



# IED INDICATORS AND GROUND SIGN AVARENESS HANDBOOK

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# IED INDICATORS AND GROUND SIGN AWARENESS HANDBOOK

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# 1. SCOPE

This handbook is intended to be used by mine action (MA) staff trained in accordance with <u>IMAS 09.31</u> <u>Improvised Explosive Device Disposal (IEDD)</u> and <u>IMAS 09.13 Building Clearance</u>.

It is intended to be focused primarily on improvised explosive device (IED) contamination, especially when non-state armed groups have been part of the conflict, although it will be of use in MA programmes where IED contamination is not present, since many of the same principles can be applied to conventional mines.

This handbook should also inform explosive ordnance risk education (EORE) practitioners in the development of methodologies, approaches and tools that are specific to environments contaminated with IEDs and other explosive ordnance (EO).

WARNING. This document is distributed for use by the mine action community. It is not an International Mine Action Standard (IMAS) although it is intended to comply with the IMAS series. It is subject to change without notice and may not be referred to as an International Standard.

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This handbook does not cover indicators and signs that may apply to IEDs during active armed conflict.

# **2. USING THIS HANDBOOK**



Image 1. An IED component camouflaged in debris identified by MA staff due to a sign (colour change and regularity)

Mine action (MA) organisations have for many years used indicators and signs to assist in the identification of IEDs and other EO during survey and clearance. This handbook aims to provide a handrail to standardise the approaches used by the MA sector in this area by sharing good practice and sectorial norms.

The knowledge and skills associated with both IED indicators and signs, helps MA staff and organisations make better evidence-informed decisions at a variety of levels. At the operational level they can be used as evidence in the categorisation, classification and definition of hazardous areas. At the individual level of a deminer / searcher or IEDD operator they can be used to help make decisions related to how very specific tasks are conducted.



HINT. Ground sign awareness is sometimes simply referred to as the "absence of the normal; presence of the abnormal".

This handbook is split into two sections:

#### **IED INDICATORS**

This section examines terrain-based indicators that can be used as part of a threat assessment process. These indicators are frequently used to identify locations where the probability of IED contamination may be higher than in others. This section will be particularly useful during the national threat analysis and operational threat assessment processes described in <u>IMAS 07.14 Risk Management in Mine Action</u>. Image 2 shows a track junction which as a slowdown point is a terrain-based indicator where potential IED contamination may be located. The knowledge and implementation of IED indicators like the one explained, helps to avoid risks, remove risk sources and minimise the likelihood of related incidents in operational threat assessments.

#### **IED SIGNS**

This section examines different signs that may indicate an IED is present. This looks at categories of signs, including ground and top signs,<sup>1</sup> how they age, and the processes used to take advantage of signs as a tool in MA. Image 1 provides an example of an IED being identified due to colour and regularity.



Image 2. A track junction creating a slowdown point where command IEDs might be particularly effective. This is an example of an IED indicator.

<sup>1</sup> Top signs are IED-related signs that can be found above the surface and in the surrounding environment.

# **3.IED INDICATORS**

# **3.1. THE BASICS**

This section looks at the operational value of different improvised explosive devices (IEDs) in relation to distinctive terrain-based indicators. The aim is to help mine action (MA) staff better categorise and define hazardous areas and to enable assessment of the highest risk areas; those which are most likely to contain IED contamination.



Image 3. High-value weapon systems may indicate contamination

Consider Image 3 showing a high-value anti-aircraft weapon system. If this is identified by MA staff, it could be an indicator that IEDs are present. The intent and capability of the armed group would need to be considered, along with other sources of direct and indirect evidence. For example, the intention of the armed group could be to deny use of this weapon after withdrawing from the area, which would mean that IEDs could be located close to or even be connected to the weapon.

If, however, the intent had been to defend the weapon system while an armed group was using it, then MA staff could consider looking out from the weapon emplacement and making an assessment of approach routes (open areas and roads) where IEDs could have been placed as part of a defensive plan.



Image 4. A building set up for defence

When defending locations, parties to an armed conflict will often develop a combined plan that incorporates both physical obstacles (pre-existing and purpose made) and explosive obstacles. The physical obstacles may include fortified structures or positions such as trenches, barbed wire, roadblocks, bunds, ditches and fixed weapon installations.



Image 5. A small arms and light weapons (SALW) position monitoring an IED belt to increase its effectiveness as an obstacle

Considering the fortified house in Image 4, if an armed group was defending this strongpoint, they would likely emplace the majority of IEDs at a distance of 50–300 m. This would mean that an explosive obstacle could be covered by SALW fire to increase the effectiveness of the obstacle, while still affording separation between the defensive position and the attacking group. However, if the armed group planned to withdraw, they may have decided to disturb the occupation of the house by placing further IEDs at vulnerable points (VPs) in, and immediately around, the position. These VPs could include the perimeter entrances, pathways, doorways and underneath ground floor windows.



Image 6. Discarded ammunition containers indicate that fighting has occurred in the area

Other IED indicators include discarded military ancillaries such as ammunition containers and packaging, as shown in Image 6 and Image 7. In general, these indicate that fighting has taken place, but more specifically they may also provide further evidence of the nature of the IED contamination that may be present. An example of this would be boxes for conventional projectiles (shells) but no indications that an artillery position was located at the site. These projectiles may have been used as main charges in IEDs.



Image 7. Abandoned ammunition packaging



Image 8. Localised marking that may indicate IED contamination

Other indicators may include the presence of markings intended to warn people of danger. These may be placed by the local community (Image 8) or by state or non-state parties to an armed conflict (Image 9).



Image 9. More formalised variations of hazard marking

# 3.2. CAGE (CHANNELLING, AIMING MARKERS, GROUND SIGN, ENVIRONMENT)

'CAGE' is an acronym developed by military forces to help personnel recall the properties of a vulnerable point (channelling, aiming (markers), ground sign and environment). CAGE helps to answer the following question:

#### "Where would it be advantageous for my opponent to use an IED(s)?"

MA staff can then apply this question retrospectively in a post conflict context to consider where would have provided a placement opportunity for an armed group to use an IED(s). This should be considered in conjunction with the intent and capability of the parties to an armed conflict that are assessed to have placed the IED(s). See Annex C of IMAS 07.14 Risk Management in MA for guidance on how to conduct threat assessment.

### **3.2.1. CHANNELLING**

Channelling reduces an opposing armed group's options for manoeuvre, making them more predictable and providing an opportunity to successfully target them with the minimum amount of resources.



Image 10. A channelled route between compound walls

In image 10 there is a channelled alley or passageway between numerous compounds and houses. As well as victim operated IEDs (VOIEDs), the damaged wall may mean that there was also an opportunity to use a command IED, as there was also a good line of sight into the alley.



HINT. Command IEDs provide the advantage of enabling the route to remain "open" as the IED only functions at the armed group's moment of choosing.

Armed group attacks with conventional weapons in these channelled areas should also be considered as a standard operational practice. Within these channelled areas, possible contamination with unexploded ordnance and explosive remnants of war must be included in the MA staff's threat assessment.

In Image 11 the channelled route between the buildings has reduced lines of sight, therefore the use of command IEDs is less likely. The most probable threat here is from VOIEDs.



Image 11. A channelled road between a series of compounds



Image 12. A narrow path for people moving on foot through a wooded area

Channelling does not just occur in urban areas or on main routes. Image 12 shows an area of dense woodland that would make movement away from the path difficult, even on foot. This would have provided an opportunity for an armed group to have been relatively selective in their targeting, even when using VOIEDs, with only the minimum amount of IED resources required to achieve their intent.



Image 13. An entrance point that has become overgrown

Routes and pathways are not the only terrain features that can accommodate people and vehicles. Other features such as entrances, doorways, relief, rivers and soft ground can have a channelling effect too. Image 13 shows an entrance in the wall of a disused agricultural compound. The area immediately around this location would have been ideal to target opposing parties to an armed conflict with VOIEDs, and might be considered by MA staff as high risk during clearance.

### **3.2.2. AIMING MARKERS**



Image 14. The pole is an example of an aiming marker for a command IED

Aiming markers enable an armed group to target moving vehicles or people at distance, using a command IED. If no aiming marker is present, then it is difficult to achieve the optimum moment of initiation, and the best opportunity for engaging a potential target could be missed. A good line of sight is also required from a firing point, where the person initiating the command IED would be located, to the contact point, where the main charge would have been placed.



WARNING. A long column of vehicles, linked IED main charges and other features that create a slowdown point may be incorporated into this type of attack to enhance its effectiveness.



Image 15. White tape tied to a single lamp post on a main road

Some aiming markers are less obvious, such as in Image 15. Here a piece of white tape has been tied around a lamp post, at the base of which is a radio-controlled IED. Although this might not be effective over a long distance it could be all that is required to differentiate the lamp posts if the firing point and contact point are relatively close together.



HINT. Debris and litter can easily get caught up on street infrastructure. Aiming markers will usually be deliberately placed or fixed in place. Keeping this in mind will aid in identifying aiming markers for command IEDs.



Image 16. Example of a good line of sight into a VP



Image 17. Example of a good line of sight into a VP

Aiming markers are often used with command IEDs and therefore a good line of sight between the firing point and the aiming marker located at the contact point is needed. In Image 16 a tracked vehicle is about to move onto a route from open countryside through a constricted access point which forms a VP. Although restricted in other directions there is actually a very good line of sight straight down the road (Image 17).

## 3.2.3. GROUND SIGNS



Image 18. A ground sign showing a buried IED main charge

Signs are described in detail in Section 2 of this handbook, which looks at the two categories of signs: top signs and ground signs. Signs can be used extensively in the decision-making processes of MA staff throughout survey and clearance of IED contamination.

### **3.2.4. ENVIRONMENT**



Image 19. A normal pattern of life?

Environment is one of the key aspects of understanding IED indicators and is often used by MA staff working in accordance with <u>IMAS 08.10 Non-Technical Survey</u> as part of the collection of direct and indirect evidence.

For example, Image 19 may initially seem to show a normal pattern of life, or positive environment indicator. But why has the field on the right not been ploughed? It could be for a very normal reason, such as it being used for grazing at a different time of year or that resources to farm it are not available at this particular time. It could also be because it is, or there is a fear that it is, contaminated by IEDs.



HINT. Identification of these environmental differences can be used by MA staff to inform further questioning of key informants, such as the person driving the tractor.



Image 20. Post-conflict pattern of life

Environmental considerations may be further amplified in post-conflict urban environments such as the one shown in Image 20. One street has been cleared of rubble, cars, and other debris. Buildings have been repaired, shops have reopened, and vehicles and people are using it, thus it is a positive environmental indicator for development. Why has the same not happened to the other road and why have the adjacent houses not been repaired?

This may simply be because it was not judged to be a priority by the community and will be completed in due course. However, it may also be that this street was a former confrontation line where IEDs have been extensively used and therefore a negative environment. Again, these terrain-based indicators will inform the questioning of key informants by survey teams.



Image 21. A local marker placed by the community to warn of IED contamination

Local customs are part of environmental indicators and understanding them will enable MA staff to use them to best effect. For example, Image 21 shows a local warning sign that has been placed by members of the community. It is very important that MA staff are attuned to these, and that they are not missed. Signs like this one could also have been used by the armed actors to record the location of devices to enable maintenance, such as the renewal of power sources.



Image 22. Aged written warning is visible on the community's warning marker

# 3.3. THE BIG 5

The Big 5 are a group of terrain-based features that may have provided opportunities for IED emplacement during a conflict. In conjunction with other evidence, these features may be used to good effect when assessing where, inside a suspected hazardous area or confirmed hazardous area, IEDs are most likely to be located and what type(s) they will be.

## 3.3.1. CULVERT / WADI / FORD / BRIDGE



Image 23. Culverts provide an opportunity for the emplacement of IEDs

Culverts, like the one in Image 23, provide an opportunity to emplace a large main charge under a hard-topped route with relative ease. These features are often associated with command IEDs as the route can remain open to other traffic until a suitable target is present. In the example above, the culvert also creates a slowdown point, channelling a ground move on this very route, further aiding the use of IEDs.



WARNING. If the armed group did not need to use the route and civilian casualties were not an issue, VOIEDs could also be a threat.



Image 24. A bridge providing opportunities to emplace IEDs

Bridges provide many of the same opportunities for IED attacks as culverts, depending on the intent and capability of an armed group. They may also be considered as critical infrastructure, making them a target for large time devices if the intent is to target the structure. These could be military bridge demolition charges or improvised variants.



WARNING. Further IEDs or additional switches may have been placed adjacent to culverts and bridges in order to protect the primary device.



Image 25. A bypass route or ford that may provide an advantage for an armed group when placing IEDs

A bypass route or ford (see Image 25), is a point where vehicles and people will be channelled to move slowly through a defined point or area to avoid a barrier or blockage. Sometimes these may be lower than the route that is being bypassed so the lines of sight will be impaired. Use of the bypass may be restricted by the size and type of vehicles used by an armed group. Due to all these factors, the most likely type of IED to be present at a bypass route or ford is a VOIED, rather than a command-initiated device.



Image 26. Example of a bypass route due to an obstacle that would only apply to certain groups

### 3.3.2. ASCENT / DESCENT / OBSTACLES



Image 27. Steep banks causing vehicles to slow

Steep ascent and descent will cause people and vehicles to slow and also potentially make them more prominent against the skyline, increasing the distance from which they can be observed. If they also serve as an approach to a dominating feature (as seen in Image 28) they may have been identified as an area of tactical advantage to opposing parties to an armed conflict, and attempts may have been made to deny access to this feature with IEDs.



Image 28. Dominating ground in relation to a village

# 3.3.3. SOFT, SANDY SOIL



Image 29. A change in the ground conditions on a route may provide an opportunity for IED emplacement

This indicator really refers to how the ground conditions will affect how easily an IED can be buried in order to conceal it. An example of this is shown in Image 29 where a tarmac road ends and a gravel track starts. In addition, soft and / or sandy conditions restrict the mobility and speed of vehicles conducting ground moves, presenting opportunities for targeting with command-operated devices.

#### 3.3.4. SHARP BENDS



Image 30. Sharp bends providing opportunities

Sharp bends on roads and routes, as shown in Image 30, will cause vehicles to slow considerably. In particular, this may increase the opportunity for command IEDs.

## **3.3.5. BOTTLENECKS**

Bottlenecks often occur when a route or track changes width, causing vehicles to slow down.



Image 31. Example of a bottleneck

# 4. IED SIGNS

# **4.1. CATEGORIES OF SIGNS**

There are six primary categories of signs that are fundamental to understand: Regularity, flattening, transfer, colour change, discardables, disturbances.

### 4.1.1. REGULARITY

Regularity is denoted by straight lines, arches or other geometrical shapes that would not normally be encountered in nature (see Images 32 to 37).



Image 32. A footprint is a clear example of regularity



Image 33. A buried link (wire or detonating cord) producing regularity in short grass



Image 34. It is worth trying to observe from multiple directions. Note how much clearer this image is than image 33 of the same area



WARNING. Achieving different angles and perspectives for observation must only be done if it is safe to do so.



Image 35. A command wire observed due to colour change in the regularity seen in images 33 and 34



Image 36. IED components are also often visible through regularity above ground level



Image 37. The explosively formed projectile main charge from Image 36 with vegetation now removed

# 4.1.2. FLATTENING

Flattening is caused through human actions that apply pressure to an area. These can be identified through comparison with their immediate surroundings (see Images 38 and 39).



Image 38. Flattening in controlled conditions



Image 39. It is distinctly more difficult to identify flattening in natural surroundings

# 4.1.3. TRANSFER

Transfer or transference is a deposit (e.g. dust, mud, soil, sand) carried from one area to another.



Image 40. Transference in controlled conditions



Image 41. Transference in natural surroundings



Image 42. Transference often occurs as people move between environments

Image 42 is an example of when a sign can also be used as evidence in other ways. This fresh footprint is a sign that a person has walked on this surface. If multiple footprints are present then this may be suitable evidence, depending on the threat, to discount victim operated improvised explosive devices (VOIEDs) with a sufficient level of confidence.

# 4.1.4. COLOUR CHANGE

Colour change is the difference in colour from a specific area to its surroundings, as shown in Images 43 to 46. Colour changes may be produced by soil excavation to place devices, or where cut vegetation is used to camouflage devices; the cut vegetation changes colour as it ages over the first 48 hours or so after being cut.



Image 43. Colour change in controlled conditions



Image 44. Colour change in natural conditions



Image 45. Is that normal?

Image 45 shows an artificial rock containing a command IED and can be seen here placed alongside natural rocks on the side of a road. Although well constructed for concealment, it reveals itself as a sign among the natural colours, through colour change.



WARNING. These types of IEDs can be extremely well camouflaged.



Image 46. Photo taken using an unmanned aerial vehicle (UAV) to observe colour change from above

## 4.1.5. DISCARDABLES

Discardables are items associated with improvised explosive devices (IEDs) (or other explosive ordnance (EO)) that have been left behind either intentionally or otherwise, as can be seen in the examples in Images 47 to 50. Discardables can include IED components, electrical tape, packaging or ancillaries.



Image 47. A discarded battery in controlled conditions



Image 48. Discarded IED main charges in normal conditions



Image 49. A discarded spilt main charge with the home-made explosive (HME) clearly visible



Image 50. Discarded IED switches (pressure plates) leaning against a wall
## 4.1.6. DISTURBANCES

A disturbance is a change or rearrangement of the normal state of an area caused by the emplacement of an IED; see Images 51 to 54 for examples.



Image 51. A disturbance in controlled conditions



Image 52. A disturbance at an entrance point



Image 53. Note how the sign becomes easier to identify from another angle



WARNING. Achieving a different perspective for observation of a sign must only be done if it is safe to do so.



Image 54. A pressure plate IED was located under the disturbance

# **4.2. TYPES OF SIGNS**

In addition to the six categories explored above, mine action (MA) staff can divide signs into two types according to their position: top signs and ground signs. The dividing line between the two types is normally taken at ankle height.

## 4.2.1. TOP SIGN

This is a sign above ankle height that can be associated with the emplacement of an IED. This may include:

- Grooves in tiles or paving slabs due to their removal.
- Unusual regularity in walls or ceilings.
- Changes in colour and unnatural position of vegetation.



Image 55. A difficult-to-spot IED component - possible radiocontrolled improvised explosive device (RCIED) antenna



Image 56. Observing from different heights and against different backgrounds

Images 55 and 56 provide another example of how observing a sign (in this case a top sign) from different perspectives significantly changes how easily it can be identified. To take this photograph, the individual only moved a distance of 1 m but went from a kneeling to a standing position.

As well as providing evidence of potential post-conflict IED contamination being present, a sign can also provide evidence that contamination may not be present. Image 57 shows recent top sign transference that indicates that a person has climbed a ladder at an infrastructure site. This could lead to the identification and questioning of a key informant who could provide additional evidence that contamination may or may not be present, and a well-informed decision for the appropriate approach could then be made.



Image 57. Transference can even occur as a top sign

### 4.2.2. GROUND SIGN

This refers to a sign below ankle height and may include:

- Flattening where IEDs have been buried in soft ground.
- Disturbance where IEDs have been concealed in tarmac or other hard surfaces.
- Regularity from command wires or physical links. These could be surface laid or buried.
- Discarded IED components.



Image 58. A disturbance at the corner of a compound where armed group personnel may gather prior to turning the corner

# 4.3. CLASSIFICATION OF SIGNS

In addition to the categories and types of signs explored above, MA staff can use two classifications of signs, according to the type of evidence the sign provides. The two classifications are 'conclusive' and 'inconclusive'.

## 4.3.1. CONCLUSIVE

A conclusive sign indicates that an IED is or has been present. This means that it can be classified as direct evidence in the MA land release process. A conclusive sign could include IED discardables or flattening / colour change / disturbance caused by regularly spaced IEDs in a defensive belt.



Image 59. Colour change and regularity showing a conclusive sign



Image 60. Is this a conclusive sign?

Anyone can see that something unusual is present in Image 60 and to the trained and experienced eye a directional fragmentation charge is clearly apparent. This is an example of both regularity and colour change. This sign would be extremely unlikely to be misinterpreted and can be considered conclusive.

## 4.3.2. INCONCLUSIVE

This is a sign that may or may not be IED related but is considered worth recording for further investigation. This category of sign may be used as indirect evidence in the MA land release process.



Image 61. Is there an inconclusive sign present?

Although Image 61 shows flattening in a position where an IED main charge and / or switch may be, or has been located, there are other reasons this sign could exist. This sign could be misinterpreted and should therefore be regarded as inconclusive.

It is important that MA staff are able to identify when a sign is inconclusive and also be able to cross reference it to other associated signs and indicators. This ability to link signs and indicators together will help increase the confidence in decisions related to whether or not IED contamination is present. It is important that confidence in inconclusive evidence is graded to enable MA staff to better discount a 'false sign'.

How MA staff differentiate between conclusive and inconclusive signs will vary between different IED threats, environments and levels of staff experience related to the application of signs as a source of evidence. For example, during the early stages of an MA response, organisations may require several signs to be recorded and linked together before assigning them as conclusive evidence of IED contamination. As MA organisations and staff develop a greater level of experience, the use of signs will become a more effective tool.



HINT. Inconclusive signs combined with terrain-based indicators such as channelling may increase the level of confidence that IED contamination is present.

# 4.4. FACTORS THAT AFFECT SIGNS

There are three main factors supplemented by other considerations which can affect the appearance of IED signs: Environment, climatic conditions, age

## 4.4.1. ENVIRONMENT

The environment in which an IED has been emplaced will have an impact on the sign that is produced. MA staff should have knowledge of what type of a sign is likely to be present for different IED threats, in the different environmental conditions of the programme in which they are working.

The following can be used as a guide:

### GRASSLAND

In grassland there may be a colour change between the location where IEDs are located and areas where they are not. Some explosives are highly toxic and are likely to kill or prevent the growth of vegetation, while others may encourage growth.

The regularity of the command wire in Image 62 can be easily seen in medium height grassland. The height of the grass however will conceal the wire from other perspectives, and light levels will significantly alter how easily it can be identified.



Image 62. The regularity of a command wire

### **ROCKY COUNTRY**

Signs may often present themselves as either a disturbance or colour change in rocky conditions. It may also mean that a top sign is more prevalent, as the parties to an armed conflict are not able to dig into the ground and bury IEDs as readily.



Image 63. A disturbance can be easily seen on this rocky ground

### FOREST OR WOODLAND

Forest and woodland can be challenging environments for MA organisations trying to use a sign to provide evidence of IED contamination and this difficulty is likely to increase as the sign ages. In these environments what should be considered is how conditions during the conflict would have affected the opportunity of parties to an armed conflict to conduct attacks using IEDs. In dense forest or woodland, mobility even on foot may be difficult and it is important to be able to locate current and former tracks that would have provided opportunities to use IEDs. Therefore, as well as being used to identify IEDs, signs can help identify the terrain-based indicators described in Section 1.

Images 64 and 65 illustrate just how difficult it can be to identify a relatively large above-surface IED component in forest and woodland conditions.



Image 64. There is an IED component part in this image, can you see it?

Image 64 was taken with a high-resolution camera less than 1 m from an IED measuring approximately 25 cm in diameter and of completely different colour to the surrounding environment.



Image 65. Taken from the same distance but a very slightly different perspective

Image 65 was taken from a very slightly different perspective (less than 0.5 m difference). This change has conclusively revealed the IED component.

### SANDY SOILS

Sandy soil is often the type of environment in which a sign can be used to best effect. However, it is an environment in which a sign can age relatively quickly, changing its characteristics, and potentially making it easier or harder to determine.

For example, if a pressure plate IED is buried in reasonably hard sandy soil, a disturbance may initially be easier to see than for softer conditions. Over time, the wind and rain reduce how noticeable this disturbance is by redistributing the surface particles, whereas in softer conditions, the sand may recompress over time leaving a very noticeable area of flattening or disturbance.



Image 66. Sandy soil clearly showing disturbance and colour change where an IED main charge is located

## 4.4.2. CLIMATIC CONDITIONS

In some regions the climatic conditions can change significantly over the course of a year. These changes will, in turn, change the characteristics of a sign, making it easier or harder to use it as evidence. Additionally, the climatic conditions present whilst MA staff are observing signs can also impact the results.

The following climatic conditions should be considered:

### DIRECT SUNLIGHT

UV radiation will change how discardables look over time, making them more likely to appear to be an item not associated with IEDs. Conversely, it may cause expansion and bulging of IED main charges, making them easier to identify through signs.

The level of sunlight at the time of observation is extremely important. For example, sunlight coming through a window in a building may increase the degree to which a disturbance in the dust on the floor can been seen.

### STRONG WIND

Strong winds can completely remove signs such as discardables or enhance other signs, such as disturbances.

WARNING. Strong winds can also create 'false signs and indicators' by spreading objects like plastic bags that can be misinterpreted as markers or transference signs.

### **HEAVY RAIN**

Heavy rain can cause localised flooding that submerges signs, significantly changing their appearance and making them very hard to identify. It may also cause IED components to rust, degrade or expand, potentially creating new signs even several years after the IED was emplaced.



Image 67. Flattening and regularity where an IED main charge has been submerged under water due to rainfall

## 4.4.3. THE AGE OF SIGNS

The time that has elapsed between when signs were first made and when they are observed, is one of the most significant factors affecting their application in MA. The longer the amount of time that has passed, the greater the probability that signs will have altered, for better or for worse. Experience and practice will help to overcome this difficulty, and this is explored further below.

## 4.4.4. OTHER CONSIDERATIONS

In addition to the factors above, there are a number of other considerations that will affect how IED signs can change.

For example, in **built-up areas**, there are many other considerations related to the application of signs, due to high population density. This includes how a sign relates to information gained from the community and how a sign can be incorporated into risk education specific to these environments. Also, there will be even more false signs identified that are extremely difficult to differentiate from true IED signs.



HINT. As visual identification of IEDs in urban environments can often be the primary means of detection, when applied well, both ground signs and top signs can be extremely important tools.



Image 68. Is that normal?

There is a metallic-looking wire protruding from the paving slab in Image 68. It could be difficult to assess whether this is an IED component or an innocent item such as a wire for a doorbell.



HINT. Providing MA staff with training on construction methods specific to a region, as well as the IED threat, can significantly help with the effective application of IED signs in an urban environment.

# 4.5. DETERMINING THE AGE OF A SIGN

MA staff should be able to take into account how the appearance of a sign changes with age so that confidence can be maintained in the use of a sign in decision-making processes. This is particularly important due to the extended period of time that MA organisations may be conducting survey and clearance after a conflict has ended. This vital skill will assist in the following ways:

- It will enable an approximate time frame to be established as to when IEDs were being used in the area.
- It will prevent overconfidence in the assumption that a lack of a sign means a lack of threat.
- It will assist in determining the level of confidence in signs.

MA staff should have a good understanding of the assessed IED threat and the climatic conditions that have occurred in the period since the IED contamination was left. These factors determine the ageing process of signs.

The following factors affect how signs will change over time.

### 4.5.1. HARD SIGNS

Examples of a hard sign would be scoring where tiles have been removed, objects dragged on floors or the burying of IEDs into tarmac / hard-top roads. These are likely to be resilient to ageing.



Image 69. A hard sign in an urban environment

A hard sign can occur regularly in urban environments and will last for long periods of time. This can be especially useful as the use of hand-held detectors in these environments can be problematic, increasing the reliance on visual identification.



Image 70. Hardstanding does not mean that you are always safe from VOIEDs

The sign in Image 69 is revealed in Image 70 as being associated with a VOIED placed underneath the paving slab. As IED switches can be easily made for a specific task, this pressure plate would have been tested to be sufficiently strong to support the weight of the slab but would function under the additional weight of a person.

### 4.5.2. SOFT SIGNS

Sign characteristics in soft soil, mud or sand will be more susceptible to the effects of ageing.



Image 71. Soft conditions can still occur in buildings

### 4.5.3. EXPOSURE

The degree of exposure to the elements will have differing effects on signs. Signs will change rapidly where there is direct exposure to sunlight, rain or heavy winds.

# 4.6. INFORMATION GAINED FROM SIGNS

In order for MA staff to make an accurate analysis of the information gained from signs, it is important that they have detailed knowledge of the IED threat including the techniques, tactics and procedures that were used by parties to an armed conflict. MA organisations should ensure that staff receive a comprehensive national threat analysis brief when joining a new programme and that operational updates are regularly provided.



HINT. Examples of when an IED sign has been used as evidence in decision making should be shared widely and in a timely manner.

### TACTICS AND DOCTRINE

A thorough understanding of the IED tactics and doctrine of the parties to an armed conflict that were active during a conflict will significantly influence how MA staff can use signs to the best effect in decision making. For example, if defensive belts were commonly used to deny ground, and signs are identified that link to this tactic, a confirmed hazardous area can be defined and categorised with a high level of confidence.

### **IED TRAITS**

These are the attributes that different IEDs are likely to provide in terms of signs. For example, a pressure plate as part of a VOIED stacked directly over a main charge is likely to provide different traits than if a pressure plate is located where a vehicle wheel would pass and the main charge is located directly underneath the likely centre of the vehicle.

### **INFORMATION GAINED**

Depending on the condition of the sign, the following information can be gained:

- Numbers / density of IEDs.
- Type of main charges (blast / fragmentation / directional).
- Type of switches / power sources.
- Layout of components in relation to each other.
- Position of components in relation to the physical terrain of a vulnerable point (VP).

# **4.7. METHODS OF INTERPRETATION OF SIGNS**

The interpretation of signs is a continual process in MA operations, as new signs will be continually observed from initial non-technical survey (NTS) to final completion. In order to make the best possible evidenced-informed decisions, it can help if staff consider the signs that they are presented with as: Facts / Assumptions / Interpretations.

### FACTS

MA staff will identify a sign that can be used as direct or indirect evidence in relation to indicators such as VPs and current use of areas by the community. As already described, this is a conclusive sign.

### **ASSUMPTIONS**

Inconclusive signs can be layered together along with IED indicators (see Section 1). Based on training and experience, MA staff will be able to make logical assumptions, up to and including using this as direct evidence.



HINT. Technical survey can be used to confirm an assumption prior to full clearance commencing.

### INTERPRETATIONS

This is the logical thought process that MA staff can apply to a particular situation when signs have been observed.



HINT. Being able to link signs together is extremely important. For example, regularity, flattening and transference that are linked together could be graded as strong evidence of IED contamination, providing more confidence than any of these individual signs in isolation.

# **5. SCENARIO EXAMPLES**

## **5.1. SCENARIO 1 – IRAQ - DEFENSIVE IED BELTS**

### **GENERAL DESCRIPTION**



Image 72. Defensive IED belt (highlighted by white dashed line) containing a damaged vehicle, close to a community housing complex (North is up)

An MA operator has received a request to conduct NTS of a community housing complex as shown in Image 72. The housing complex was occupied by a non-state armed group for over 12 months. They were using it as a fortified fighting position to dominate the channelled movement of an opposing armed group between a river and an area of steep relief.

The local community reported that the area inside the walls has been reoccupied by local families for over six months and there have been no issues related to EO. However, the community are concerned about the area to the north, which includes an area of commonly owned land which herds of sheep move over to get to the river.

An MA organisation is tasked to conduct NTS of the common land in the north.

### DURING NTS THE FOLLOWING EVIDENCE WAS RECORDED

### **IED** indicators

- There is a VP to the north of the housing complex created by steep relief and a river. During the conflict this would have **channelled** the movement of vehicles and people trying to attack the non-state armed group occupying the housing estate.
- The ground is suitable for wheeled vehicles to move over but soft enough to bury a VOIED in order to conceal it.
- There are no **aiming markers** or tightly restricted VPs, such as **culverts** or **entrance points** in the area to the north.
- There is a destroyed pickup truck with a mount for a heavy machine located approximately 150 m from the northern perimeter wall. The vehicle damage is consistent with a blast main charge functioning directly between the front wheels, which in itself is a **sign**.

#### **IED** sign

• Ground sign **disturbance** is noted approximately 150 m to 170 m from the northern wall. The signs appear to be in two rows and with a consistent distance between each area of signs.

### **OPERATIONAL THREAT ASSESSMENT**

A threat assessment consistent with <u>Annex C of IMAS 07.14 Risk Management in Mine Action</u>, based on the evidence of IED indicators and signs recorded during NTS, concludes that:

A defensive belt of VOIEDs is probably located to the north of the housing complex. These are probably VOIEDs (pressure) with the main charge and firing switch offset by approximately 1 m. The main charge likely contains approximately 5–10 kg of explosives.

WARNING. Evidence recorded from other sources such as key informant interviews, national threat analysis and MA reports related to the area would be used to expand this operational threat assessment prior to its inclusion in an IED clearance plan.

A breakdown of the evidence and assessment linkage is as follows:

OPERATIONAL THREAT ASSESSMENT	EVIDENCE	ASSESSMENT
A defensive belt of VOIEDs is probably located to the north of the housing complex.	There is a vulnerable area to the north of the housing complex created by relief that would constrict or <b>channel</b> the movement of vehicles assaulting the position.	Time and command-initiated devices are not as effective as multiple VOIEDs in providing a persistent (day & night) effect in vulnerable areas.
	The ground is suitable for wheeled vehicles to move over but has <b>soft</b> <b>enough soil</b> to bury a VOIED in order to conceal it.	Confidence in this assessment is increased by the consistency and <b>regularity of the disturbance</b> . The distance from the complex's perimeter is linked to an explosive obstacle that is covered by direct fire weapons. This is a known tactic of the non-state armed group that placed the contamination.
	<b>Regularity</b> in areas of <b>disturbance</b> are noted approximately 150 m to 170 m from the northern wall. These appear to be in two rows and with a consistent distance between each area of signs.	
These are probably VOIEDs (pressure) with the main charge and firing switch offset by approximately 1 m. The main charge likely contains approximately 5–10 kg of explosives.	There are no <b>aiming markers</b> or tightly restricted VPs, such as <b>culverts</b> or <b>entrance points</b> . There is a destroyed pickup truck with a mount for a heavy machine located approximately 150 m from the northern perimeter wall. The vehicle damage is consistent with a blast main charge functioning directly between the front wheels, which in itself is a <b>sign</b> .	The threat of command-initiated devices is further reduced through a lack of opportunity due to the ground not being suitable for the use of this IED capability. Damage to the vehicle is consistent with this quantity of HME function when a wheel makes contact with a pressure plate causing a main charge to detonate in an offset position.

# ADDITIONAL IED INDICATORS AND GROUND SIGNS RECORDED DURING IED CLEARANCE ACTIVITIES

When the MA searcher / deminer is 4–5 m away from the sign that was originally recorded as a disturbance they are able to observe the sign in more detail (see Image 73).



Image 73. Initial clearance lane

The searcher / deminer recorded the following observations:

- An area of **disturbance** approximately 0.5 m to 0.75 m in diameter. This is consistent and assessed to be the location of the main charge.
- 1 m to 1.5 m of **regularity**. This is extremely narrow and is assessed to be the location of an electrical link.
- An area of rectangular **flattening** (0.5 m by 0.2 m). This is assessed to be consistent with the location of a pressure plate switch.

The IED that the searcher / deminer is assessing to be present is:



Image 74. The assessed VOIED in detail

The assessed VOIED is a high metal content pressure plate IED. The main charge is concealed in a round canister and is connected to the pressure plate by a wire. The bottom device shows the pressure plate switch removed from its blue weatherproofing. The connection between the visually recognised ground signs and the design of the IED is clearly visible.



Image 75. The assessed VOIED in relation to the ground sign

# AFTER REFERRAL WITH THE TEAM LEADER, THE FOLLOWING KEY DECISION IS MADE

The search lane is moved to the left in order to avoid the assessed switch location (see Image 76). This will enable the IED's main charge to be detected and located by the searcher / deminer and for the task to be handed over to an MA improvised explosive device disposal (IEDD) operator.



Image 76. Evidence-informed decision on assessment of the sign to avoid the probable location of a pressure plate

## 5.2. SCENARIO 2 – AFGHANISTAN FOOT PATROL ROUTE

### **GENERAL DESCRIPTION**



Image 77. Aerial photograph showing a section of the patrol area

Image 77 is an aerial photograph that shows where an armed group previously occupied a building (red rectangle) on the outskirts of a village (blue shading). The red line denotes a main route that is currently not being used by the community, even though the conflict has ended.

During the conflict, the route provided a defence opportunity for the armed group that occupied the building, by **channelling** opponent groups as they moved through the village. The local community, some of whom remained in the area during the conflict, reported that there were a number of explosions along the route during the conflict. At the time of conflict, the community were instructed not to use the route between dusk and dawn, as it was 'mined', creating an **IED indicator** of a negative environment.

The conflict in the area ceased six months ago and, gradually, the local population has been moving back into their homes. According to the village elder, whose position has been substantiated by a diverse mix of women, girls, boys and men across the community, there have been two explosive accidents on the route in the last six months.

The community does not use the main route nor a number of interconnecting walkways between compounds. This is causing significant issues especially for families with children.

### DURING NTS THE FOLLOWING EVIDENCE WAS RECORDED

#### **IED** indicators

- The route running through the middle of the village provided a defensive opportunity for the armed group by **channelling** both their opponent's foot and vehicle patrols. The vehicles that were used during the conflict were lightly armoured 4x4 pickups.
- During NTS a UAV was used to confirm two craters (or **disturbances**) from previous explosions. They are both approximately 3 m in diameter and 0.5 m deep.
- The ground is a mixture of compacted stone and sand and it would be possible to secrete subsurface IEDs in the ground, perceived as a **Big 5** indicator.
- There are no obvious **aiming markers**, but the urbanised area does have constricted areas when moving off the main route to smaller further restricted tracks, some of which would allow small vehicles to access and **channel** considerably.
- There are **warning markers** in the form of fist-sized rocks and stones laid in a line at the two ends of the red line that can be seen in the aerial image.
- The village elder suggested there are areas of **disturbance** at a number of points on the route.

#### **IED** signs

- A ground sign **disturbance** can be seen on the track, with what seems to be a **regularity** of linear shape running off into the verge.
- **Discardables** are present in the form of what appears to be a number of VOIED switches and 'palm oil' main charge containers that have been abandoned, as a ground sign near to adjacent buildings.
- Traces of a white granular substance or **discardable** on the surface of the ground commensurate with the type of HME used by the armed group has been found.

### **OPERATIONAL THREAT ASSESSMENT**

A threat assessment consistent with <u>Annex C of IMAS 07.14 Risk Management in Mine Action</u>, based on the evidence of IED indicators and signs recorded during NTS, concludes that:

The main route is most likely contaminated with VOIEDs. These are probably low metal content pressure plate switches with the main charge in the centre of the route and the battery offset in the verge to make detection by opposing groups more difficult. The IED's main charges are likely to be 15–20 kg of HME in a plastic container.



WARNING. Evidence recorded from other sources such as key informant interviews, national threat analysis and MA reports related to the area, would be used to expand this operational threat assessment prior to its inclusion in an IED clearance plan. A breakdown of the evidence and assessment linkage is as follows:

OPERATIONAL THREAT ASSESSMENT	EVIDENCE	ASSESSMENT
VOIED contamination on the main route running through the village. Most likely to be VOIEDs (pressure) with the power source offset 4–5 m from the switch to hamper detection.	Due to the parties of an armed conflict's (in context) considerate nature towards the community of the area and the evidence that suggests the local community were instructed to not use the route, creating inconclusive evidence of a <b>negative environment</b> .	This lends itself to the use of VOIEDs, likely with a remote power source to enable arming and disarming and making it more difficult to detect by reducing the IED's metal content on the route.
	The armed group would have expected opposing forces as the route <b>channelled</b> vehicles and people.	
	The conditions allow good placement of IEDs due to the relatively soft ground, a <b>Big 5 indicator</b> .	
	Areas of disturbance can be seen on the track with what seems to be linear <b>regularity</b> in a <b>disturbance</b> running away to the verge (assessed as remote power source).	
The main charge most likely contains approximately 15–20 kg of HME, located in the centre of the route and offset 1 m from the pressure plate switch.	A crater, or <b>disturbance</b> from one of the explosions is around 3 m in diameter and 0.5 m deep. It is located in the middle of the route.	This crater is commensurate with a 10–20 kg subsurface HME main charge. During the conflict, the armed group in this area rarely used command-initiated IEDs and the ground in question does not lend itself to such a type of attack due to limited lines of sight.

ADDITIONAL IED INDICATORS AND GROUND SIGNS RECORDED DURING IED CLEARANCE ACTIVITIES



Image 78. Showing the initial 2 m clearance lane towards the ground sign

The MA searcher / deminer made more detailed observations based on the signs that were originally recorded as **disturbances**, from a distance of 4–5 m. The searcher / deminer recorded the following observations:

- An area consistent with the location of the pressure plate switch and main charge.
- 4 m of **regularity**. This is extremely narrow and is assessed to be the location of the remote power source.

# THE IED THAT IS ASSESSED TO BE PRESENT IS SHOWN IN THE FOLLOWING IMAGES



Image 79. The relocated clearance lane with standard MA marking system and assessed VOIED ground sign beyond the end of the lane marker



Image 80. Aerial view of clearance lane with standard MA marking system and assessed VOIED beyond the end of the lane marker

### AFTER REFERRAL, THE FOLLOWING KEY DECISION IS MADE

The initial clearance lane shown in Image 78 is relocated, as shown in Images 79 and 80, to increase the probability that the first part of the IED encountered is the power source, therefore reducing the risk to the searcher / deminer.



Image 81. The assessed VOIED in the ground displaying the ground sign

# 5.3. SCENARIO 3 – COMMAND IED

**GENERAL DESCRIPTION** 



Image 82. Aerial photograph showing main route leading to a port

Image 82 is an aerial photograph showing a semi-urban area through which a main route runs, as a **channelled route**, east-west to a port. As the route gets further away from the port, the density of the surrounding buildings reduces and the terrain becomes open desert.



Image 83. Showing compound of interest, which is a concern to the local community

The conflict in the area ended over four months ago and an MA organisation has received a request to conduct NTS of the route leading to the port. The area encompasses an urban-rural interface that acts as the break between the open desert and the more densely urbanised areas around the port. The route is being trafficked by lorries, cars and people, creating evidence of a positive environment. However, there is a compound, adjacent to the route, that is a concern to the local community.

The area was under the control of a non-state armed group for over 12 months and significant areas of the town remain unused. The town's community, many of whom remained in the area during the conflict are worried about the compound, as well as other areas adjacent to the route, believing them to be dangerous. This is especially true in the interface area where a lot of the heavy fighting occurred, creating evidence of a negative environment.

The community's main fear relates to them finding military ordnance and suspicious objects, or **discardables**, that they believe the non-state armed group modified into weapons. There have been reports of explosions, but these mostly occurred in the 30 days after the conflict ended when the community was still identifying areas that were dangerous.

### DURING NTS THE FOLLOWING EVIDENCE WAS RECORDED

### **IED** indicators

- The route had a number of vehicles travelling on it during NTS. The compound of interest, highlighted in red in Image 83, was determined as an area the local community did not use (negative **environment CAGE indicator**).
- Some of the local community stated they were warned not to go near the compound during the conflict, and also advised not to be in the vicinity whilst opposing forces were present.
- A former police officer suggested that during the conflict there were explosions along the route triggered by 'observers'. It was stated that some were effective, and some were not. He once witnessed an explosion occurring just in front of an armed group's vehicle.
- As the route runs into the town from the desert it becomes constricted and **bottle-necked** at the urban-rural interface.
- The ground is compacted sand and it would be viable to emplace subsurface IEDs or main charges (a **Big 5 indicator**).

### **IED** signs

• There is a **top sign** item identified through **colour change** and **regularity** on the compound of interest. This is believed to be an IED component, probably an antenna.



Image 84. Showing the locations of the top sign and ground sign

- Suspicious ground sign **disturbance** can be seen in the area highlighted in blue on Image 84.
- There is **regularity** in the form of a small black wire, around 50 mm in length, protruding upright from the top corner of the south-eastern compound wall.
- There is damage in the vicinity including a compound in an additional nearby VP consistent with explosive fragmentation from military ordnance displaying **regularity** and **colour change**, which could be termed as **discardables** as well.

### **OPERATIONAL THREAT ASSESSMENT**

A threat assessment consistent with <u>Annex C of IMAS 07.14 Risk Management in Mine Action</u>, based on the evidence of IED indicators and signs recorded during NTS, concludes that:

The compound highlighted in the photos is likely to be concealing a receiver for an RCIED with a potential main charge in the middle of the track. The main charge is likely to be a medium-sized charge and is potentially military ordnance.



WARNING. Evidence recorded from other sources such as key informant interviews, national threat analysis and MA reports related to the area would be used to expand this operational threat assessment prior to its inclusion in an IED clearance plan.

A breakdown of the evidence and assessment linkage is as follows:

OPERATIONAL THREAT ASSESSMENT	EVIDENCE	ASSESSMENT
Most likely command- initiated devices in the area. Probable RCIED in the area of the highlighted compound.	During the conflict, the armed group and the local community had a relatively amicable relationship or <b>environment</b> with no known accidental IED incidents.	The area around the red compound is a VP due to the <b>channelling</b> from the desert that enables a good <b>line of sight</b> to a contact point on the route. Command-initiated devices offer more control to the armed group than VOIEDs. With no known accidental IED incidents against the local population in the area and considering information from key informants, it is highly likely that any IEDs will be command- initiated and most likely RCIEDs as the opposing forces had no means to mitigate their use. The urban-rural interface environment would have had a lower <b>pattern of life</b> in comparison to the more densely populated areas, presenting an opportunity to better target opposing forces without the threat of local population casualties. This assessment is commensurate with armed group tactics within this area.
	The highlighted compound is on the northern side of the route and the ground directly adjacent presents a <b>bottleneck</b> effect where the desert links to the urbanised area. The route presents the main vehicular access to the port, which was of strategic value.	
	The ground is viable for IED secretion due to its nature of compacted sand which is interspersed with <b>loose soil</b> .	
	There are areas of <b>top signs</b> around the compound including a potential past explosion contact point which may include a nearby compound and also a wire protruding from the corner of a compound.	
The main charge is likely to be a medium-sized charge and is potentially military ordnance.	Military ordnance or <b>discardables</b> found by local population in other areas. Damage or <b>disturbances</b> in VPs nearby from the result of an explosion, consistent with military ordnance fragmentation.	Military ordnance is available to this armed group and offers superior explosive qualities, beneficial if targeting vehicles. Opposing forces did not mitigate the risk of IEDs by searching with metal detectors. The use of plastic container main charges was not necessary.

ADDITIONAL IED INDICATORS AND GROUND SIGNS RECORDED DURING IED CLEARANCE ACTIVITIES



Image 85. Image showing the sign in detail. Note the wire protruding from the corner

When the MA searcher / deminer is 4–5 m from the sign that was originally reported at the south-eastern corner, it is interpreted as follows:

- A wire projecting from above the corner junction of the wall by approximately 100 mm. This is assessed to be the receiver element of an RCIED. There is also a potential wire running down the wall. This is identified by **colour change** (red).
- A linear area of **disturbance** running from the corner into the road. Assessed to be an electrical link.
- The circular **disturbance** on the route is assessed to conceal the IED's main charge.

### AFTER REFERRAL THE FOLLOWING KEY DECISION IS MADE



Image 86. Image of relocated clearance lane

The search lane is relocated to the side of the compound to gain safe access and to ensure that the receiver / power source is the first part of the IED to be encountered (Image 86). Once these components are located, the task can be handed over to an MA IEDD operator.



Image 87. Image showing the IED main charge in the road

# 6. CONCLUSION

Knowledge of IED-related indicators and signs and their application play an important role in strengthening safety measures.

Knowledge and skills required to identify IED-related threats not only assist MA personnel in survey and clearance but are useful for a wide range of humanitarian aid workers and first responders operating in an IED threat environment.

Recognising IED indicators and ground signs can be essential for risk management on different levels, as well as making evidence-based decisions and identifying hazards.

The aim of this collection of good practice and sectorial norms is to assist in all these aspects, with the goal of increasing confidence, mitigating risks, increasing efficiency for MA personnel, programmes and the affected population.

# **7. LEXICON OF ACRONYMS**

CAGE	Channelling, aiming markers, ground sign and environment	
EO	Explosive ordnance	
ERW	Explosive remnants of war	
HME	Home-made explosive	
IED	Improvised explosive device	
IEDD	Improvised explosive device disposal	
IMAS	International Mine Action Standards	
MA	Mine action	
NTS	Non-technical survey	
RCIED	Radio-controlled improvised explosive device	
SALW	Small arms and light weapons	
UNMAS	United Nations Mine Action Service	
UXO	Unexploded ordnance	
VOIED	Victim operated improvised explosive device	
VP	Vulnerable point	

# 8. GLOSSARY OF TERMS

**Clearance.** In the context of mine action, the term refers to tasks or actions to ensure the removal and/ or the destruction of all Explosive Ordnance from a specified area to a specified depth or other agreed parameters as stipulated by the NMAA/Tasking Authority. **(Source: IMAS 04.10 Second Edition, Amendment 10, February 2019)** 

**Command (IED).** A type of switch that is activated by the attacker in order to control the moment of initiation. (Source: UNMAS IED Lexicon)

**Conclusive Sign.** A conclusive sign indicates that an IED is or has been present. This can mean that it is classified as direct evidence in the land release process. (Not defined in IMAS)

**Confirmed Hazardous Area (CHA).** Refers to an area where the presence of mine/ERW contamination has been confirmed on the basis of direct evidence of the presence of mines/ERW. (Source: IMAS 04.10 Second Edition, Amendment 10, February 2019)

**Explosively Formed Projectile (EFP).** Specially designed main charge configuration incorporating an explosive charge with a concave metal liner which by the force of the charge reshapes the plate into a high velocity metal slug capable of penetrating armor. (Source: UNMAS IED Lexicon)

Note: In some literature, an EFP can sometimes be called an explosively formed penetrator, or a self-forging fragment.

**Explosive Ordnance (EO).** Interpreted as encompassing mine action's response to the following munitions:

- Mines
- Cluster munitions
- Unexploded ordnance
- Abandoned ordnance
- Booby-traps
- Improvised explosive devices

Note: Improvised explosive devices (IEDs) meeting the definition of mines, booby-traps or other devices fall under the scope of mine action, when their clearance is undertaken for humanitarian purposes and in areas where active hostilities have ceased. (Source: IMAS 04.10 Second Edition, Amendment 10, February 2019)

**Explosive Ordnance Disposal (EOD).** The detection, identification, evaluation, render safe, recovery and disposal of EO. EOD may be undertaken:

- As a routine part of mine clearance operations, upon discovery of EO;
- To dispose of ERW discovered outside hazardous areas, (this may be a single item of ERW, or a larger number inside a specific area); or
- To dispose of EO which has become hazardous by deterioration, damage or attempted destruction. (Source: IMAS 04.10 Second Edition, Amendment 10, February 2019)

**Explosive Remnants of War (ERW).** Unexploded Ordnance (UXO) and Abandoned Explosive Ordnance (AXO). [CCW Protocol V]. (Source: IMAS 04.10 Second Edition, Amendment 10, February 2019)

**High Risk Area**. An identifiable area that is typically mined in a Confirmed Hazardous Area, or an area that is described by a non-technical survey as being more likely to be mined or to contain ERW than others. (Source: IMAS 04.10 Second Edition, Amendment 10, February 2019)

Home Made Explosive (HME). A combination of commercially available ingredients combined to create an explosive substance. (Source: IMAS 04.10 Second Edition, Amendment 10, February 2019)

**Humanitarian Principles**. A set of principles that guides humanitarian action, which include the principles of humanity, neutrality, impartiality and independence.

Note: See **IMAS 01.10 (6.2)** for more on humanitarian principles in mine action. These principles are endorsed in UN resolutions 46/182 and 58/114 and considered the foundation for humanitarian action [UNOCHA]. (Source: IMAS 04.10 Second Edition, Amendment 10, February 2019)

**Identification Procedures.** Those actions taken to establish the make-up and characteristics of an item of EO. (Source: UN IEDD Standards (May 2018))

**Improvised Explosive Device (IED).** A device placed or fabricated in an improvised manner incorporating explosive material, destructive, lethal, noxious, incendiary, pyrotechnic materials or chemicals designed to destroy, disfigure, distract or harass. They may incorporate military stores but are normally devised from non-military components **[IATG 01.40:2011]**.

Note: An IED may meet the definition of a mine, booby trap, and/or other type of explosive ordnance depending on its construction. These devices may also be referred to as improvised, artisanal, or locally manufactured mines, booby traps, or other types of explosive ordnance. (Source: IMAS 04.10 Second Edition, Amendment 10, February 2019)

**IED Disposal (IEDD).** The location, identification, rendering safe and final disposal of IEDs. (Source: IMAS 04.10 Second Edition, Amendment 10, February 2019)

**Inconclusive Sign.** This is a sign that may or may not be IED related but is considered worth recording for further investigation. This category of sign may be used as indirect evidence in the land release process. (Not defined in IMAS)

**Key Informants.** All men, women and children who have relatively good knowledge on the hazardous areas in and around their community.

Note: Key informants may include, but are not limited to, community leaders, mine-affected individuals, schoolteachers, religious leaders etc. (Source: IMAS 04.10 Second Edition, Amendment 10, February 2019)

Land Release. In the context of mine action, the term describes the process of applying "all reasonable effort" to identify, define, and remove all presence and suspicion of Explosive Ordnance through non-technical survey, technical survey and/or clearance. The criteria for "all reasonable effort" shall be defined by the NMAA. (Source: IMAS 04.10 Second Edition, Amendment 10, February 2019)

**Main Charge.** The explosive charge which is provided to accomplish the end result in a munition. Examples for end results are: bursting a casing to provide blast and fragmentation; splitting a canister to dispense sub-munitions; or producing other effects for which it may be designed. (Source UNMAS IED Lexicon)

Main Charge Configuration. The arrangement or design of the main charge and other materials (usually metal) to create an effective weapon to attack personnel, vehicles, or structures. (Source UNMAS IED lexicon)

## Mine action (MA). Activities which aim to reduce the social, economic and environmental impact of mines, and ERW including unexploded sub-munitions.

Note: Mine action is not just about demining; it is also about people and societies, and how they are affected by landmines and ERW contamination. The objective of mine action is to reduce the risk from landmines and ERW to a level where people can live safely; in which economic, social and health development can occur free from the constraints imposed by landmine and ERW contamination, and in which the victims' different needs can be addressed. Mine action comprises five complementary groups of activities:

- 1. Explosive ordnance risk education;
- 2. Humanitarian demining, i.e. mine and ERW survey, mapping, marking and clearance;
- 3. Victim assistance, including rehabilitation and reintegration;
- 4. Stockpile destruction; and
- 5. Advocacy against the use of anti-personnel mines.

A number of other enabling activities are required to support these five components of mine action, including: assessment and planning, the mobilisation and prioritisation of resources, information management, human skills development and management training, quality management, and the application of effective, appropriate and safe equipment. (Source: IMAS 04.10 Second Edition, Amendment 10, February 2019)

Mine action organisation. Refers to any organisation (government, military, commercial or NGO/civil society) responsible for implementing mine action projects or tasks. The mine action organisation may be a prime contractor, subcontractor, consultant or agent. (Source: IMAS 04.10 Second Edition, Amendment 10, February 2019)

**Non-Technical Survey (NTS).** Refers to the collection and analysis of data, without the use of technical interventions, about the presence, type, distribution and surrounding environment of explosive ordnance contamination, in order to better define where explosive ordnance contamination is present and where it is not, and to support land release prioritisation and decision-making processes through the provision of evidence. (Source: IMAS 04.10 Second Edition, Amendment 10, February 2019)

**Power Source.** A device that either stores or releases electrical or mechanical energy. The key elements of information about a power source are its type / source, number of batteries and their configuration (series or parallel), its voltage (if electrical) and how it is connected to close an IED switch. **(Source UNMAS IED Lexicon)** 

**Pressure.** A switch designed to function when pressure is applied in a predetermined direction (plate, tube, plunger, crush wire). **(Source UNMAS IED Lexicon)** 

**Sensor.** A switch used to detect change in heat, light, movement, vibration, electromagnetic frequency, sound or magnetic field. **(Source UNMAS IED Lexicon)** 

Suspected Hazardous Area (SHA). An area where there is reasonable suspicion of explosive ordnance contamination on the basis of indirect evidence of the presence of mines/ERW. (Source: IMAS 04.10 Second Edition, Amendment 10, February 2019)

**Switch.** A device for making, breaking, or changing a connection in an IED. A single switch can have multiple functions (i.e. arming and firing). (Source UNMAS IED Lexicon)

Time. A type of switch that functions after a period of time. (Source IMAS 04.10 Second Edition, Amendment 10, February 2019)

**Unexploded Ordnance (UXO).** Explosive ordnance that has been primed, fuzed, armed or otherwise prepared for use, or has been used. It may have been fired, dropped, launched or projected yet remains unexploded either through malfunction, design or for any other reason. (Source: IMAS 04.10 Second Edition, Amendment 10, February 2019)

Victim Operated. A type of switch designed to be initiated by a victim's presence, proximity, contact or activity causing a device to function that may injure or kill one or more persons. (Source: IMAS 04.10 Second Edition, Amendment 10, February 2019)

**Vulnerable Point (VP).** Specific points where it is particularly advantageous for an aggressor to position an ambush, using either IEDs, SALW, or both. VPs are typically characterized by prominent or restrictive feature or choke point on the ground. Several factors pertaining to aggressor capability, intent and local factor use will contribute to the vulnerability of a specific point. (Source: UN IEDD Standards (May 2018)


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