Application of the Technical Survey in the Demining Process

The author proposes a way that Technical Surveys can be used as a step in the process to eliminate the negative socio-economic impact of mines/UXO in the most productive, cost-effective, efficient manner and to guarantee that the best technology for the task is applied.

by J. J. van der Merwe, *UNOPS*

The opinions expressed in this paper are those of the author and do not necessarily reflect those of the United Nations Office for Project Services (UNOPS).

Introduction

The mine action industry has grown out of one very specific technical area of interest relating to the physical destruction of mines and UXO. From there it has been forced to expand its horizon to look at the broad implications of what it does and to encompass peripheral activities that fall under the same general heading of mines, including survey, awareness and prioritization. It is also true that mine clearance resources are typically scarce and should be effectively utilized. This calls for correct application of available clearance technologies and careful targeting of these resources in order to have a critical impact on the problem.

Some major developments have been made recently in the field of demining. The International Mine Clearance Standards for Humanitarian Mine Clearance Operations have been revised and updated to take into account the progress in the industry, and the first Level One Impact Survey was completed in Yemen. The information that has become available as a result of the survey provides a better definition of the mine problem in a specific country and also allows for a better method to prioritize and rank impacted communities.

Many mine clearance organizations have traditionally publicized their efforts by focusing on the number of mines or unexploded munitions that have been found. This is in reality as meaningless as assessing the effectiveness of the clearance operation based purely on its size. It is becoming better understood that mine clearance is as much or more about the elimination of the negative socio-economic impact on communities as it is about clearance of the actual contamination.

Experience over the past few years has indicated that within a zone of probability for mine contamination in the majority of mine-affected countries, the majority of the ground is not mined. In addition, most of the areas contain few mines. Out of the 18,000 mine records received from the former warring factions in Bosnia and Herzegovina, 60 percent of the records indicated that the mined areas contained less than 10 mines, and in Yemen the Level One Impact Survey concluded that there was approximately a 40 percent exaggeration of the actual size of the contaminated area. Therefore, the faster the ground that is not mined is ruled out, the greater productivity and the impact of the clearance efforts will be. Linked to the need to rapidly rule out mine-free ground is the need to decide which ground needs to be freed up first. The size of these areas is a function of the subsequent users' requirements. Defining the minimum areas ensures that mine clearance resources are not committed to clearing any more ground than what is actually required at the time. The Technical Survey, if applied in the correct manner, will help provide answers to the issues raised above.

Mine Free vs. Free From the Effects

Recently, there have been a number of discussions on what can be achieved practically in addressing a mine-affected country's socio-economic problems caused by mines and UXO. There has to be a balance among the time spent on demining areas, the amount of impact being reduced and the amount of funds available to carry out the task. At the strategic level, there are two outcomes that could be sought. These two options are:

- *Mine Free*: A strict interpretation of the Ottawa protocols and other mine action documents would suggest that the desired end-state for all mine action programs is to make mine contaminated countries "mine free." This implies that all mines in the entire country are to be removed from the land and therefore all possible risk related to mine and UXO contamination is to be removed as well. While such an idealistic end state may be desirable, a more realistic assessment indicates that it is not achievable, nor would pursuing it to this end be a good use of limited resources. The laws of diminishing returns, limitations on available donor resources and simple cost-benefit analysis all highlight that a mine free state is practically unobtainable. The cost of removing the last mine in a country would be considered prohibitively high and offers very little (if any) benefit as compared to the other possible uses for the same amount of money.
- *Free from the Effects of Mines:* During the planning process, consideration should be given to adopt a risk management approach focusing on controlling or mitigating the worst impacts of mines in order to make a country "free from their effects." This approach may result in the occasional unfortunate accident; however, accidents will be rare, economic impacts will be negligible and the people will have learned to live with the residual level of contamination. The effects of mines and UXO can be reduced to a tolerable level through clearance of the most dangerous areas followed by a continual capacity to conduct limited clearance and/or Explosive Ordinance Disposal (EOD) tasks, mine risk reduction education (MRRE) and maintenance of a marking system.

It is clearly beneficial to adopt the second option and address high-impact areas first and then proceed to address those areas more moderately impacted. Hazardous areas impacting communities should also be prioritized, and the solution selected to decrease the impact should be applicable to provide the greatest relief in the shortest time or in the most cost-effective manner.

Prioritization/Targeting

Prioritization is only the first step in the process that will lead to the eventual selection of sites to be demined. A number of other factors need to be taken into account before the final selection is made. For example, there could be seasonal factors to be considered, the security situation could have an influence and there may be a requirement to cluster tasks to allow for the efficient use of resources.

The key for humanitarian mine clearance in the future is the accurate targeting and then the subsequent allocation of resources to address the problem in a safe, productive and cost-effective manner. Programs should ask themselves where they could achieve the greatest impact with the available demining resources. It is no longer an option to tie resources down for long periods of time if they are only working on one site. It might be better to work on a number of lower order tasks but have a high turnover. Targeting should be done at the macro and micro level. The result of the General Mine Action Assessment (GMAA) Process includes the socio-economic impact that the mines and UXO have on communities in an impact-priority list, which should be used to develop a clearance works program. The same should be done on the micro level. Identified tasks should be unraveled to reveal the most critical areas that should be cleared as a first priority and then clearance should expand to address the other less critical areas. As a first step, the less critical areas should be marked or fenced off.

The process for prioritization and selection of sites for demining can be compared to a situation in which a medical doctor arrives at an accident scene finding a number of injured patients. Before any patient is treated, a doctor must assess each of their injuries. Patients are then divided into two groups: those with minor injuries and those with serious, life-threatening injuries. The injuries on these patients are then treated in order of priority, meaning some minor injuries might be left while the doctor moves on to another patient to treat cardiac injuries, loss of blood and pulmonary injuries. Targeting for mine clearance operations should follow the same principles. Communities are ranked according to the presence of mines/UXO, the number of "blockages" and the number of recent victims. In addition, there might be development priorities that the government has identified that also have to be taken into account before the final priority list can be produced. In order to prepare the work plan there should be another step similar to when the doctor in the example above takes the pulse of the patient, which is to carry out a Technical Survey to collect specific information on the suspect area.

Revision of the International Mine Action Standards

The term technical survey is not applied universally. Some mine action authorities and demining organizations consider the detailed examination of known or suspected hazardous areas and the related documentation and marking as defined in IMAS 08.10 to be merely the first stage of an integrated survey-clearance operation. However, as it is described here, technical surveys are an important part of the demining process, since they provide the information needed for safe, effective and efficient area reduction, clearance and marking.

To date, prioritization and clearance have generally been aimed at individual mined areas. With the introduction of the GMAA process, which includes an assessment on the socio-economic impact, there has been a shift in focus towards impacted communities. The old Level Two Surveys, by default, became associated with area reduction, and only after the area was reduced was an attempt made to plan the clearance activity. IMAS now reflects changes to operational procedures, practices and norms that have occurred over the past three years, and in a number of cases where new terminology was created, it also included an expansion of the old definitions. The changes in the different surveys and assessments are one example in which not only were the old terms replaced, but the definitions have also expanded considerably. The main differences between the old Level One and Two Surveys and the new Impact Assessments and Technical Surveys are outlined below:

Old Level One Survey: The objective of the old Level One General Survey was to collect information on the general locations of suspected or mined areas. Mined areas were prioritized according to the following criteria:

- Provision of emergency assistance.
- Settled land with high civilian casualty rates.
- Land required for the resettlement of refugees/IDPs.
- Land required for agriculture.
- Community development.

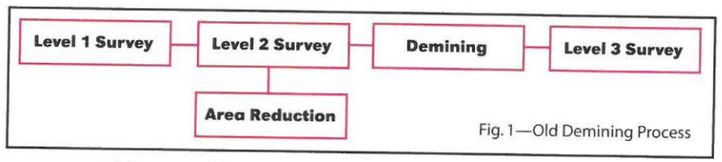


Fig. 1—Old Demining Process

• Access to and free operation of health services.

• Reconstruction and infrastructure development.

Old Level Two Survey: The objective of the old Level Two survey was to determine and delineate the perimeter of mined locations initially identified by an old Level One General Survey. The marked perimeter formed the area for future mine clearance operations. Where possible, with time and resources permitting, these teams should also undertake area reduction work in order to accurately define the outer perimeters of the mine field. Graphically, the old process can be described as shown in Figure 1.

New GMAA Process: The purpose of the GMAA process (IMAS 08.10) is to gather, evaluate, analyze and release sufficient information to assist the strategic planning of a national mine action program. The general mine action assessment produces two kinds of estimates:

1) The proportion of communities contaminated by mines.

2) The levels of socio-economic impact within contaminated communities.

The focus has also shifted from individual mined areas to communities impacted by the presence or perceived presence of mines. The prioritization process in this case is much broader and makes provision for a number of scenarios. In all cases, three aspects are taken into consideration to gauge the level of impact:

1) The presence of mines and unexploded ordnance.

2) The blockage caused by the mines and UXO.

3) The number of recent mine incidents that have taken place.

Neither the old Level One Survey nor the IMAS GMAA process involves entry into the hazardous area or any form of demining. The aim is purely to collect basic information on the approximate location and size of the suspect area and to define the impact of these contaminated areas on their respective communities.

New Technical Survey: The Technical Survey (IMAS 08.20) is the detailed technical and topographical investigation of known or suspected hazardous areas. Such areas may have been previously identified during the GMAA process (formerly called Level One Surveys) or otherwise reported. The primary aim of a Technical Survey is to collect sufficient information to more accurately define the clearance requirement, including the area(s) to be cleared, the depth of clearance, the local soil conditions and the vegetation characteristics.

Figure 2 describes graphically the order in which demining activities could be conducted using the Technical Survey as the foundation for planning actual operational activities.

The proposed process introduces the Technical Survey as a step between the National Survey and actual demining activities. The information obtained from a Technical Survey should be summarized in a survey report, which should be used as the technical specification for planning and managing a subsequent demining task. Although Technical Surveys precede demining activities, the two activities should not take place in tandem. Normally, once fully implemented, the Technical Survey teams would work approximately one demining season ahead of the demining teams. This would allow Mine Action Centers to plan future operations and prepare programs that would keep demining organizations occupied for a whole season at a time. It will also ensure that demining resources are utilized in the most productive, efficient manner and that the correct resources to manage the problem are used.

The disadvantages of the old process were:

• Demining organizations immediately embarked on demining activities through an attempt to reduce the area without carrying out a reconnaissance of the suspect area. Only once the outer perimeter was defined could a plan be developed to address the mined area, or in most cases, the area reduction capacity would just continue demining the area. The focus at this time was to eliminate the whole mine problem in a particular area. Demining assets were tied down for long periods of time and other high priorities had to wait. A typical example of this is when mine detection dogs are automatically used for the area reduction and soon the handlers realize that the dogs are not effective due to the type of vegetation found in the area, which may have thorns or grass that pricks the noses of the dogs, causing them to lift their heads off the ground. This could have been prevented if a proper Technical Survey had been carried out.

• In some cases, demining resources were used in a manner that did not suit them, and they were not able to perform to their optimum capacity. One of the strengths of demining lies in the "Tool Box" approach of using the best tool or combination of tools to address the problem. The size of some areas and the obstructed view of the suspect area often mislead demining organizations to use one type of tool, and during the execution of the task—often too late—they realize that the wrong resources have been used on that particular site.

• The exact area to be addressed was not known, which led to organizations being unable to estimate how long a particular task would take to complete.

• To date there has been a focus on clearing mines and UXO instead of on making uncontaminated land available for use. Technical Survey teams may be able to identify whether or not land contains mines. The mine-free land can often be made available for immediate use. The cost of making this land available will often be much less than that of mined land that requires intensive manual clearance.

• It was difficult to account for all the different areas handled in the process, because the initial area identified by the Level One Survey was an estimation and not an accurately defined area. This meant that the statistics collected through the process were not always accurate and some areas remained unaccounted for.

Some might argue that this approach to the Technical Survey is introducing

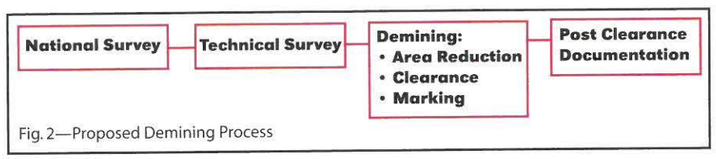


Fig. 2—Proposed Demining Process

another step to the process, but in actuality, the new application will increase output, limit wasted resources due to decreased down time, and most importantly, provide relief to impacted communities in a very focused manner. The procedure will actually enhance the process and provide mine action authorities more control over demining activities since it will be a calculated step-by-step approach.

Technical Survey as Part of an Integrated Solution

The solution to a country's mine and associated socio-economic problems is through the provision of a combination of mine action services. The Technical Survey described in this document mainly refers to a step in the demining process; however, while Technical Surveys are being carried out, similar needs assessments should take place to collect information for planning and implementing mine awareness and victim support programs.

In order to prepare an annual workplan, it is suggested that the following approach be taken to ensure that these services are provided in a coordinated and balanced package.

• After the database has been populated with information collected through the GMAA process, communities have to be prioritized and a selection has to be made of those communities where mine action activities will be undertaken to provide relief of the impact caused by the presence of mines and UXO. This process should take place at the Mine Action Center level under the supervision and coordination of the program director, and it should include all departments within the Mine Action Center, such as information, operations, mine awareness, victim support and administrative/logistical support.

• Community Mine Action Liaison (CMAL) is a process designed to place the needs and priorities of mine affected communities at the center of the planning, implementation and monitoring of mine action and other sectors. CMAL is based on an exchange of information, and it involves communities in the decision-making process in order to establish national priorities for mine action. It is intended to ensure the mine action programs are sensitive and respond to community needs and priorities and to ensure that affected communities understand and support mine action.

• The next step should be for senior personnel from the Mine Action Center (including representatives from mine awareness, victims' support and the local authorities) to visit these communities to inform them of the events that will follow. It is very important to communicate the sequence of events so that people do not assume that the area has been cleared after the Technical Survey.

• Once communities have been informed, the technical surveyors (demining, mine awareness and victim assistance personnel) deploy to the community and commence collecting the information required to develop a specific mine action plan for the community. To make the project a success, the mine awareness personnel should begin educating the community on the process, the danger and also their responsibilities. The mine awareness messages should be adopted throughout the process to educate communities on the dangers and remedies.

• After selected communities have been surveyed, the information is verified and an annual workplan is developed. Depending on the nature of the program, this will be done on a national, regional or district level. This annual workplan should include operational activities for demining, mine awareness and victim support.

Information to Be Collected During the Technical Survey

The Technical Survey is the primary source of planning information for mine and UXO operations and usually involves gathering specific information, entering the contaminated area and mapping the suspect area. In doing so, the survey process will:

• Provide essential information for regional and local planning.

• Provide information to assist in defining training requirements.

• Provide planning information for subsequent area reduction, clearance and marking operations.

• Provide the basis for scheduling demining assets to limit down time.

• Expedite demining activities through the provision of accurate and in-time information on the particular site.

During the Technical Survey, the following information should be collected:

• Confirmation of the blockage data that was collected during the National Survey.

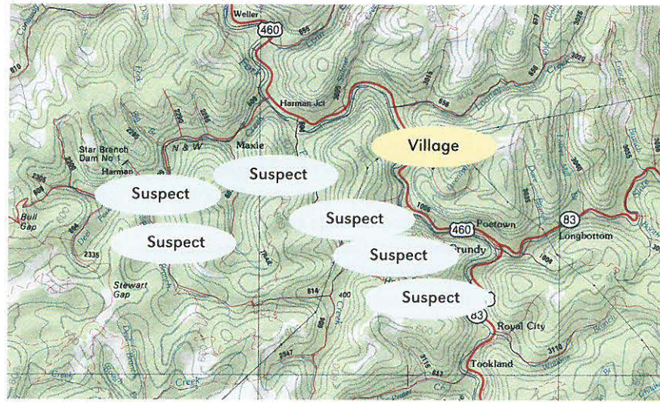
• Assessment of the ground in terms of the soil, metal contamination, vegetation and slope.

• Presence of mines and UXO.

• A definition of the area in terms of its size, described through angles and bearings. Area measurements should be more accurate than those calculated during the national survey and should be within 10 percent of the actual area.

• Suggestion of the depth to which clearance should be conducted. This suggestion doesn't replace the requirement to clear to a depth determined by the future intended use of the land; it is rather a suggestion based upon actual information collected in the hazardous area.

• Resources required to carry out demining activities per identified area and the estimated time for manual teams, mechanical teams, mine detection dog



Sample map of suspect areas located near a village.

teams and EOD teams as appropriate.

In addition to the information mentioned above, a detailed site sketch must also be prepared, as this will be provided to the demining organization that will eventually carry out the task. The following information should be noted on the sketch of the area:

- Exploratory lanes and safe access routes as applicable.
- Benchmarks and turning points as applicable.
- Distances and bearings from the benchmarks and turning points.
- Location of visible mines/UXO and the pattern of mines (if known).
- Location(s) of any mine, UXO or other devices destroyed during survey.
- Location(s) of any accidents in or around the contaminated area.
- Natural prominent features such as hill contours, creeks, bushy areas, etc., and other prominent man-made features within the hazardous area (houses, tombs, fortifications, canals, roads, hills, rivers, etc.).

In order to collect the required information, it will be necessary to enter hazardous areas by breaching exploratory lanes into the suspect area. Once the information has been collected and documented, it should be returned to the Mine Action Center to be included in the mine database. This will assist in the preparation of the annual program and the tasking orders that will be provided to demining organizations. These tasking orders will describe in detail what the demining requirements are (area and depth), which kind of resources and how many of them are best to use and how long they are expected to work on the task to address the impact that was defined during the GMAA process.

Sequence for Carrying Out the Technical Survey

After impacted communities have been ranked in priority order and a selection has been made, the Technical Survey should be carried out to collect sufficient information to enable the demining requirement to be more accurately defined. These demining activities include areas that need to be reduced, cleared and/or marked. Sketch Map 1 shows an example of a village and six suspect mined areas within the village boundary. These hazardous areas were identified by interviewing the inhabitants of the village during the National Survey. The identified suspect areas have impact on the villagers or prevent them from living a normal life free from the dangers of mines and UXO.

Sketch Map 2 shows one of the suspect areas and indicates the blockages caused by the presence of mines. The suspect area is blocking access to:

- *Pasture land for grazing.* The identified suspect area is right in the middle of agricultural land and at the moment an area of 12,500 m² is blocked for grazing.
- *Drinking water.* The villagers have to walk around the hazardous area, instead of through it, to the spring that supplies the village with drinking water.
- *Powerline.* The powerline was damaged in the war, and the area underneath the line would have to be cleared to reconstruct the line and pylons.

The next step in the process should be to plan, prepare for and execute the Technical Survey. As previously stated, the aim of the survey is "to collect sufficient information to enable the clearance requirement to be more accurately defined and for the subsequent clearance operation to be conducted in a safe, effective and efficient manner."

Using the road and the already defined benchmark as the starting point, one should analyze the blockages caused by the mines, and then propose solutions to address how these blockages can be eliminated through marking, reducing and/or clearing the areas concerned. This initial planning is done before carrying out the Technical Survey, and it is done by analyzing all available information and preparing an initial plan. The survey is then focused on collecting the correct information that would allow such a final plan to be devised. Exploratory breaching lanes into the suspect area should also be planned. The purpose of these lanes is to allow safe access into the suspect area in order to collect specific information that can be used to develop a detailed plan for the site. The number and location of these lanes will depend on the information requirements. There could be a number of solutions to remove the impact in this particular case. One possibility would be to treat the areas as follows:

- *Pasture land.* Depending on the terrain, vegetation and mine threat, the area could be covered using mechanical systems or mine detection dogs. The terrain feature in the bottom right hand corner of the suspect area could either be fenced off or cleared manually.
- *Drinking water.* As a first step, a safe lane could be made through the suspect area to provide villagers access to the spring.
- *Powerline.* Due to the fact that the powerline is part of the area required for pasture land, one should clear the area around the powerline and pylons at the same time when the pasture land is being cleared; however, a different method might be applied due to the presence of scrap metal and power cables on the ground.

This pre-planning exercise will focus the members of the Technical Survey team on the information they need to collect in order to confirm the initial plan. To support the identified planning requirements, lanes would have to be breached into the suspect area. To collect the information identified above, one could establish lanes as shown in Sketch Map 3.

The information collected through the survey will either confirm the preliminary plan or indicate that the plan needs to be amended.

After the survey has been completed and the information has been entered into the mine information database, a final plan should be developed for this particular site. The same process has to be carried out for each one of the six other identified suspect areas. These areas could eventually become one cluster, and resources should be shared and moved among the six different sites to prepare the ground, reduce the suspect area and/or clear and mark contaminated areas.

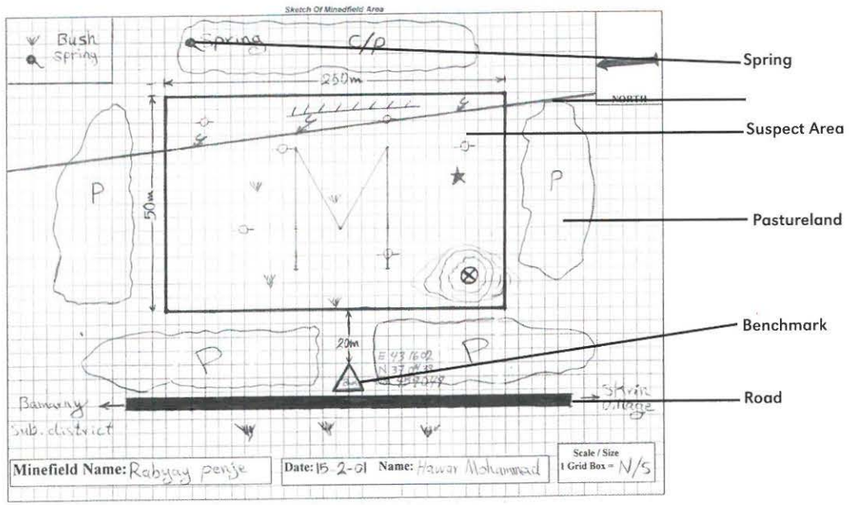
As a result of analyzing the information collected though the Technical Survey, a plan to manage the mine problem is developed. The main focus of the plan is to address the impact of the mines and UXO on the community where they are found. One of many solutions is shown graphically in Sketch Map 4. The plan should ensure that the whole area identified in the GMAA process is taken care of and as a result is accounted for.

Conclusion

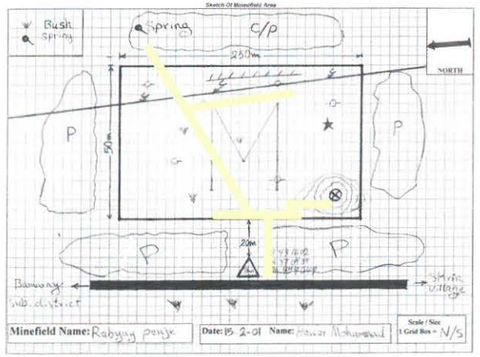
In the absence of effective new technologies, better resource allocation can reduce demining costs and increase the rate of land release and clearance. Technical Surveys will provide the planners of demining activities with crucial information to plan area reduction, clearance and marking activities. It will also ensure that the resources on a particular site are used with the highest efficiency and that these resources are targeted to provide the identified relief. Finally, the Technical Survey will provide the necessary milestones to estimate and later gauge the progress of operational activities.■

Contact Information

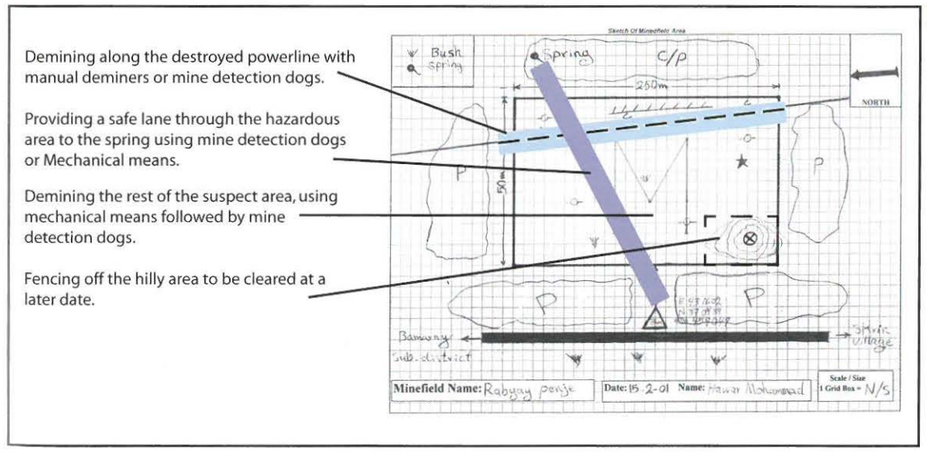
J. J. van der Merwe
UNOPS Mine Action Advisor
The Chrysler Building
405 Lexington Avenue
New York, NY 10174
Tel: (212) 457-1283
Fax: (212) 457-4049
E-mail: johanm@unops.org



Sketch Map 2: Blockages caused by mine presence in a suspect area.



Sketch Map 3: Establishing lanes to collect information on a suspect area.



One solution for managing the mine problem in a specific suspect area.