Cabinet Office

Civil Protection Common Map Symbology

Version 1.0

March 2012

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1. INTRODUCTION

Interoperability

1.1 Interoperability is defined as *the extent to which different organisations can work together coherently as a matter of routine.* To be interoperable organisations must first understand how other organisations work under varying operating conditions, and this is set out in both single and multi-agency doctrine. A further element that underpins interoperability is commonly understood terminology, and Cabinet Office maintains a lexicon of civil protection terminology[1], in order that terms share a common definition across the many organisations that use them. What is set out here for the first time is a common set of map symbols that are recommended for adoption by emergency responder organisations. Common symbols, underpinned by commonly understood terminology, can facilitate information exchange; promote common awareness of assets, hazards and vulnerabilities; support at-a-glance situational appreciation from map displays; and ultimately support collaborative and informed decision making.

1.2 The publication of these symbols links doctrine, terminology and the use of mapping in a way that promotes shared situational awareness. For the first time emergency responders will be able to look at a map that is annotated with these symbols and share an understanding of the meaning of the symbols; link the abbreviations and acronyms to definitions given in the lexicon of terminology; and also appreciate the operational implications of that as set out in doctrine publications. This is the wider context within which single and multi-agency doctrine, commonly understood terminology and commonly understood map symbols enable interoperability.

Development of the map symbols

1.3 Cabinet Office has developed these map symbols in partnership with the Ministry of Defence and the Ordnance Survey. The symbols are published as a statement of good practice, the adoption of which will promote interoperability and enable the attainment of shared situational awareness.

[1] www.cabinetoffice.gov.uk/cplexicon

1.4 What is set out here is a *core* symbol set: it is restricted to those elements that are referred to in civil protection multi-agency guidance documents. It does not, in its current form, include elements that are specific to individual emergency responder organisations and their single service doctrine.

1.5 This release is Version 1.0 and further releases will be published to www.cabinetoffice.gov.uk/cpsymbology , together with technical updates and downloadable symbols as they become available.

Design principles

1.6 The symbols have been developed in line with the principles that they should be:

- Based on common UK civil protection terminology, and multi-agency civil protection doctrine;
- Coherent wherever possible with key existing symbol sets, notably the international standard NATO APP-6;
- Simple in design form;
- Rapidly appreciable to users with a basic grasp of the primary acronyms and abbreviations;
- Suitable for drawing by hand as well as through a software-embedded symbol set;
- Not requiring colour as an essential component of their basic form, although it may enhance the distinctiveness of certain features.

1.7 This core symbol set is based around a small number of basic building blocks which are generally geometric (i.e. shapes requiring explanation through a legend) rather than pictorial or associative (i.e. using recognisable graphic likenesses to denote features). The emphasis throughout has been on ease of use and appreciability, and guidance is offered in Sections 2 and 9 about how to make the best use of these symbols.

1.8 We encourage local responders to make use of these symbols in a way that fits with and supports local practices. As with all tools, map symbols require

judgement in their application, and users are reminded that common understanding of a situation, resources, risks and events is fundamental to interoperability. Local modifications of the core symbol set should take care not to compromise that vital objective.

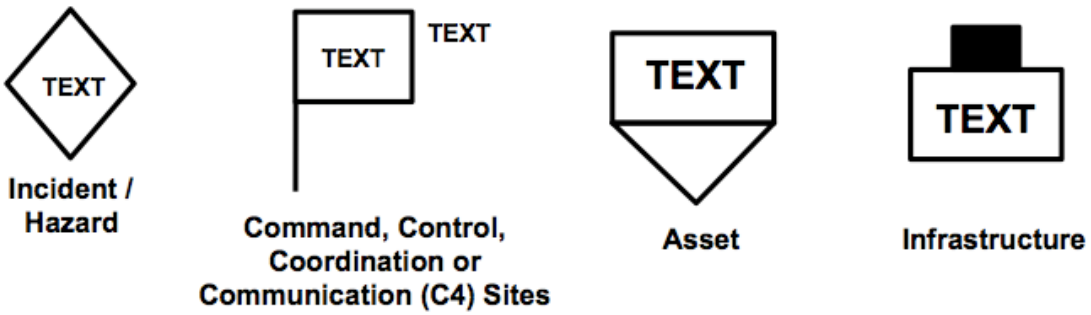
2. OVERVIEW OF THE MAP SYMBOLS

Building blocks

2.1 The core symbol set is founded on a small number of **basic building blocks** which represent:

- Incidents and hazards;
- Command, Control, Coordination or Communication (C4)[2] sites;
- Assets;
- Infrastructure;
- Cordons, zones and areas.

2.2 The first four of these are illustrated below, and all are presented and elaborated in the following sections.



[2] there are variants of this terminology, including C2 (Command and Control) and C3 (Command, Control and Communication or Command, Control and Co-ordination or Command, Coordination and Communications) and C4 is used here as an overarching abbreviation for sites conducting some or all of these activities.

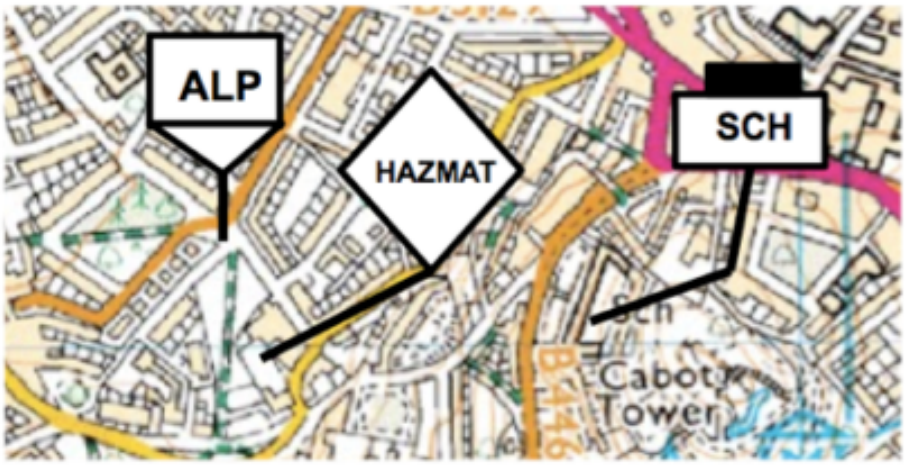
2.3 These basic building blocks are modified as follows:

- The use of **leader lines** to 'anchor' symbols to specific locations on the map;
- Annotation with **acronyms or abbreviations**, as defined in the lexicon of civil protection terminology;
- The optional use of **colour**, which is left to individual users' discretion and the availability of suitable display or map reproduction facilities;
- The inclusion of a **RAG status** to indicate risk or readiness in relation to assets and infrastructure elements.

2.4 Simplicity and flexibility were core design considerations, and this means that the map symbols can be made to fit local requirements. The only caveat is that maps should always be associated with a legend which explains what individual symbols stand for, and organisations should consider creating, for operations or control rooms, a reference poster of the symbol set.

Locating point symbols on a map

2.5 Due to their shape the base of the generic symbols for Incidents, C4 sites and Assets effectively 'point' to a specific location on the map. Where this is not the case (e.g. for infrastructure sites, and where scale or clutter requires that the symbols are offset) **leader lines** to indicate the precise location can be added, as illustrated below to identify the precise location on a map of the relevant feature.



2.6 Leader lines should be used to offset symbols where:

i) The map symbol may occlude relevant features on the map itself;

ii) Where multiple features are located at the same point or close nearby;

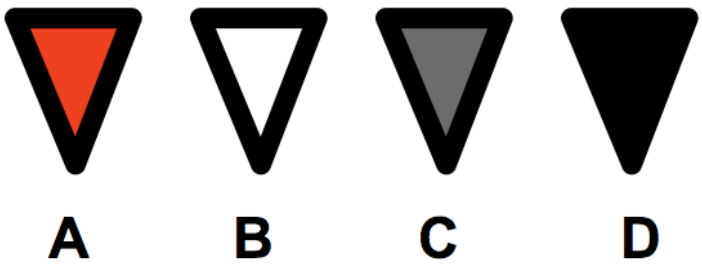
iii) There is otherwise a likelihood of clutter or mess that may detract from the usefulness or impact of the map.

2.7 This is an issue that needs judgment, and users should take care not to try and pack too much into a small space where the whole point of the map is to enable ease of communication.

The use of colour

2.8 As indicated above the use of colour has been kept to a minimum in this symbol set. Where colour is used it is intended to *aid* discrimination between features, rather than being the only characteristic that distinguishes between symbols that would otherwise be the same. All the symbols presented here can be used in black and white as well as colour, and where colour symbols are given black and white versions are presented alongside.

2.9 For example, in the figure below the symbols represent access and egress points into and out of a cordoned area. **A** is the colour option for an access point into a cordoned area, **B** is the black and white version of the access point symbol and **C** is what a black and white photocopy of a colour print of **A** would look like. **D** is the only symbol for a point of egress out of a cordoned area, and all are readily distinguishable.

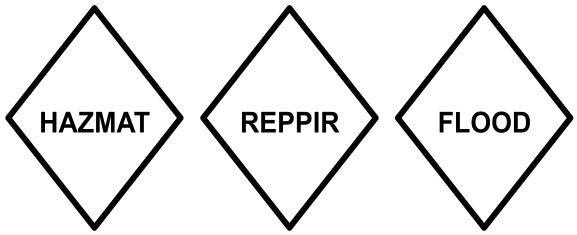


2.10 As with all aspects of the symbol set, users should exercise judgment in their use of colour to ensure that foreseeable circumstances (e.g. the absence of colour display or printing facilities) are considered in determining which option to use.

3. INCIDENTS AND HAZARDS

3.1 The generic symbol for an incident and a hazard is the diamond, illustrated right, which is then rendered specific with the use of text.

3.2 The figure below illustrates the way in which the generic symbol can be modified through the use of annotation and the optional use of colour. There has been no attempt to capture the full range of potential hazards or incidents, but the examples given illustrate the principle, showing the optional use of colour.



Hazard / incident Site(s)

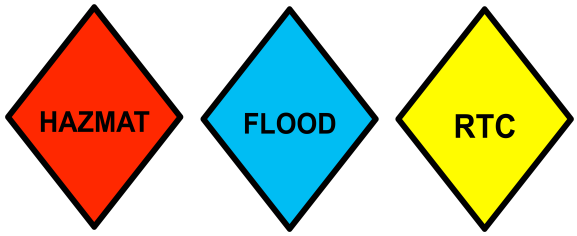
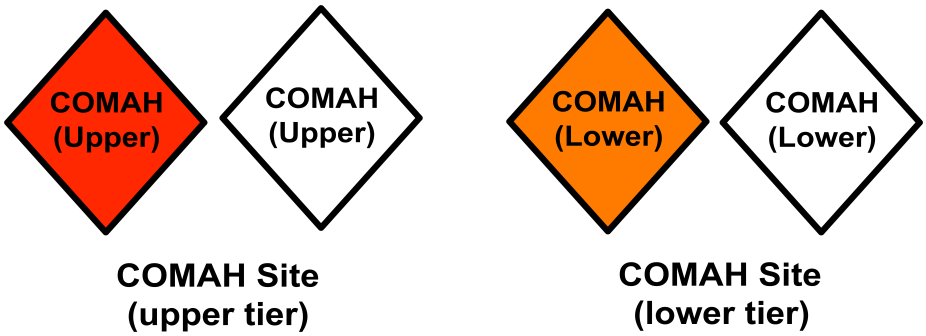


Illustration of colour option, with selection of appropriate colour to be locally determined

3.3 The line feature for a **Major Accident Hazard Pipeline** (MAHP) is:

Major Accident Hazard Pipeline

3.4 Colour and black and white symbols for **Upper and Lower Tier COMAH sites** are:



COMAH Site (upper tier) **COMAH Site (lower tier)**

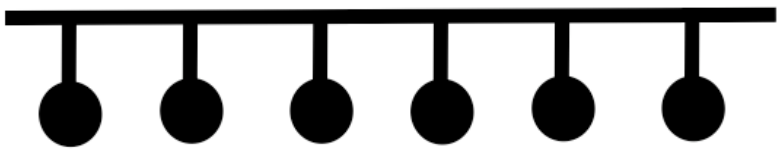
4. CORDONS AND BOUNDARIES

Generic Cordons

4.1 A number of different types of cordons exist and each is symbolised differently. All cordon symbols are comprised of a line or lines, which may be solid or dashed, and castellation[3]. Users should note that the direction of the castellation (i.e. whether it is on the inside or the outside of the cordon) is important in distinguishing between the different types. It is however intuitive in that the castellation on inner cordons denotes the *inside* of the cordon, while the castellation should be on the *outside* of an outer zone boundary.

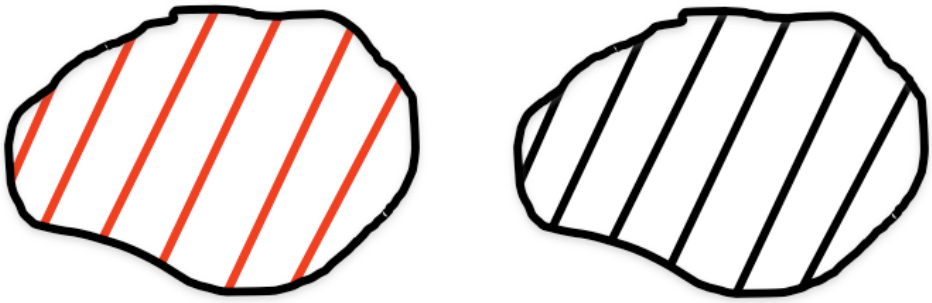
4.2 Generic **inner cordon** (with castellation on the inside):

4.3 Generic **outer cordon** (with castellation on the outside):



[3] The exception to this is the symbol for an exclusion zone which uses cross-hatching rather than castellation.

4.4 An **exclusion zone** is symbolised as shown below, in both colour and black and white. There is no castellation used for an exclusion zone, as the cross-hatching indicates the interior of the zone.



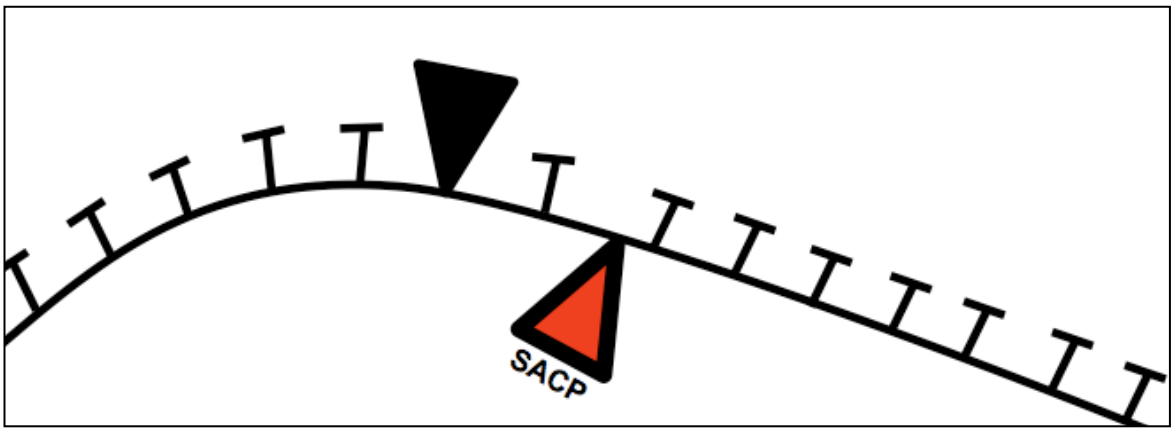
4.5 Generic **access and egress points** and **Scene Access Control Point** symbols:

Point of access into a cordoned area (colour and black and white options)

Point of egress out of a cordoned area

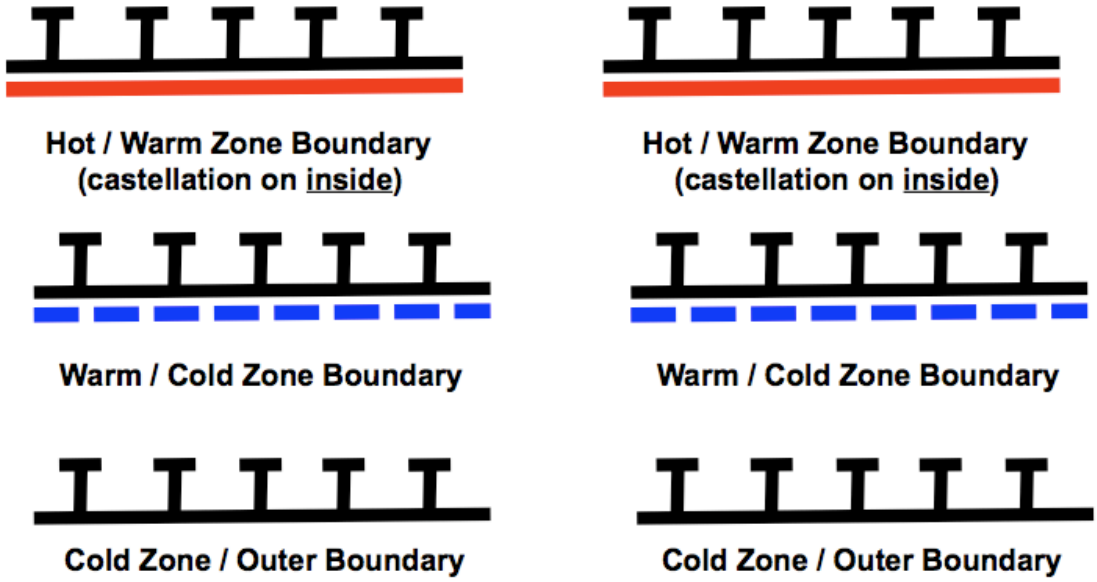
Scene Access Control Point (colour and black and white options)

4.6 The figure below shows SACP and access points on an inner cordon, illustrating the way in which castellation indicates the interior of the cordoned area even when only a segment of the cordon boundary is visible.



CBRN and Threat Response Boundaries

4.7 The figure below illustrates the symbols, in both colour and black and white, for cordons between **Hot / Warm, Warm / Cold and Cold / Outer Zones**. These named zones are identified in the guidance for responding to Chemical, Biological, Radiological or Nuclear (CBRN) incidents as well as the guidance relating to a specific threat scenario[4]. As with the generic cordons castellation is on the inside (they are all in effect inner cordons) and access and egress and SACP points can be symbolised as shown in paragraph 4.5.

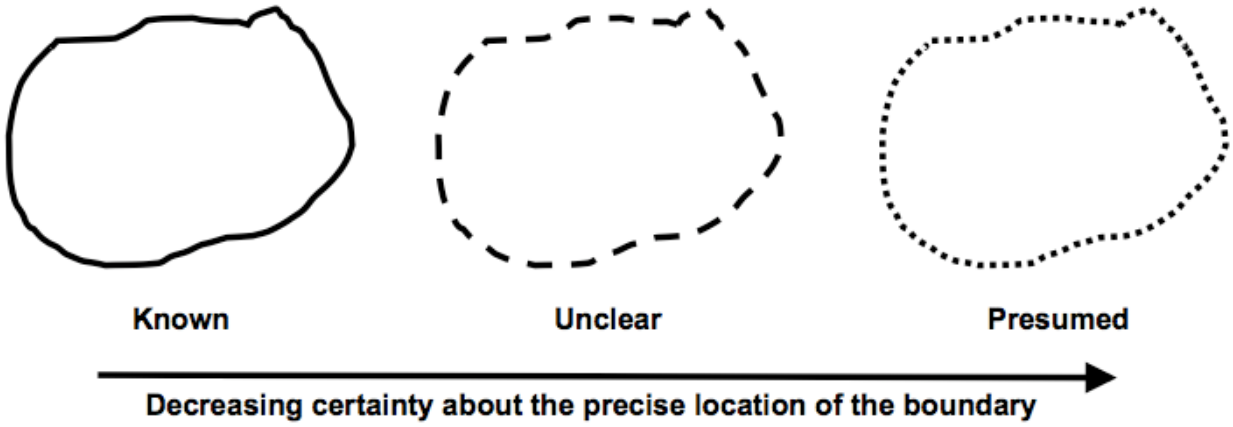


Generic symbols for areas, indicating uncertainty

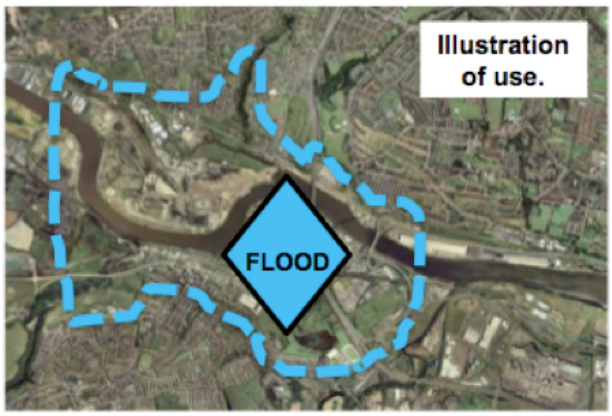
4.8 Under the circumstances of an emergency precise boundaries are often not known. The use of solid, dashed and dotted boundaries provides a simple way to differentiate between **known, unclear and presumed boundaries** respectively[5]. These terms (i.e. known, unclear and presumed) are not defined here, leaving it to local users to agree what distinguishes between what are points on a spectrum of uncertainty.

[4] The guidance relating to the response to threats that utilises Hot, Warm and Cold Zones is RESTRICTED.

[5] A widely used framework for differentiating between degrees of certainty, originally in Neustadt and May (1986) *Thinking in Time: The Uses of History for Decision Makers,* Macmillan Free Press, New York.

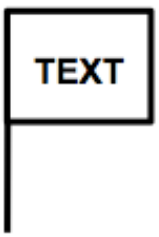


4.9 The use of solid, dashed and dotted boundaries is set out in the figure above and illustrated for the case of flooding below.



5. COMMAND, CONTROL, CO-ORDINATION OR COMMUNICATION (C4) SITES

5.1 The **generic symbol for a C4 site** is a flag, illustrated right. This is then rendered specific with the use of text, both within the flag and surrounding it.



5.2 These C4 sites are classified as follows:

a. Multi-agency co-ordination sites;

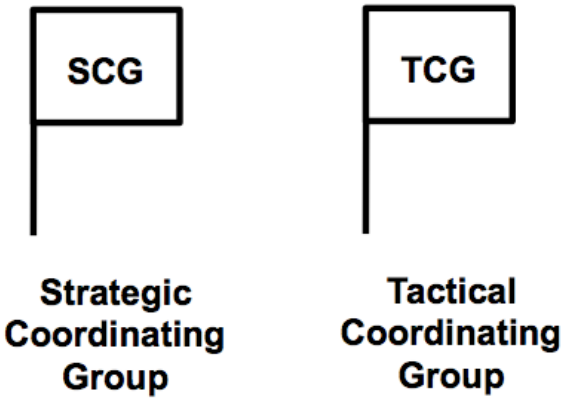
b. Single agency command and control (C2) sites;

c. Co-located command and control sites (i.e. two or more agencies occupying the same location for their independently run C2 sites).

5.3 The building blocks and specific instances of these appear below, but all can be modified as required to suit local requirements and circumstances. For acronyms, abbreviations and definitions see www.cabinetoffice.gov.uk/cplexicon

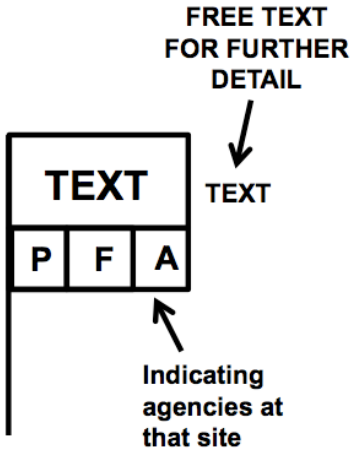
Multi-Agency Co-ordination Sites

5.4 The symbol for multi-agency **Strategic (SCG) and Tactical (TCG) Co-ordination Groups** appears below.



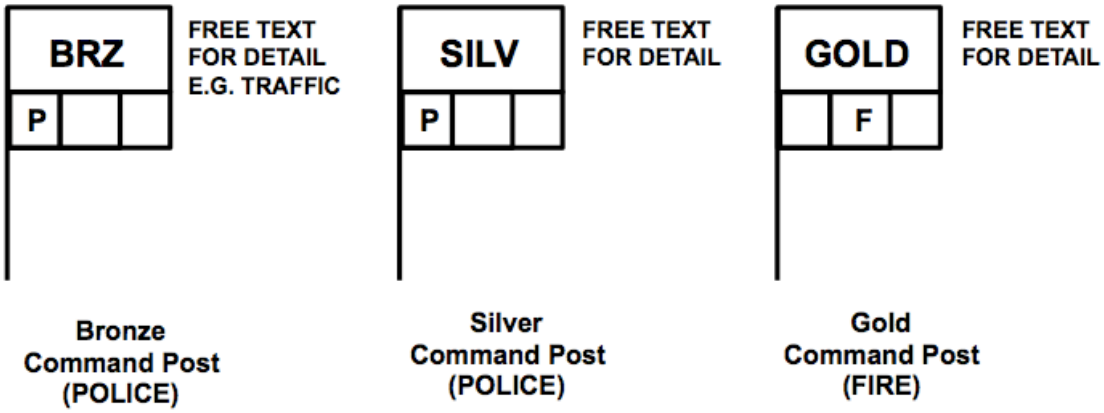
Generic Symbol for Single Service Command and Control (C2) and Co-located C2 Sites

5.5 The symbols for single-service command and control (C2) and co-located C2 sites require further detail. The generic building block for both single service C2 sites and co-located C2 sites is shown right. The text inside the main flag indicates the level or type of C2 site, the banner beneath the flag is used to indicate whether it relates to any or all of Police (P), Fire and Rescue (F) and Ambulance (A) services, and the free text to the right of the flag can record further attributes such as acronyms or abbreviations of additional agencies (e.g. LA for local authority) at that site or the specific responsibility held at that C2 site (e.g. Police – Traffic).



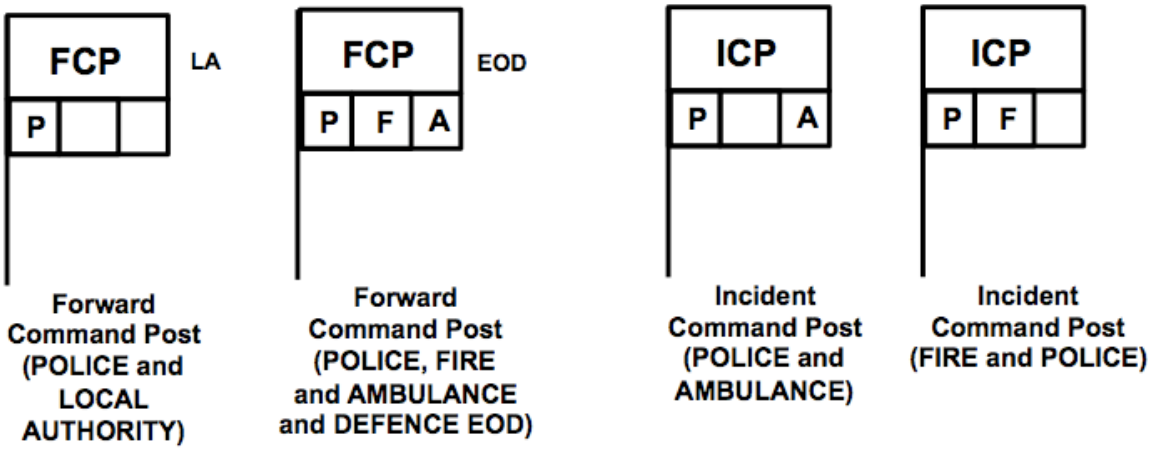
Single Service Command and Control (C2) Sites

5.6 The examples below illustrate, for Bronze (BRZ), Silver (SILV) and GOLD levels how **single-service C2 sites** are developed from the building block described above.



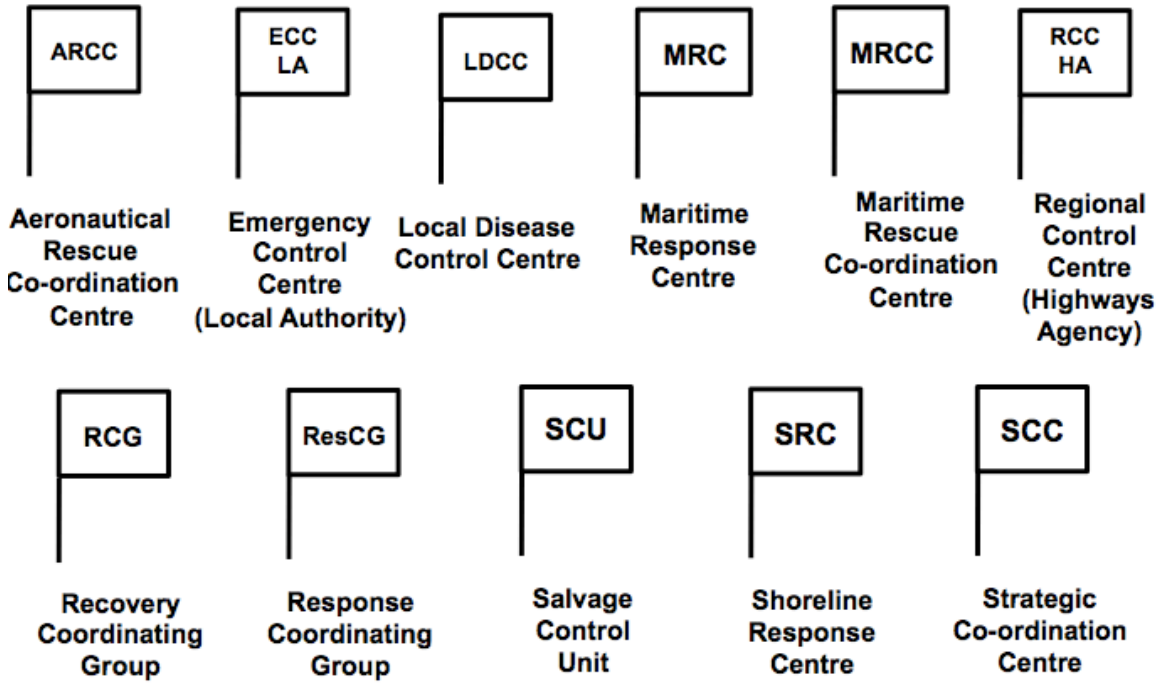
Co-located Command and Control (C2) Sites

5.7 The examples below illustrate, for **Forward Command Posts** (FCP) and **Incident Command Posts** (ICP), how co-located C2 sites are developed from the building block described above.



Additional Command, Control, Co-ordination & Communication Sites

Multi-agency guidance and the lexicon of civil protection terminology[6] describes a series of additional, specific C4 sites. These are simple variants of the basic flag symbol and they are illustrated below.



6. ASSETS

6.1 The generic symbol for an **asset site** is illustrated right and rendered specific with the use of text. Assets are broadly defined for the purposes of the symbol set to include resources relevant to an emergency response.

6.2 Assets are likely to be either:

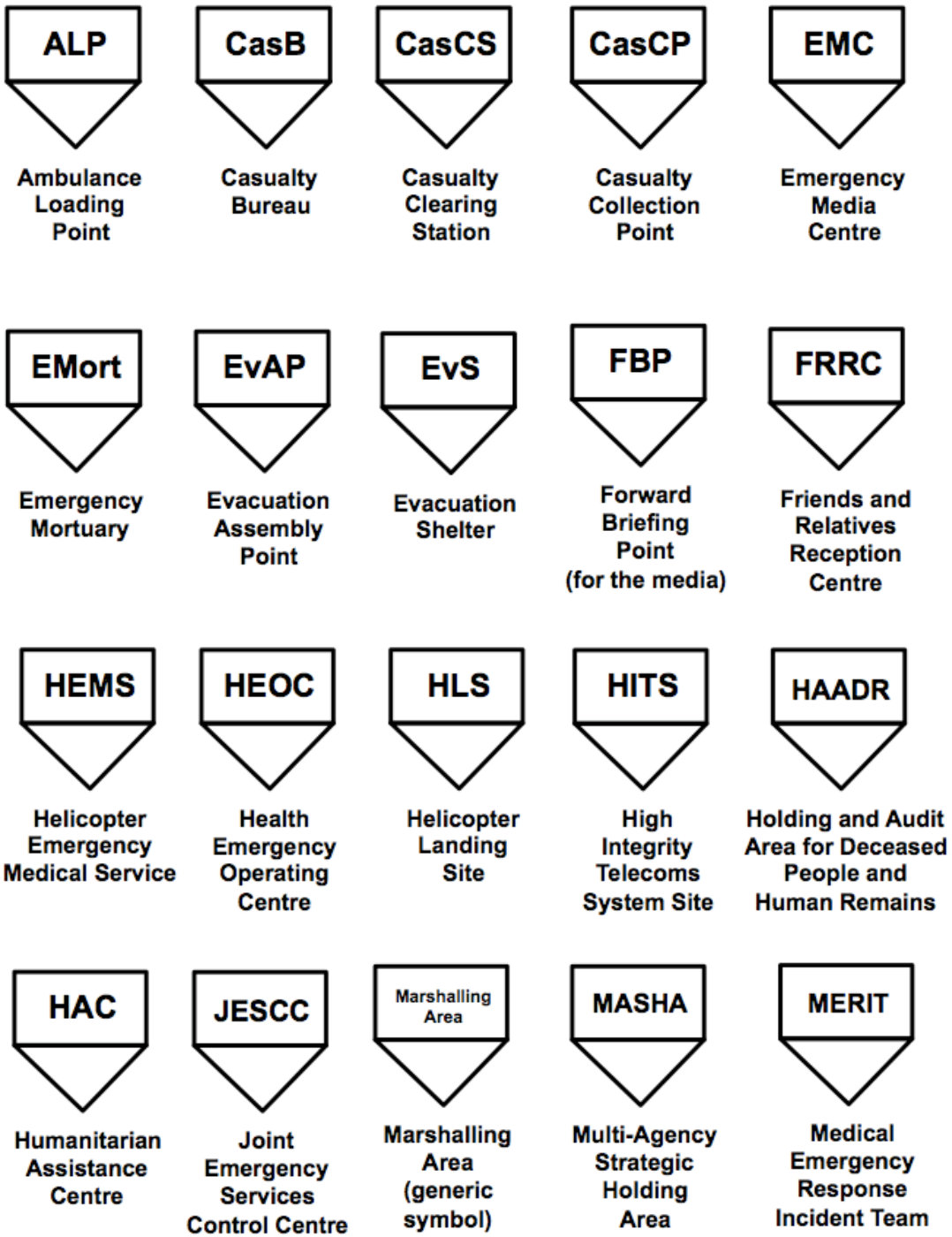
i) a **deployable asset** such as High Volume Pumping (HVP) equipment; or

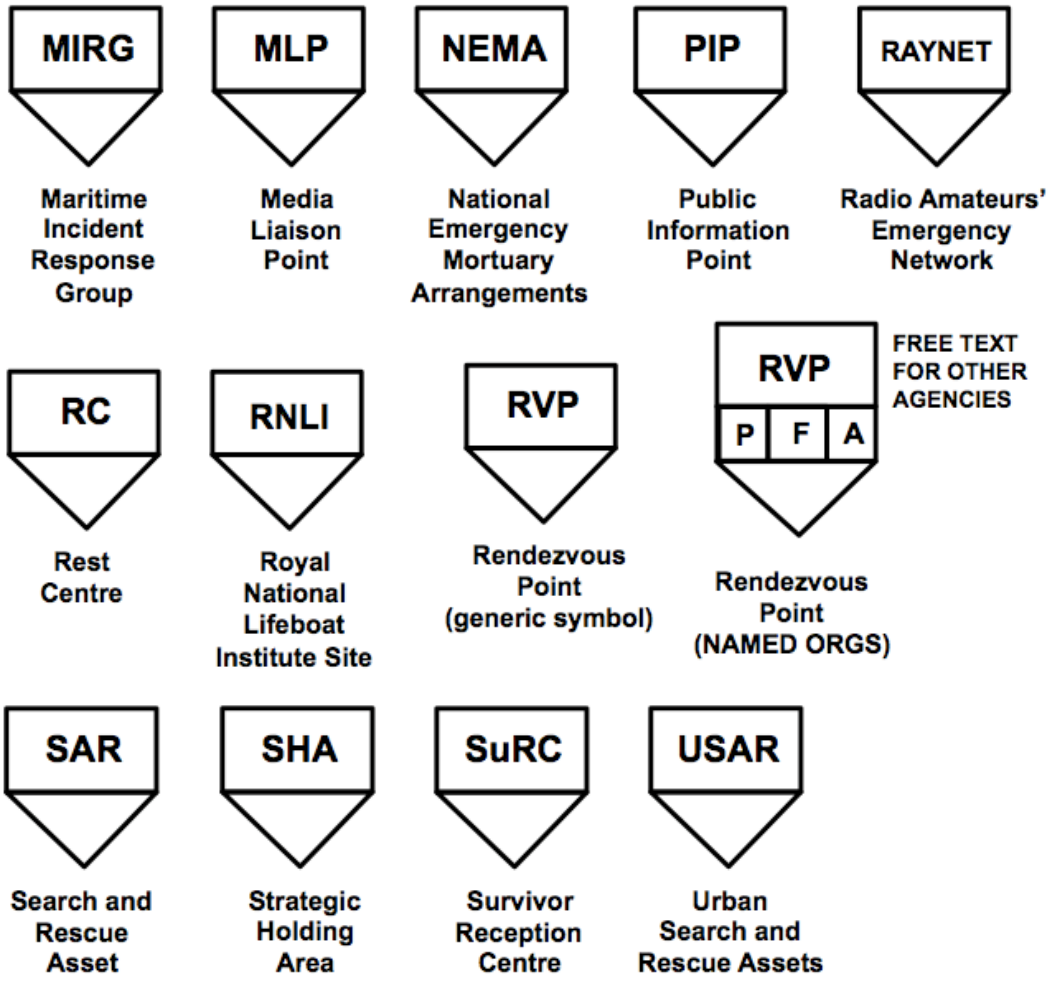
ii) a **location that has been designated with a specific role** such as a Rendezvous point (RVP) or a Helicopter Landing Site (HLS).

[6] www.cabinetoffice.gov.uk/cplexicon

6.3 No specific symbols are proposed here for highly mobile assets such as individual personnel, vehicles, boats or aircraft. This is being taken forward with the emergency services and will be issued for consultation separately.

6.4 Symbols for assets appear below. Additions to these are welcomed and contact details for submissions can be found at www.cabinetoffice.gov.uk/cpsymbology





7. INFRASTRUCTURE

7.1 The generic symbol for an infrastructure site is illustrated right and rendered specific with the use of text.

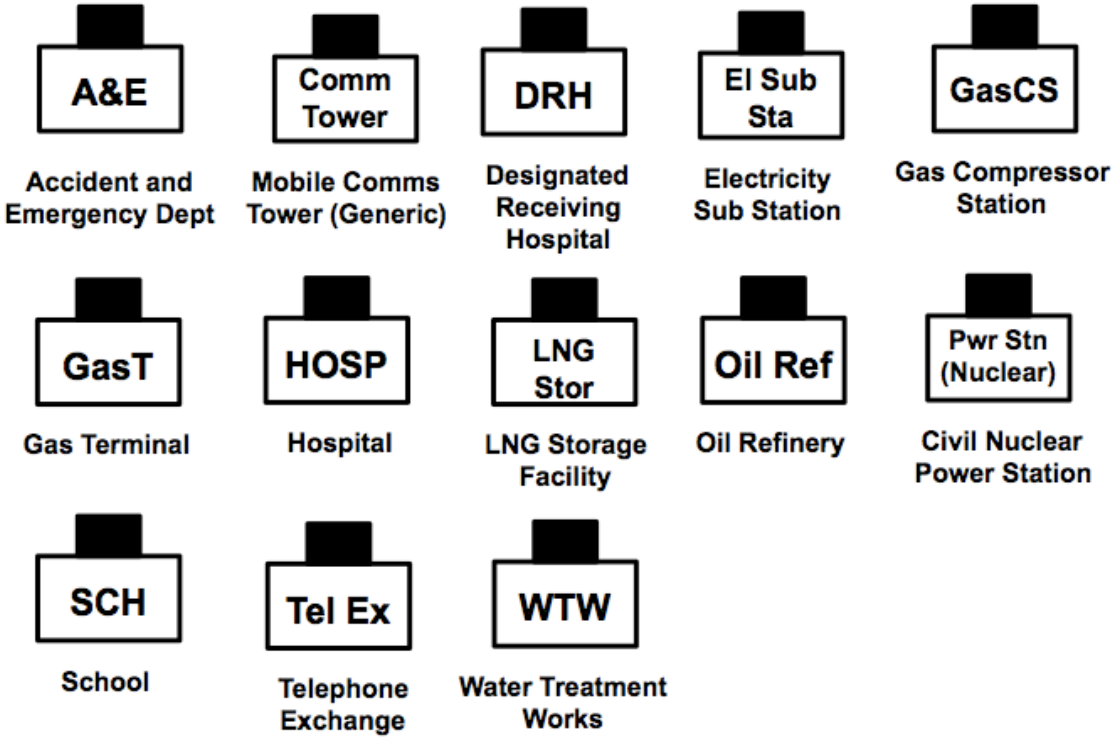
7.2 Infrastructure is broadly defined for the purposes of the symbol set to include buildings, points and elements of networks that:

i) have a primary use that is relevant to the emergency; and

ii) are geographically fixed (i.e. they do not include highly mobile or deployable units such as vehicles, boats and aircraft).

7.3 The category includes both features that will be *impacted* by an emergency (e.g. schools and critical infrastructure that supports essential services) and features that will *provide resources* to emergency responders, such as hospitals.

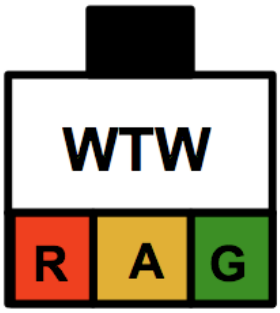
7.4 There has been no attempt to capture the full range of potential infrastructure elements, but the examples given below illustrate the principle.



7.5 Please note that these are examples only and the basic symbol can be adapted for local use. A full set of abbreviations and acronyms for specific symbols will be developed in consultation with sectors and end-users.

8. ATTRIBUTING RISK OR READINESS STATUS

8.1 A Red – Amber – Green (RAG) status can be used to indicate the degree to which a feature is functionally operational. This can be applied to either assets or infrastructure, as illustrated for a Water Treatment Works (WTW) right. The use of colour is optional but it is important to keep the order, from left to right, as **R**ed – **A**mber – **G**reen to avoid confusion.

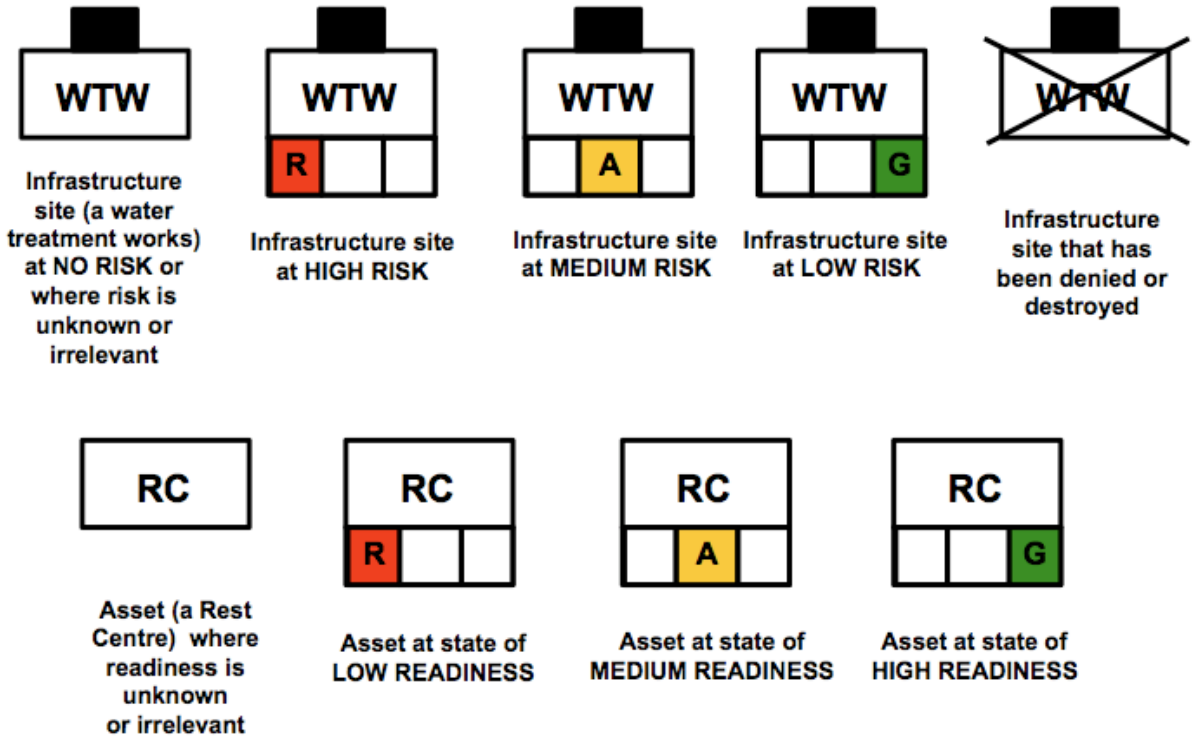


8.2 Two broad scenarios for the use of RAG annotation are envisaged:

i) Where assets or infrastructure are at risk. For example a water treatment works that is at imminent risk from rising flood waters would be **R**ED. Additionally this approach allows for infrastructure or assets that have been denied or destroyed to be illustrated.

ii) Where an asset is being prepared for use. For example a Rest Centre that is being prepared for use might be **A**MBER.

8.3 Illustrative examples of RAG-annotated infrastructure and asset site symbols are given below.



8.4 Note that as with all aspects of map symbology achieving a common understanding amongst all those involved of what individual symbols mean in a specific context is critical, and this *must* be reflected in map legends and any associated documentation.

9. PRACTICAL CONSIDERATIONS IN USING THE SYMBOLS

9.1 Now that the symbols are published, work will commence to embed them into GIS and mapping software, and progress updates will be posted to www.cabinetoffice.gov.uk/cpsymbology . This should not however stop users from implementing them at an early opportunity, for example by drawing them:

- directly onto maps with a marker pen;
- onto acetate overlay sheets;
- onto transparent sticky notes and then applying them to maps.

9.2 Whichever option is chosen in the short term, symbols can potentially become 'lost' against backdrop mapping. Three options to deal with this are illustrated below, each of which may be more or less appropriate depending on context. For many applications the hollow symbol will be insufficiently distinct against anything other than a plain, light background, and for this reason the solid symbol may be preferable. However there may be circumstances where greater emphasis is required and occlusion of the backdrop map is not an issue – under these conditions the symbol on backdrop may be most appropriate. These are illustrated below.

Hollow symbol | Solid symbol | Symbol on backdrop

10. NEXT STEPS

10.1 This first version of the core symbol set has now been published and four further stages in its development and promulgation are intended:

i) In the short term work will be undertaken to translate the graphic elements into Scalable Vector Graphics (SVG format) so that the symbols can be deployed in desktop GIS;

ii) In the medium term it is intended that the symbols will be put forward to NATO as a UK annex to the APP-6 map marking standard, thereby opening the door for them to be incorporated into commercial GIS software in use by UK practitioners;

iii) No specific symbols are proposed here for mobile units such as personnel, vehicles, boats or aircraft. This is currently being taken forward with the emergency services and will be issued for consultation separately;

iv) As further symbols are required they will be incorporated, including relevant symbol sets developed by competent authorities for which a formal association will be sought.

10.2 None of this means however that users cannot pick up a marker pen and start using the symbols, print them onto stickers or affix them to magnets.

10.3 Feedback will be very welcome, and contact details can be found at www.cabinetoffice.gov.uk/cpsymbology

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