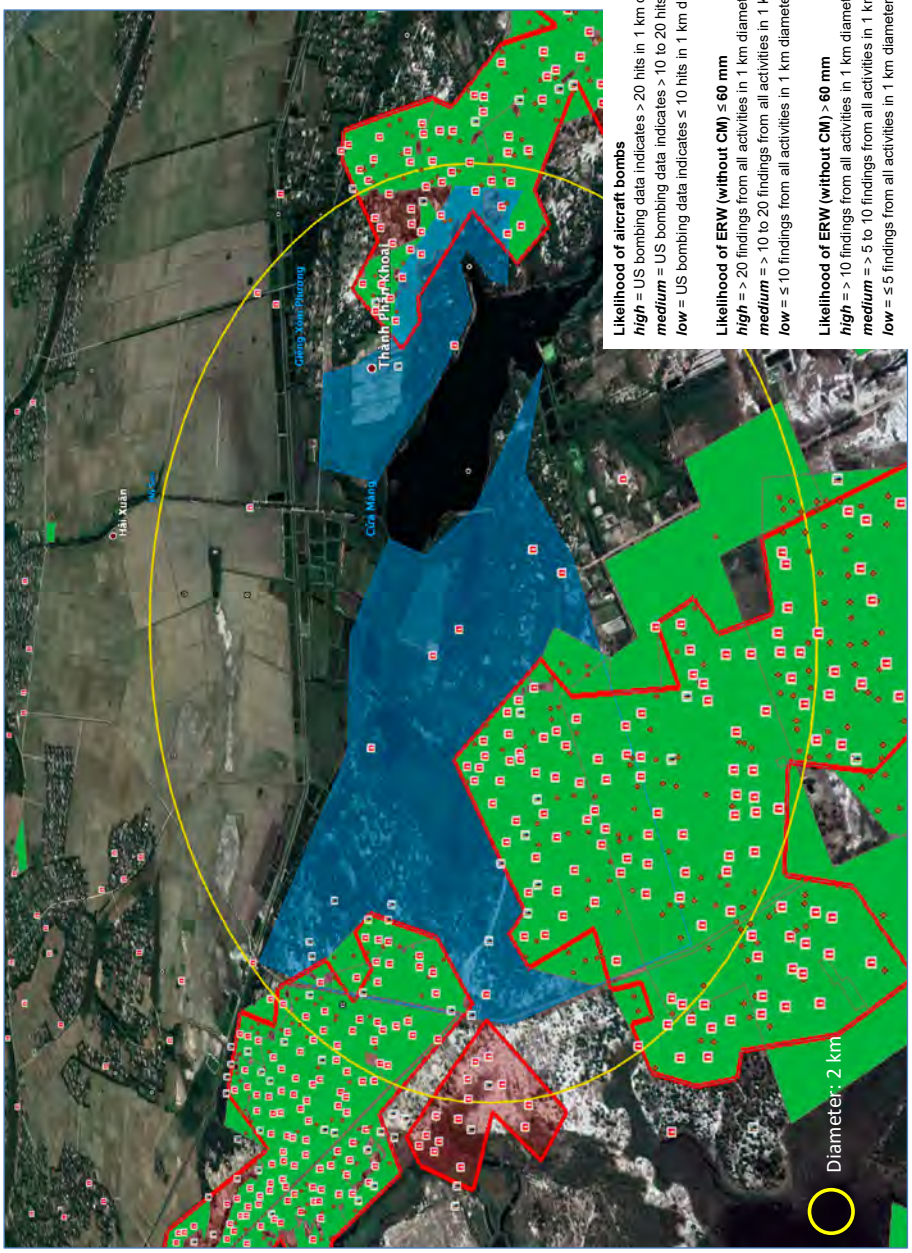
Sensitivity	green	Notable disturbance needed for ignition	yellow	Some disturbance needed for ignition	red	Little disturbance needed for ignition
Expected condition	green	Not likely to function anymore	yellow	Partially still functioning	red	Likely still functioning
Likelihood			yellow	Medium	red	High

* Overall rating: 3 x green = **green (no action required)** / 3 x red = **red (action required)** / every other combination = **yellow (discuss risk acceptability with stakeholder)**

ANNEX D) COMPLETED FORMS B1 AND B2 FOR 6 FUTURE DEVELOPMENT SITES

TEST DEVELOPMENT SITE 6) DIAMETER MAPPING METHOD, THRESHOLD 1 KM; FORM B1 (GENERAL RISK ASSESSMENT)

Form B1: Mapping of (residual) contamination: **Tram Tra Loc eco-tourism area, Hải Xuân**



TEST DEVELOPMENT SITE 6) DIAMETER MAPPING METHOD, THRESHOLD 1 KM; FORM B1 (GENERAL RISK ASSESSMENT)

General risk assessment for residual contamination (completed)

Contamination / Activity matrix

Contamination	Likelihood	No human activity	Surface activity, non-mechanical	Surface activity, mechanical	Intrusive activity, ≤ 30 cm	Intrusive activity, > 30 cm – 1 m	Intrusive activity, > 1 m
Aircraft bombs	High	0	0	0	0	0	2c
	Medium	0	0	0	0	0	2c
	Low	0	0	0	0	0	1a
Other ERW (> 60 mm)	High	0	0	0	1b	2b	2b
	Medium	0	0	0	1b	2b	2b
	Low	0	0	0	1a	1a	1a
Other ERW (≤ 60 mm)	High	0	0	1b	2a	2a	2a
	Medium	0	0	1b	2a	2a	2a
	Low	0	0	1a	1a	1a	1a
Cluster munitions	Confirmed	0	0	1b	2a	2a	2a
Mines	Confirmed	0	2a	2a	2a	2a	2a

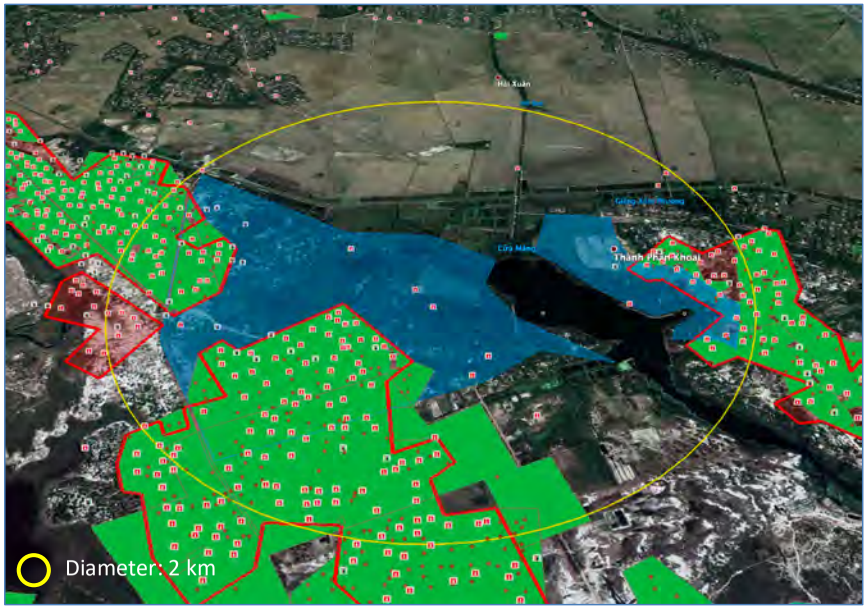
Required action

0	No action required (land use poses no threat).	1a	No action (residual risk). In case of findings = EOD call-out and reassessment.	1b	Site-specific assessment to clarify land use / work steps.
2a	Conduct site-specific assessment to identify the exact perimeter of the planned intrusive work ≤ 30 cm and conduct clearance to that depth (and / or propose other risk mitigation measures).	2b	Conduct site-specific assessment to identify the exact perimeter of the planned intrusive work > 30 cm – 1 m and conduct clearance to the estimated maximum penetration depth of the expected ammunition > 60 mm (and / or propose other risk mitigation measures).	2c	Conduct site-specific assessment to identify the exact perimeter and depth of the planned intrusive work > 1m and conduct clearance to that depth (and / or propose other risk mitigation measures).

Findings from database (findings counted manually)

Aircraft bombs: **low**	Other ERW (> 60 mm): **low**	Other ERW (≤ 60 mm): **high**
Uncleared cluster munition CHA in close vicinity – fade-out possibly required.		

Form B2: Site-specific risk assessment: **Tram Tra Loc eco-tourism area, Hải Xuân**

General information					
District / Commune / Coordinates	Hải Lăng	Hải Xuân	No coordinates available	**Date of assessment:**	01 April 2019
Assessor company / Team / Name	MAG	TFM, Head Office		Henry Marriner	
Project name / Planned activity	Enlarge/redesign recreational area		Planting / Ploughing (intrusive activity 30 cm - 1 m)		
Result of general risk assessment	***Expected contamination:***	Aircraft bombs: low likelihood/other ERW: low likelihood of > 60 mm and high likelihood of ≤ 60 mm			
	Required action:	2a for ≤ 60 mm (clearance down to 30 cm or other risk mitigation measures)			
Residual contamination in commune					

ANNEX D) COMPLETED FORMS B1 AND B2 FOR 6 FUTURE DEVELOPMENT SITES

TEST DEVELOPMENT SITE 6) FORM B2 (SITE-SPECIFIC RISK ASSESSMENT)

History of the site / Information from NTS	As with the rest of Hải Lăng district, this area saw large amounts of ground fighting leading to extensive contamination with UXO. The area was also heavily bombed throughout the war, however, the presence of these air-dropped bombs is assessed to be low after many years of clearance efforts by the military and several international NGOs. This particular site is surrounded by previously cleared confirmed hazardous areas. The cleared areas can be observed in green fill with the original borders of the CHAs in red.
Planned activities (detailed process steps and construction plans, if available)	Some information is missing regarding the exact proposal of work to be commenced in the area, however it is anticipated that the majority of the work will be light, with a focus on preservation of the natural area. Some ploughing can be expected using light machinery and potentially the planting of new trees. There may be a requirement to build in the area which would involve heavy machinery and foundations to a depth of 1.5 – 2 m.

Detailed risk assessment													
Expected ERW category	**Worst expected ammunition type / effect**	**Sensitivity**			**Expected condition**			**Likelihood of encountering ammunition**		**Overall rating***	**Expected depth**	**Work steps at risk**	**Expected worst case**
Other ERW ≤ 60 mm	40 mm/HE	(green)	(orange)	X (red)	(green)	(orange)	X (red)	X (orange)	(red)	X (orange)	0 – 30 cm		Unplanned explosion on the surface during work.

Possible measures for risk mitigation:

The presence of the 3 previously cleared CHAs within and around the area will significantly have reduced the likelihood of cluster munitions and other UXO. The work carried out will have applied a "'50 m fade-out rule" meaning there should be no UXO around the borders and, given their proximity to one another, the chances of residual contamination is low. The risk matrix indicates clearance to a depth of 30 cm. Given the size of this development task the recommended action would be technical survey of the entire proposed area (blue shading on map) excluding any previously cleared areas (green shading). If TS indicates consistent UXO contamination, then battle area clearance should be conducted to a depth of 30 cm within the proposed areas.

If building work is required, then a detector calibrated for a deeper search (up to 1 m) should be swept over the foundation footprint. Domestic EOD teams (MAG / NPA / PeaceTrees Vietnam / Quảng Trị military) are on standby and coordinated by QTMAC in the event that any suspect items are discovered by the local population.

All construction workers should have limited working knowledge of "suspected UXO" so that on discovery, construction workers can cease all operations, avoid moving or tampering with the object and call QTMAC for immediate assessment and, if required, RSP and removal.

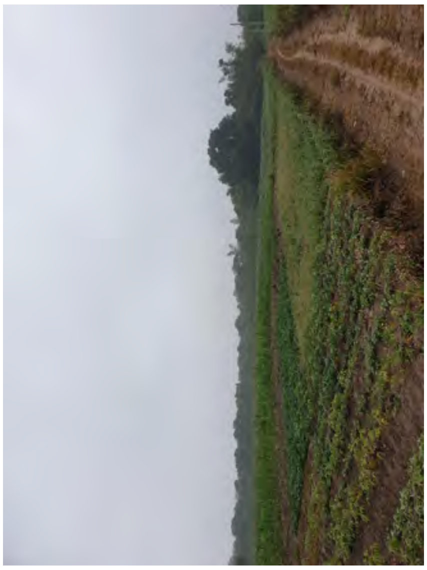
ANNEX D) COMPLETED FORMS B1 AND B2 FOR 6 FUTURE DEVELOPMENT SITES

TEST DEVELOPMENT SITE 6) FORM B2 (SITE-SPECIFIC RISK ASSESSMENT)

Stakeholder discussion and decision:

Sensitivity	Notable disturbance needed for ignition	Some disturbance needed for ignition	Little disturbance needed for ignition
Expected condition	Not likely to function anymore	Partially still functioning	Likely still functioning
Likelihood		Medium	High

* Overall rating: 3 x green = **green (no action required)** / 3 x red = **red (action required)** / every other combination = **yellow (discuss risk acceptability with stakeholder)**



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