MARAUDING TERRORIST ATTACKS

Supplementary Guidance:
Active Delay Systems

CPNI
Centre for the Protection
of National Infrastructure

COUNTER TERRORISM POLICING

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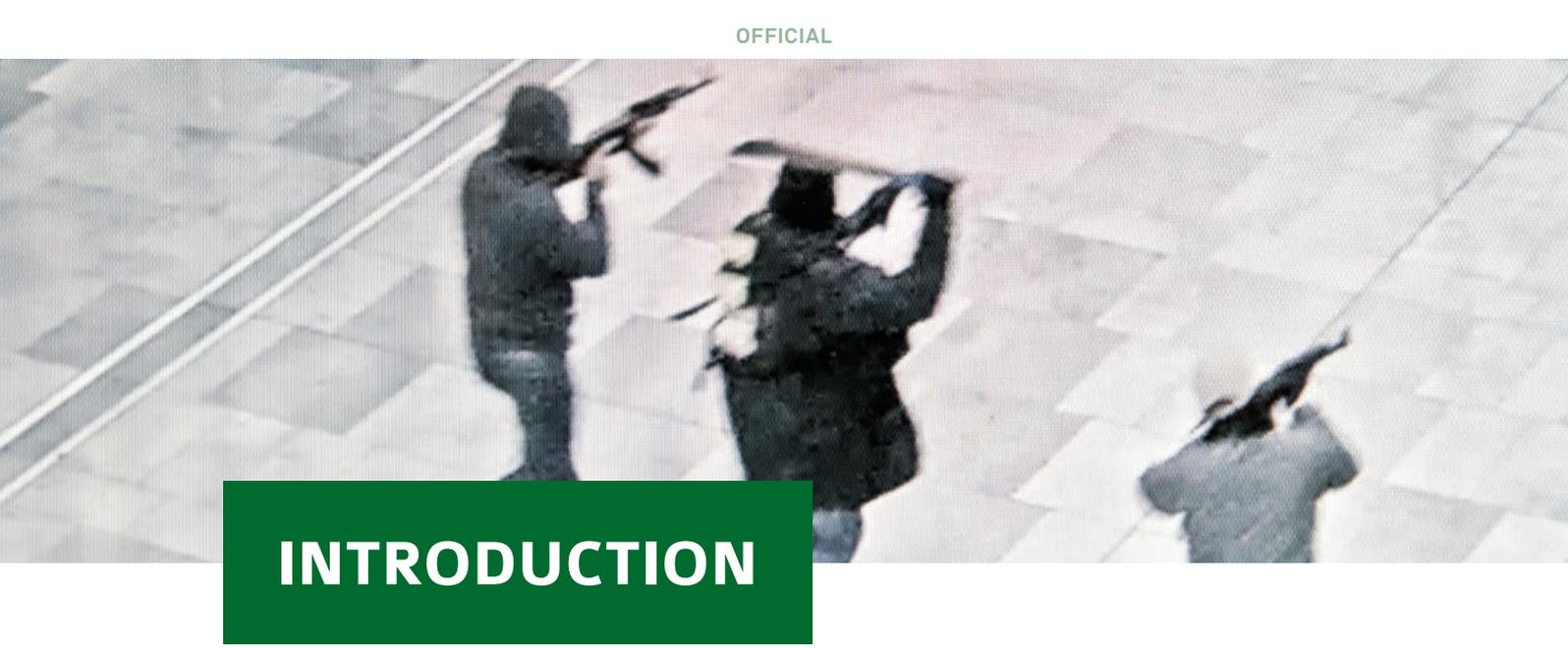
INTRODUCTION

Intended audience

This document is most useful for:

- Physical Security Managers

- Security Control Room Managers

- Security Control Room Supervisors

- Business Continuity Managers.

Scope

Marauding Terrorist Attacks (MTAs) are fast-moving, violent attacks where assailants move through a location aiming to find and kill as many people as possible. Most deaths occur within the first few minutes, before police are able to respond.

This document is supplementary to *CPNI's Marauding Terrorist Attacks: Making your organisation ready*. It builds on the information provided in that document and the supplements titled:

Supplementary guidance: Lockdown

Supplementary guidance: Physical Barriers To Delay and Discourage Attackers

It introduces Active Delay Systems (ADS), which are prepositioned reactive systems designed or adapted to slow adversaries. It explains the different types that are available and provides advice on their use.

This guidance document discusses how your site can install and deploy ADS. It is most relevant to office buildings, including multiple tenancy buildings. The principles of the advice may also be usefully applied to other CNI sites, crowded places and major events; however, there will be some differences which must be carefully considered.

This document discusses:

- What ADS are.

- The different types of ADS.

- How ADS can be used in response to an attack.

- The importance of preparing personnel.

This document does not discuss:

- Technical detail in relation to each ADS measure.

ACTIVE DELAY SYSTEMS (ADS)

The main guidance document, *Marauding Terrorist Attacks: Making your organisation ready*, describes the typical characteristics of an MTA. It highlights that most deaths occur within the first few minutes of an attack. Analysis of previous attacks and CPNI's research have shown that initiating "lockdown" and deploying ADS can be a highly effective way of reducing casualties.

ADS deployed in response to an attack are intended to save lives by:

- Preventing or delaying attackers' progress in finding and killing victims.

- Disrupting attackers by causing confusion, creating uncertainty and discomfort, and reducing confidence.

- Preventing building occupants inadvertently entering the attack zone.

ADS are installed in a passive mode that goes unseen by most building occupants. They are only activated when an attack is identified.

The activation may be either as a result of:

- A person verifying the need to deploy or

- An automatic **trigger from a detection system**, such as a Gunshot Detection System (GDS).

Some ADS can be additional and cost-effective enhancements to the overall site security plan.

When introducing ADS, careful consideration needs to be given as to how they integrate with other safety and security systems and processes.

Types of Active Delay System

Table 1 – Summary of Types of Active Delay System

TYPES	DESCRIPTION	INTENT
Conventional Barriers	Manual or automatic activation of a physical barrier. Examples include automatically closing a door or locking down access control systems.	Prevent or delay access
Vertical Transport Systems – (VTS)	A change to the state of lifts and escalators within a building. Examples include preventing lifts going to the ground floor and stopping escalators.	Delay access
Sensory	A rapid deployment of one or more sensory effectors that inhibits the senses, coordination, concentration or, communication. Examples include security fog, noise, flashing lights.	Delay caused by creating confusion, uncertainty or discomfort and so disrupting the actions of the attacker

Why use ADS during a Marauding Terrorist Attack?

CPNI's research has shown that activating ADS in the event of an MTA can be a highly effective way of reducing casualties.

They are most useful when an attack is identified at an early stage, outside or in the reception area(s) of a building, where a timely activation of ADS can delay attackers from entering an area or deter them altogether. If the attack is identified beyond these areas and further into a building, ADS deployment **in entrance areas** will be less effective. **Planning for early detection and activation is advisable.**

Consideration should also be given as to how the use of ADS could vary, depending on the location of the attackers. For example, it will be easier to correctly implement lockdown of an Automatic Access Control Systems (AACS) if attackers are outside the building, rather than introduce some form of zoned lockdown once attackers are inside the building.

Similarly, time also plays a crucial role; if the attackers are already inside the building and the attack is underway, it will be extremely challenging to rapidly deploy measures.

The use of ADS may not always be appropriate or practical. If implemented in the wrong circumstance, ADS can increase the risk to personnel and members of the public. ADS may not be suitable in some situations, including:

- Sites where access is generally not restricted and there are no barriers to lock.

- Sites with limited escape routes where the risk of over-crowding may be too high, if people's exit were slowed or stopped and so compromise an evacuation.

- Buildings with many doors that are locked and unlocked manually, where the speed of instigating or cancelling lockdown would be too slow.

- Attacks beginning within a building where locking doors would impede people's escape.

- Where there are insufficient security personnel to monitor and maintain lockdown integrity.

- Where people are not familiar with the environment in which ADS are deployed.

- Where Emergency Services have already arrived on scene as this may hinder their ability to stop the attack or save lives.

PLANNING

The introduction and deployment of ADS involves complex decision making. Detailed planning will be required to adapt existing plans or introduce new measures. CPNI advocates using a risk assessment and following the Operational Requirements (OR) process for determining security requirements. These processes will enable security managers to understand the environment and identify the constraints the security measures need to operate within.

The most important considerations are:

- Identify specific threat scenarios.

- Identify the attack pathways. Consider the attack start and end.

- Identify which type(s) of ADS are most suited to your site.

A checklist of the key planning actions is provided at Annex A.

Table 2 – ADS planning considerations

1. Identification of specific threat scenarios and the methods/tactics likely to be used by adversaries

2. Where is the attack likely to start and how will it develop? Identify potential attack routes and timings. Consider the impact of existing security measures in these areas.

3. Based on the above, which types or combination of ADS are likely to be most suitable?

4. Where could ADS best be deployed? They are most effective at chokepoints and within controlled space.

5. Who will make each of the the key decisions in relation to the six deployment steps (see figure 1)? Will technology and automation assist?

6. How quickly will they be effective? ADS are 'responsive', so may take a short period to be fully operational.

7. Training and briefing requirement for security officers, staff and visitors.

8. Impact on the Emergency Services and other stakeholders. Systems may need to be deactivated or reversed when the police arrive or a full evacuation is required.

9. Impact on normal business operations. Measures should have minimal impact on day to day operations and be difficult to detect in advance.

10. Compatibility with statutory requirements, such as Health & Safety, Building and Fire Regulations etc (see later). Update risk assessments.

11. Impact on evacuation routes. An alternative escape path to the outside may be necessary. Consideration should be made to the circumstance in which the ADS might need to be deactivated to enable people to escape.

12. Impact on those with physical, sensory or mental disabilities. Update your Equality Access Audit.

13. How to use tabletop exercises to validate decisions.

14. Lifecycle maintenance and testing to ensure capability remains effective.

15. Consideration should also be given to the use of an accredited security professional who is either a Registered Security Engineer and Specialist (RSES) or a Chartered Security Professional (CSyP).

Concept of operations

A Concept of Operations (ConOps) should set out how the ADS should be operated. This will ensure that there is a complete understanding of how and in what circumstance it will be operated.

The ConOps will describe the steps involved in each deployment and define who makes decisions at each step. Figure 1 below illustrates the key phases and relationship with other systems and processes

Figure 1 Deployment Cycle

ADS

Steady State	Detect	Assess	Decide
	Ongoing management / assessment / review		
	Deactivate	Deployed	Activate

Announcements	Emergency evacuation	Lockdown	Operational response

DEPENDENCIES
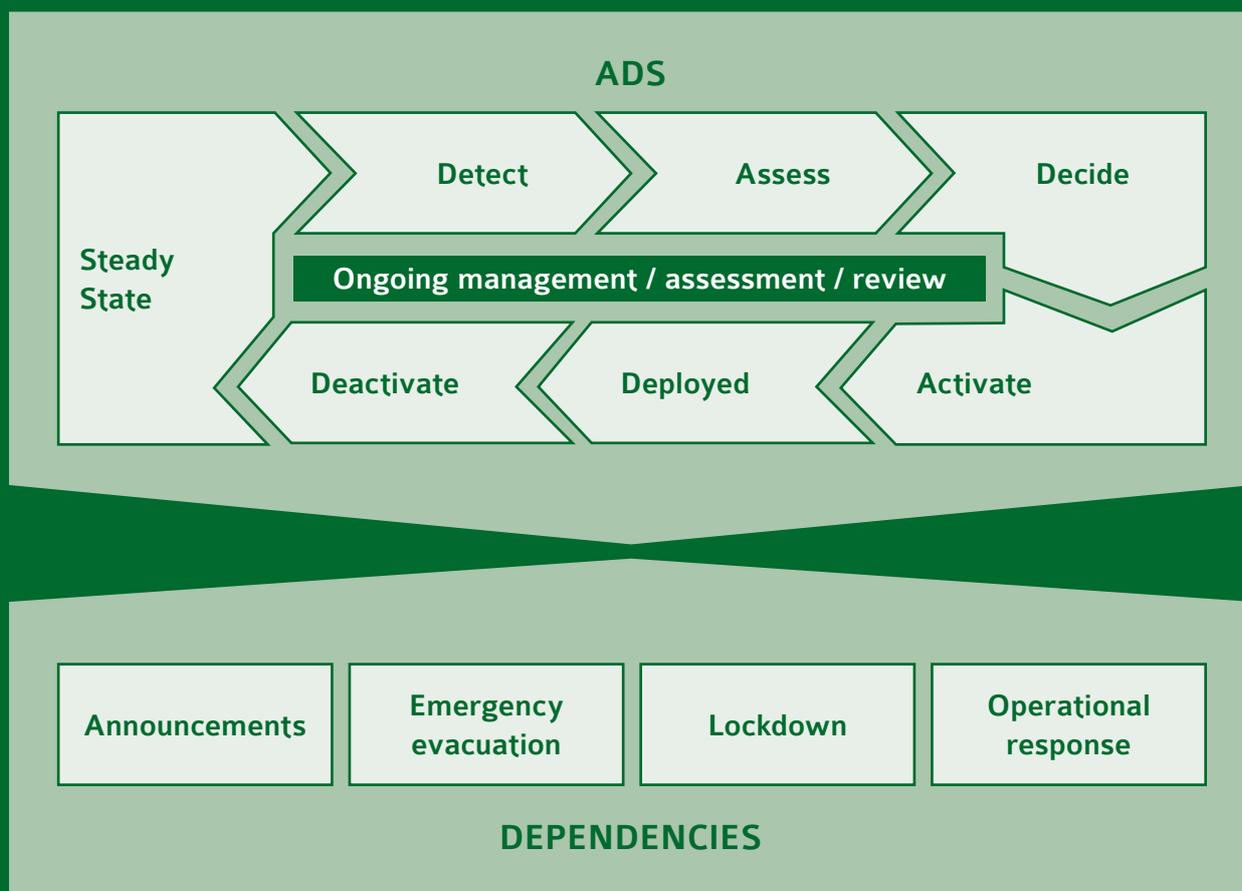
Completion of these tasks will need to be undertaken rapidly and are a critical priority. They will place a considerable additional burden on both Security Control Room (SCR) and operational staff at a time when resources are under extreme pressure.

As soon as ADS are activated, the deployment must be actively monitored until the attack has ended or they are turned off for another reason. Monitoring should make sure that the ADS are working, lockdown remains effective, there is no adverse impact on building occupants and there is no requirement to call a full/partial evacuation. As a lockdown progresses there may be a number of stages which require access control to be opened and closed, this may require a corresponding deactivation and reactivation of the ADS
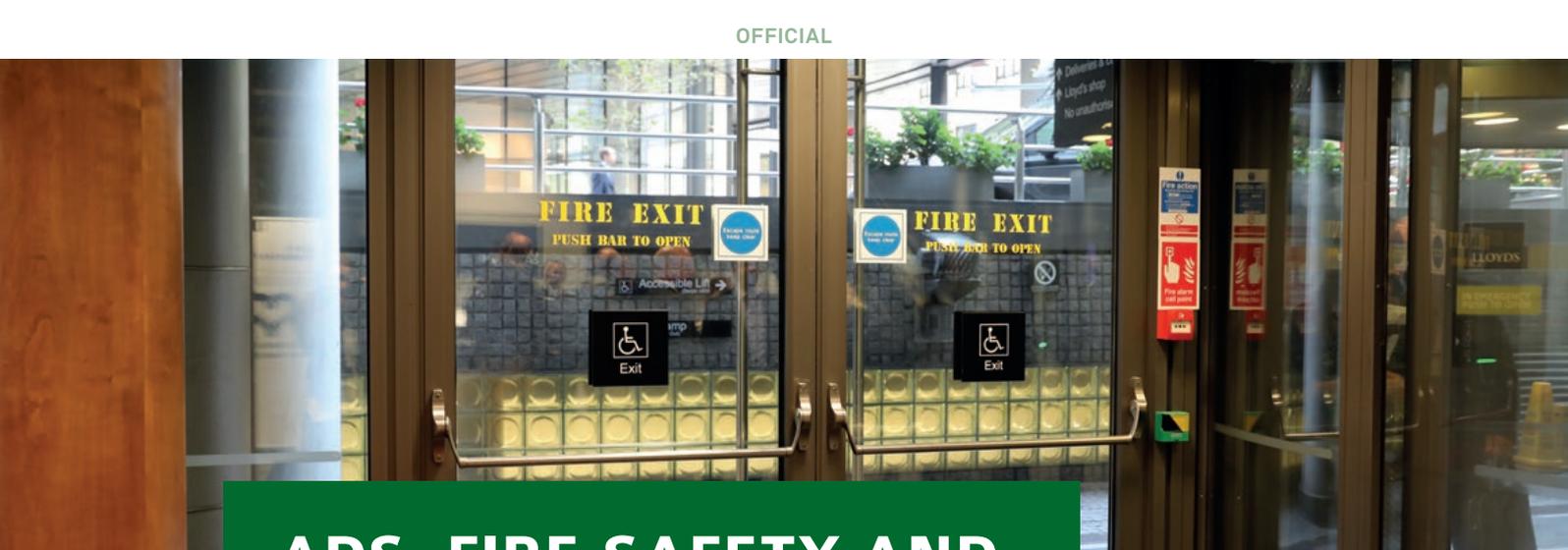
ADS, FIRE SAFETY AND EVACUATION PLANNING

Detailed guidance is provided in relation to the considerations that should be given when deploying Lockdown on pages 14 to 16 of the supplementary guidance: *Marauding Terrorist Attacks: Lockdown*. These same considerations must be made when considering the installation and deployment of ADS. Careful deliberation must be given to make sure any conflicts are addressed and satisfactorily dealt with.

Difficult decisions will need to be made both in relation to the introduction of an ADS system and subsequent activation. A detailed record must be made of the decision making process to decide if an ADS system should be introduced. The record will demonstrate how it will work in parallel to fire safety plans, equipment and evacuation plans. Operational decisions to activate ADS are likely to be fully justifiable if they are supported by carefully considered risk assessments, policies and standard operating procedures that have thought through all the above points.

The decision to introduce ADS into a site and the circumstance in which they should be used will be made at a senior level. However, due to the need for immediate action in an attack situation, the ADS activation decision has to be made by staff in the SCR or at the scene. To be effective, research has shown that staff need to be empowered to activate these systems.

These decisions must be mindful of obligations under:

- Health and Safety at Work Act

- Common law – duty of care

- Building Standards Regulations

- Fire Safety Legislation

- Human Rights Act.

ADS and fire safety

The key points are summarised below:

- The impact of ADS on fire and life safety systems should be recorded in a risk assessment.

- The case for ADS should be discussed with your Fire Safety Officer, the local Building Control department and where appropriate, the Fire Safety Enforcing Authority.

- In practical terms make sure you have considered: -

    - If ADS has been deployed and a fire alarm sounds what action should be taken? **In the event a fire is confirmed, the ADS should be deactivated so as to allow the escape of persons from fire.** Some ADS, such as security fog, may take several minutes to disperse enough for people to traverse.

    - In what other circumstance should ADS be deactivated?

    - What happens if there is a power failure? **Systems will be able to either fail safe or fail secure. Careful consideration is needed to establish the best configuration for your site.**[1] Fail safe is likely to be the default position for fire safety reasons but this may adversely affect the safety of occupants if an attack is underway.

- Security fog can cause an activation of smoke sensors, so it is necessary to consider the impact on fire detection systems. Heat sensors are less affected and may be an alternative option. Expert advice should be sought from a fire safety engineer.

ADS and evacuation planning.

The deployment of ADS along primary access pathways may impact on predetermined escape routes and the Emergency Services plans to access the site. This will be because they either can no longer be used or additional people using other routes may adversely increase the time taken to evacuate a building. Consideration must be given as to how occupants will be evacuated if some escape routes can't be used.

If ADS are deployed consideration will need to be given to either locking a site down and moving the occupants away from the point of danger or evacuating away from the attack location. This may mean people will need to take a course of action that they have not practised, and a route that is not their usual evacuation route. It may be necessary to change this response by telling occupants to avoid specific routes.

One particular challenge is that, through fire evacuations and normal day to day egress of a building, occupants will be in the habit of using particular evacuation routes. This is unhelpful during an attack; instead occupants must be prepared to be flexible in their choice of route and practiced in making decisions based on the information they are provided with. Evacuation drills should be undertaken where building occupants are prevented from using routes where ADS have been deployed. Multiple credible scenarios should be considered, with the routes available to occupants during drills changing depending on the scenario being tested.

1. Additional information is provided on P10 of supplement titled Marauding Terrorist Attacks: Lockdown

ADS and the Emergency Services

When considering which systems to install there should be early engagement with the Emergency Services. If there is a need to activate ADS in response to an incident, the police will need to respond to that incident. The Emergency Services may need to access the building to stop the attack, treat casualties or fight fires, therefore, they should be informed that the ADS have been deployed and how ADS will impact on their access to the site.

Consideration needs to be given as to how the use of ADS need to be managed to assist and not hinder as the Emergency Services arrive. They may need to be deactivated to facilitate access. Advice should be taken on how and when systems should be deactivated, either partly or fully, **and whether the Emergency Services will request reactivation when they are inside the building**. SCR operators need to have a good understanding of the police needs.

These will vary according to the systems used:

• Fogging may need to be cleared rapidly to facilitate a response. Careful consideration should therefore be given as to the number of entry/exit points that fog should be deployed at so that the Emergency Services response is not delayed.

• Doors unlocked in a staged approach to assist entry of responders whilst limiting egress of attackers.

• Consideration should be given as to the use of dark zones during the Emergency Services response, as most responders will have a light source which may have an adverse effect by drawing the attacker's attention directly to either them or building occupants who may have been sheltering in the darkness.

• During a live incident, the SCR should remind the police what lockdown capabilities are available to them, allowing the police to request areas to be opened or closed.

As measures are being introduced, the details of these should be passed to your local Police contact (CTSA, Contingency Planner, Tactical Planner) so the sites Tactical Information Pack (TiP, a Police product) can be updated and early engagement can be made with Emergency Service responders into how the system is used in conjunction with their response.

CONVENTIONAL BARRIERS

Overview

Physical barriers will already be present and play a key role in the site security plan. Detailed guidance as to how they can be used is provided in the document titled *Supplementary guidance: Physical Barriers To Delay and Discourage Attackers*. Consider how existing doors, windows and shutters can be used as part of the ADS. They can be activated either manually or automatically. The better the barrier system, the longer the delay likely to be achieved.

Automatic activation is likely to be more effective as it will be both faster and more likely to remove the need for a person to lock doors that may be close to attack points. This will enable them to move away quicker from the point of immediate danger.

Minor enhancements may be necessary to improve or relocate locking systems to make them easier and safer to lock.

Manual Lockdown

If a manual activation is required, doors might be secured by:

- Operating a nearby control (such as a panic button or the closing mechanism on a roller shutter)

- Using a key or other locking system to engage the mechanism (keys used for manual lockdown must be readily, but securely, available at all times).

It is very difficult to implement lockdown effectively with conventional locks and keys where there are multiple doors. Manual lockdown is typically only practical where barriers may be locked quickly from a safe location. For example, a roller shutter on a shop front should be operable from the rear of the shop rather than at the entrance.

Automatic - Centralised Lockdown and Automatic Access Control System (AACS)

The AACS[2] can be triggered into lock mode by either:

- Centrally located SCR staff or

- An automatically generated alert from another part of the security system. For example, an alert from a GDS could activate door locks.[3]

Managing ADS from a central location ensures that individual doors are locked and unlocked in a coordinated fashion. A centralised location also improves the ability to monitor lockdown status. This understanding of whether areas of the building are open or shut can become complicated in complex sites, particularly for those without a SCR. Having one centralised system that is easy to understand is recommended.

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2. AACS provide detection and audit to limit who can go where. They can be combined with assured physical barriers to provide delay into a secure site or can be used with demarcation barriers i.e. half height gates, to provide only detection.
3. Given the potential disruption caused by false alarms, only CPNI approved detection systems with a low false alarm rate are suitable.

VERTICAL TRANSPORT SYSTEMS (VTS)

Overview

Consideration should be given as to whether they should or should not be used. Can they be used to prevent attackers reaching the occupants or move occupants away from the attack? Can they inadvertently move occupants towards an attack if occupants are unaware of the imminent danger?

VTS are divided into either lifts or escalators. The location of the controls will be key to their use during an attack. Remote control from the SCR or other secure location will be beneficial. If the controls can't be easily accessible, it is unlikely that in the early moments of the attack that the SCR operators or others will have the time to activate the ADS. If controls can be overridden in lifts this will make them more vulnerable to use by attackers.

Detailed planning will have been undertaken to determine how both lifts and escalators are used during a fire evacuation. Similar planning should be undertaken as to how they can be used during an MTA. Plans must not impact adversely on the safe operating of site evacuation plans. It is advisable to develop fire evacuation and MTA evacuation plans in tandem.

People may be reluctant to use lifts in an MTA (or a normal fire scenario). Should the use of lifts be a crucial part of your evacuation planning, this should be supported by training and information provided to building occupants.

Time should be spent considering how they could be used. It will be important that:

- There are easy to understand Standard Operating Procedures (SOPs) that set out the steps the SCR operators and others should take.

- Technical controls are:

    - Easy and safe to access and operate

    - Simple to implement and reverse

- Building occupants know what is happening and receive adequate training. Consideration must be given as to how announcements can be used to inform personnel.[4]

Lifts

The default for many buildings is that most lifts go to ground level and shut down in the event of a fire alarm. If it is suitable to change the use of lifts in the event of an MTA, then consideration should be given to setting lifts so that they are:

- Not available on the ground floor and

- Can't take any passengers to upper floors

If security fog is deployed in or close to a lift lobby it may be moved to adjacent floors through lift shafts as a result of moving a lift car. This may cause a fire alarm to be triggered and consequently for occupants to evacuate into the path of the attack. Automatic fire detection systems may be set to make automated announcements instructing people to evacuate. The content of messages given out should be reviewed and operators ready to override them in an MTA or Fire as a Weapon (FAW) scenario.

4. See Marauding Terrorist Attacks Supplementary Guidance: Announcements

Escalators

Consider:

- Stopping the escalators. The height of the risers on escalators do not make for as easy use as stairs and will contribute to delaying an attacker.

- Reversing the flow so that an escalator flows towards the attacker, not away from them. An escalator moving towards an attacker will increase the time taken for them to traverse it because it will be moving in the wrong direction. Caution must be taken as it could also deliver victims to the attacker, or cause slips/trips/falls in the attack zone. Reversing escalators should be approved by engineering experts, as reversal may damage the system.
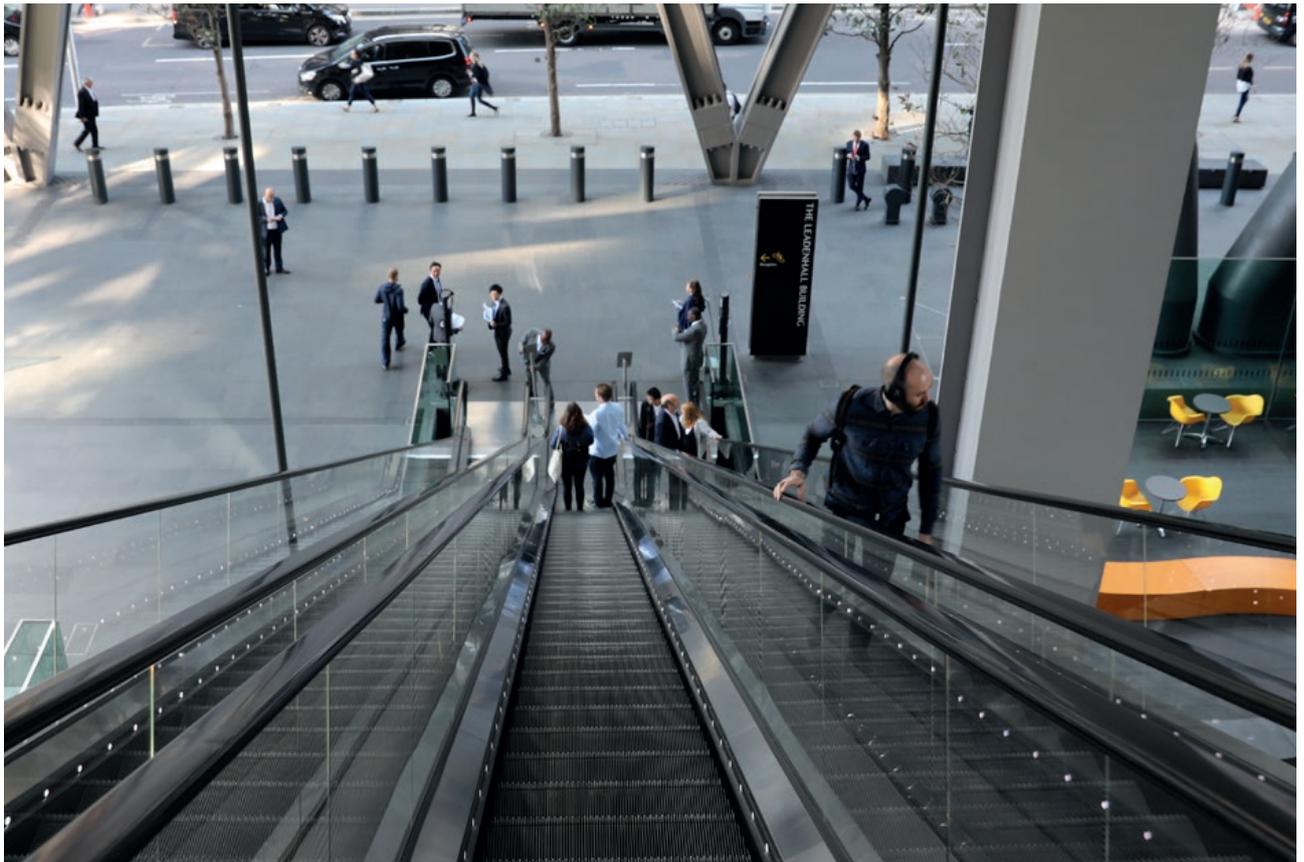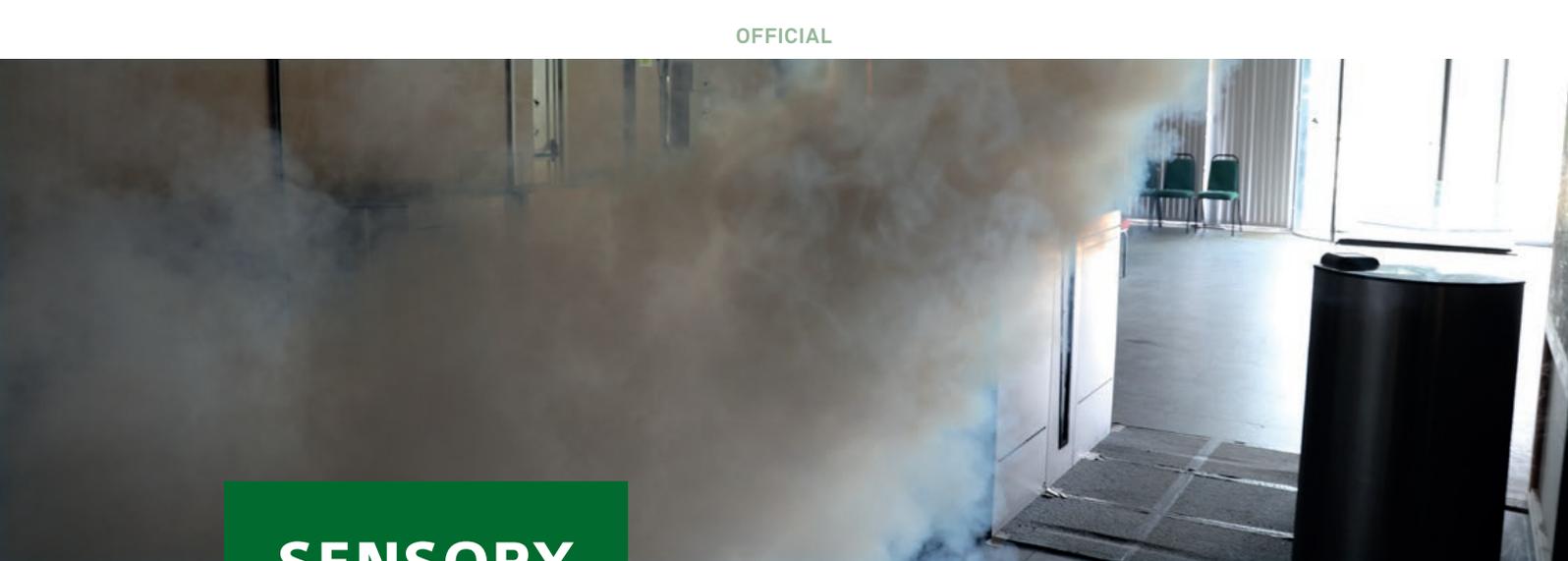
SENSORY

Overview

The aim of sensory effectors is to:

- Increase uncertainty and discomfort of attackers

- Increase opportunity for people to take evasive action and

- Distract attackers

However, the technologies used must remain safe and legal when installed in the workplace.

CPNI has investigated a number of technologies that are legal and do not require any special licences to acquire or use. A brief description is provided in table 3 below.

Table 3 – Sensory ADS

Security fog	A rapidly (but not instantaneously) generated dense blanket of fog (also referred to as 'smoke') that obscures vision and strongly affects mobility and manual dexterity.
Strobe lighting	A high intensity flickering lamp that is highly distracting, causes after-images that affect vision, and can affect balance and coordination. The flicker rate remains effective at frequencies considered generally safe.
Darkness	Very simply, turning off the lights in an enclosed space can be an effective disruptive measure, forcing an attacker to seek alternative light sources and providing distraction until their eyes adjust.
Glare lighting	A bright directional light that is suddenly activated can be highly distracting and produce a veiling effect, obscure a target or cause discomfort and after images.
Noise	Loud noise can disrupt concentration and strongly affects verbal communication between attackers. The levels do not need to be harmful to be effective.

These technologies may be used on their own or in combination. Extensive trials and research have shown that a deployment that combines both security fog and strobe lighting will produce the most effective combination of sensory effectors.

CPNI trials have provided clear and growing evidence that sensory measures may disrupt the actions of an attacker and so delay their progress. They have shown strong disruptive effects on the decision making behaviour of attackers.

What are they intended for?

The location of the deployment, how they are activated and monitored will all be determined by the OR and the detail of how and when they are operated will be set out within the ConOps.

Location

Sensory measures are best deployed:

- In relatively confined spaces. Deployment in large open-plan areas is harder to control and remains under evaluation.

- At choke points. Deployment is recommended at the main entry points because it is likely to affect the early stage of the attack. Some entry/exit points should be left uncovered to provide the police a route in and provide for evacuation (See page 13 for additional information).

- In internal corridors and other confined spaces. Generally, CPNI would not recommend the deployment of fog on stairs.

- In conjunction with a security door or other barriers. For example, fog deployed in conjunction with a low security barrier can dramatically improve the overall delay resistance of the security measure – often doubling (or more) resistance.

Intent

Consider what tasks you intend to inhibit the attacker undertaking, this will help identify the best location. Intentions could be to delay or prevent the attacker:

- Breaching a door

- Locating building occupants in the immediate vicinity

- Locating building occupants in the distance

- Communicating with other attackers

- Being able to move rapidly through a building, for example by causing disorientation.

Activation

Careful consideration must be given as to how they are activated. Is it a manual activation through the SCR or automated? Automation will lead to a faster deployment and take a task away from SCR operators at the busiest time. If automation is used the risk of a false activation must be considered. SCR operators should be empowered to make decisions based on automated alarms but seek to rapidly review the circumstance to confirm the veracity of the alarm.

In extensive CPNI trials GDS have been used as a trigger. The GDS must be deployed in a controlled environment to minimise false activations.

Situational awareness

The SCR must be able to monitor the effectiveness of any activation and respond to changes they identify. Consider how CCTV systems can be augmented to deliver this.

- Darkness may require infra-red (IR) illumination to assist CCTV.

- Fog may require a thermal imaging (TI) camera to work alongside a conventional camera.

- Conventional cameras are needed to:

    - Confirm measures have been activated / extent of deployment

    - Provide images as fog clears

    - Monitor the reaction on attackers and occupants

Consider how the use of noise can effectively be monitored. There may be a physical reaction CCTV will detect.

Impact on attackers and other systems

Not everyone is affected to the same extent by the technologies, particularly those creating effects of a psychological nature. An opportunist or poorly-planned attacker is more likely to be disrupted and deterred by ADS. However, a well-prepared attacker with inside knowledge of a site layout and ADS technologies could readily overcome their effects with countermeasures such as earplugs or a torch.

Controlling the information about their deployment is therefore an essential factor for their success. Information about the use of ADS should not be placed on any open source documents and consideration should be given to the information security risks associated with the development and operation of ADS.

All devices must be compatible with a building's existing security and life safety systems; this particularly applies to those considering security fog.

The technologies must also be carefully managed so as not to provide a hindrance to those attempting to find safety in the event of an attack or to any security response. Staff must be trained in how to act when ADS are deployed, to prepare for both real incidents and accidental activation.

Technical expertise should be sought to make certain no unintentional health and safety risks are created in their deployment.

Sensory effector technologies

There are a number of effector capabilities that are already used across the security industry. These may be used either on their own or in combination with another effector. This section describes how each type can be used and the considerations that should be factored in when deciding which is the most suitable for your site. **However, trials have shown that the most effective deployment will combine the use of security fog with strobe lighting.**

Security fog

Fogging devices are widely installed as security measures against criminal attacks. The principle is simple: to rapidly deploy a bank of fog thick enough to obscure the main assets under attack. Glycol-based liquid blends are rapidly heated to 350-400 °C to produce a vapour which then disperses into a gas.

The most effective deployment for ADS is in a relatively confined space with a fog density of >80 % opacity that despite dispersing, remains above 60 % after five minutes.

Technical and practical considerations:

- Fog is safe to breathe during limited exposure but may irritate those with respiratory conditions. It is important to take advice on the safety of the specific fog being used by the manufacturer.

- It will take a short time for fog to become fully effective, determined by the type used, the number and location of the fog machines and the size of the space to be filled.

- Removal is not instant; it will take time for normal visibility to return. Consideration needs to be given as to how fog will be cleared as this may be required to support a rapid police firearms deployment, an evacuation or return to business as usual in the event of a false alarm.

- Hazards in the vicinity may become obscured causing additional risk to those in the vicinity.

- Security fog can activate smoke sensors, consequently, consider using heat detectors.

- Once deployed, fog will disperse through gaps in doors/windows/HVAC systems. As part of commissioning of the systems, leakage of the fog should be understood – in some cases, it may be necessary to take action to stop or slow intended leakage.
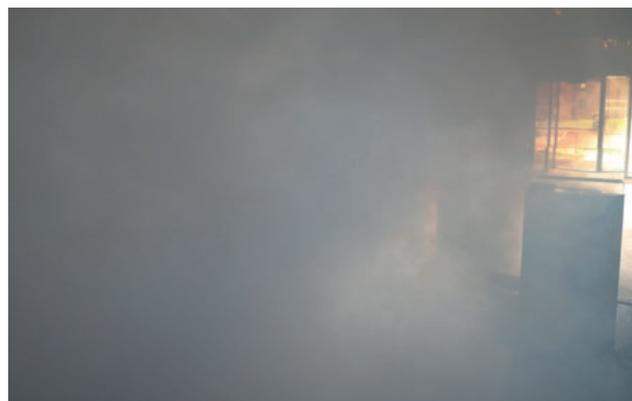
Strobe lighting

Strobe lights are known to cause a variety of distracting and disruptive side effects, ranging from imbalance and nausea, to blink reflex and visual impairment.

Technical and practical considerations:

• The key risk is that the strobe induces headaches or seizures, particularly in those with photo-sensitive epilepsy.

Darkness

The simple act of turning out the lights at the location of the attack could provide a useful reduction in situational awareness to attackers. In response to the darkness, the light from an external source, such as a smartphone screen or torch may illuminate an attack point at close range. However, in a fast moving MTA, an attacker will be working under stress; they may not think to use their phone and even if they do, retrieving it will delay them and operating the device will limit their ability to attack people.

Darkness will help provide some protection for the occupants caught in the immediate vicinity of the attack. Familiarity with the location may enable them to move away from the attacker.

Technical and practical considerations:

• Attention should be paid to existing hazards both within the dark area and in the immediate vicinity.

• Occupants should be warned to cover their mobile phones, and not use them as torches or to make calls as this may make them a target. Receiving calls or notifications may also alert an attacker to a person's location.

• As attackers become accustomed to the dark their eyes will adapt and they may regain some visibility. Light spill from other areas will significantly impact on this ability.
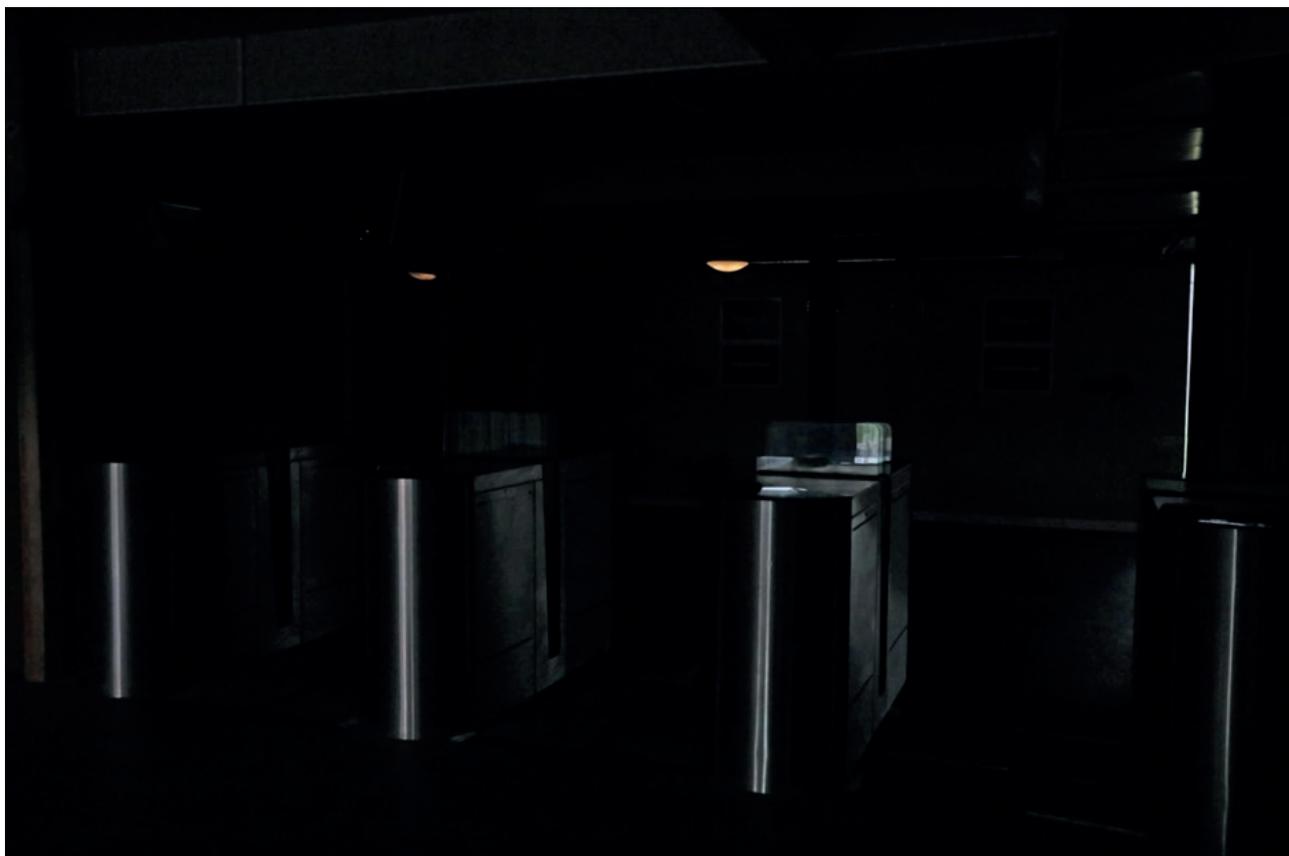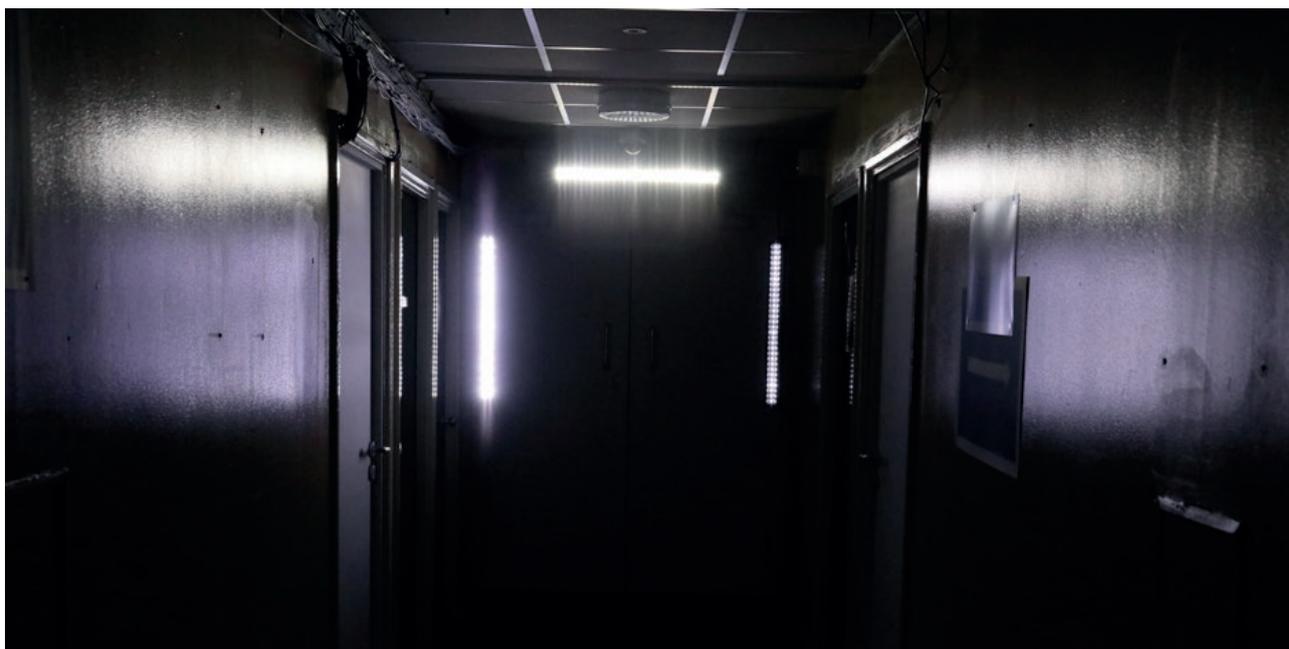
Glare lighting

Strong lighting can create glare that will distract an attacker. Glare can create after-images and blurred vision which may last a few seconds. For best effect there should be high contrast between the ambient light conditions and supplementary glare lighting. The area in which they are deployed should be internal and darkened.

High intensity, narrow focus lamps should be fixed at specific locations designed to coincide with a decision making point for an attacker. They are best suited to long thin spaces and so could be appropriate for intersections and corners in interior corridors to influence the direction an attacker takes or to veil a potential response force.

Technical and practical considerations:

- At maximum light exposure levels, glare is generally considered safe, the natural reflex being to close one's eyes or avert one's gaze.

- The reflection of the glare lighting off nearby walls is likely to reduce the impact by lighting the surrounding area

Noise

Loud noises are well established as being capable of causing discomfort and distraction. Sirens, whistles and alarms are all used to attract attention and may be capable of creating sufficient levels of incapacitation to promote disruption and delay.

A range of devices produce high intensities of sound that cause severe distraction, pain and temporary hearing loss to those in the vicinity. These devices are intended to be deployed over a long range, making them arguably safe at the intended point of hearing.

For closer ranges, a continuous sound stream sufficient to disrupt conversation could have a disruptive effect on communication between attackers, affecting their ability to coordinate their plan.

Technical and practical considerations:

- Use of noise as an ADS is subject to the Control of Noise at Work Regulations (2005), limiting the level and duration of sound to which people can be exposed each day. These regulations would also apply during maintenance and accidental activation of such devices.

- There is a risk of permanent hearing damage to people in close proximity to high intensity sound.

- PA-VA announcements and other communications to building occupants may be interrupted and so not heard.

Combinations of technology

All the proposed technologies can be used in combination. There will be instances where technologies are not compatible, such as glare and strobe. Combinations that particularly appear to enhance the effects of each technology are:

- **Security fog and strobe:** highly disorientating with strong effects on balance and spatial awareness; virtually no visual clues. Extensive trials have shown that this is the most effective combination of technologies.

- **Darkness and strobe:** affects vision, balance and hand-eye coordination; makes swift movement difficult.

- **Darkness and glare:** glare works best if it is against a dark background.

- **Darkness and noise:** strong detrimental effects on communication.

Risk considerations

As has been highlighted, there are numerous factors that need to be considered when deciding if ADS should be installed. Table 4 below lists the different types of ADS available and some of the factors that need to be considered in relation to each one.

The ratings for each category are based on a very high level subjective assessment made by CPNI and will, of course, vary for each individual site. Consideration MUST be given to the specific circumstances that are manifested at your site when considering the benefits of each system.

Some additional explanatory comments are provided below.

- The right-hand column is intended to provide an assessment of the level of risk that will be mitigated and the overall security effectiveness.

- It should be noted that the rating in relation to manually activated conventional barriers has been scored twice. The first is for a complex site, with multiple entry and exit points that require manually locking. It is assessed that this situation creates a number of risks. However, the second option potentially provides for a situation with a low risk of disrupting fire evacuation routes. This is conditional on there being a minimal number of entry points where doors are provided with easy to operate locking systems (such as thumbturn locks or keys are kept in the locks at the bottom of the door) and the building occupants are able to easily open the doors themselves. In this circumstance, the mitigation is assessed to be high as the implementation will be faster and safer, and the other factors assessed to be of minimal impact.

- Lifts and escalators have not been scored for ease of installation as it is assumed there will be no additional cost in changing their use. However, additional cost may be incurred if control systems need to be moved or adapted.

- Scores for overall effectiveness will go up if systems are integrated. For example, strobe lighting when working with security fog will lift the effectiveness rating for strobe to high.

Table 4 – Risk considerations when using ADS

	Types	Ease of installation of the measure	Speed of deployment	Ease of activation/ deactivation	Cost	Impact on fire evac	Impact on health & safety	Overall security effectiveness
Conventional Barriers See notes	Manual **Complex**	EASY	SLOW	DIFFICULT	LOW	HIGH	HIGH	★
	Manual **Easy**	EASY	FAST	EASY	LOW	LOW	LOW	★★★
	Automated	EASY	FAST	EASY	MEDIUM	MEDIUM	MEDIUM	★★★★
VTS	Lifts	N/A	FAST	EASY	LOW	MEDIUM	MEDIUM	★★
	Escalators	N/A	FAST	EASY	LOW	MEDIUM	MEDIUM	★
Sensory	Security fog	MEDIUM	MEDIUM	MEDIUM	MEDIUM	HIGH	HIGH	★★★★
	Strobe lighting	EASY	FAST	EASY	LOW	MEDIUM	HIGH	★★
	Darkness	EASY	FAST	EASY	LOW	MEDIUM	MEDIUM	★★
	Glare lighting	EASY	FAST	EASY	LOW	MEDIUM	MEDIUM	★
	Noise	EASY	FAST	EASY	LOW	MEDIUM	HIGH	★★

READINESS

The successful operation of ADS is dependent on both:

- the actions of security and other key personnel and

- successful integration with other security and safety systems.

The decision to activate ADS must be rapidly taken by staff directly dealing with an incident. Any delay in activation is likely to reduce the intended effect.

It is therefore essential that all those involved in the activation and deployment are provided with the necessary training and management support to make them ready, confident, empowered and able to make decisions and activate systems.

All personnel need also be prepared for the activation of ADS. They will need to understand what this may mean in relation to a preferred evacuation route. That route may become unusable if doors have been locked or sensory measures deployed.

Staff need to be provided with sufficient information to understand what they should do if they are in, or need to enter, a zone where ADS has been deployed.

Training and familiarisation

Security and front-line personnel must be prepared for the activation of ADS. Training and briefings should be delivered that enables staff to understand:

- The purpose of deploying ADS

- The circumstances in which ADS would be activated

- Any circumstances in which ADS must not be activated

- The actions they should take in common scenarios

- The importance of controlling information about the equipment securely.

The supplementary guidance titled *Marauding Terrorist Attacks: Preparing Personnel*, sets out the importance of delivering training that will build confidence and increase awareness of building occupants. Due to the dramatic impact of deploying sensory measures, it is recommended that staff should be exposed to them as part of a site induction process. This will prepare them to respond if they are inadvertently caught in either a live or false activation.

Exercising

Through every stage of planning, installing and live operations, the use of ADS should be subject to exercising. Discussions and tabletops held in the initial phases will enable those responsible for making the key design and installation decisions to test concepts and to be clear on the impact of those decisions.

The Emergency Services should be engaged at an early stage to support planning, and once measures are installed, to undertake live exercising as to how ADS would be deployed and its impact on the end to end response.

Testing

Once a system has been installed, those staff whose actions are critical to the successful implementation should be provided with the opportunity to understand the system and both test the activation of the equipment and understand the impact of its deployment.

ADS equipment is likely to remain unused for considerable periods of time. It is therefore particularly important to make certain that there is a maintenance and testing regime that provides confidence that equipment remains in working order and performs as expected if it is activated. This may range from daily tests of key components to occasional testing of complete systems.

Testing should also be completed when changes are made to other systems within a site that may impact on the ADS.

ANNEXE A: ADS PLANNING CHECKLIST

Preparing your organisation's response to a marauding terrorist attack requires many strands of work. This annexe provides a list of key ADS related tasks.

Planning

- ☐ Identify scenarios and methods/ tactics to be used by attackers
- ☐ Identify potential attack routes
- ☐ List existing security measures on routes
- ☐ Identify most suitable types of ADS
- ☐ Identify potential locations
- ☐ Work with others to identify and address conflicts with fire evacuation procedures and life safety measures
- ☐ Consider using a specialist engineer
- ☐ Consider how to balance use of deterrence communications with the need not to release detailed information

Developing procedures

- ☐ Write an ADS ConOps
- ☐ Identify dependencies on other security and life safety plans
- ☐ Identify who triggers activations
- ☐ Identify how activations will be monitored
- ☐ Consider impact on evacuation routes
- ☐ Complete ADS risk assessment. Update fire safety risk assessments
- ☐ Engage local Building Control officials, Fire Safety Authority and Emergency Services
- ☐ Identify response to a fire alarm after ADS is activated
- ☐ Identify when ADS should not be used or be deactivated
- ☐ Determine status of powered locking systems if there is a power failure
- ☐ Consider impact on evacuation plans
- ☐ Consider impact on RUN HIDE TELL
- ☐ Determine actions building occupants should be advised to undertake

Conventional Physical Barriers

- ☐ How can existing physical barriers be used and what enhancement may be required?
- ☐ Are they activated manually or automatically?

Lifts and escalators

- ☐ Can they be used to prevent/delay access?
- ☐ Identify how/if lifts and escalators can be safely controlled
- ☐ Work with those responsible for planning how lifts and escalators are used in fire evacuation plans
- ☐ Consult engineers over reversing escalators

Sensory measures

- ☐ Define the intended tasks
- ☐ Confirm activation method
- ☐ Confirm compatibility with other security and life safety systems
- ☐ If fog used – identify venting requirement
- ☐ Identify other potential hazards in deployment zones
- ☐ If darkness used – identify light spill

Readiness

- ☐ Develop a Testing and Exercising plan for design, build and operational phases
- ☐ Identify requirement for training different staff types
- ☐ Prepare training and briefing materials
- ☐ Consider how personnel can be exposed to sensory measures
- ☐ Prepare and test announcements

ACRONYMS

AACS	Automated access control system
ADS	Active Delay Systems
ARV	Armed Response Vehicle
CBRN	Chemical, biological, radiological or nuclear
CCTV	Closed Circuit Television
CNI	Critical National Infrastructure
CPNI	Centre for the Protection of National Infrastructure
CSO	Chief Security Officer
CTSA	Counter Terrorism Security Adviser
FCP	Forward Command Point
GDS	Gunshot detection systems
HART	Hazardous Area Response Teams
HM	Her Majesty's
JESIP	Joint Emergency Services Interoperability Programme
JOP	Joint Operating Principles
LED	Light emitting diode
LRF	Local Resilience Forum
MERIT	Mobile Emergency Response Incident Team
MTA	Marauding Terrorist Attack
MTFA	Marauding Terrorist Firearms Attack
NaCTSO	National Counter Terrorism Security Office
NCTP	National Counter Terrorism Policing
NHS	National Health Service
PA-VA	Public Address - Voice Alarm
PHE	Public Health England
PPE	Personal Protective Equipment
PTZ	Pan Tilt Zoom camera
RVP	Rendezvous point
SCR	Security Control Room
SMS	Short Message Service - Text
SOPs	Standard Operating Procedures
STAC	Scientific and Technical Advice Cell
TIC	Thermal Imaging Cameras
TCG	Tactical coordination group
VAW	Vehicle as a Weapon attack

GLOSSARY

Airsoft weapons	Airsoft guns are replica weapons used in sports and firearms training. They are essentially a special type of very low-power smoothbore air guns designed to shoot non-metallic spherical projectiles which are typically made of plastic or biodegradable resin materials. The pellets have significantly less penetrative and stopping powers than conventional air guns, and are generally safe for competitive sporting and recreational purposes if proper protective gear is worn.
ASCEND	CPNI's MTA work involves the repeated physical simulation of an MTA in a building environment – Project ASCEND. This involves subjecting a building population to a simulated attack and looking at factors that can either improve or reduce survivability before the arrival of an armed police response.
CitizenAID™	CitizenAID™ empowers the general public in situations of emergency and allows them to be effective in aiding the injured with medical support prior to the arrival of emergency services. It is comprised of simple and logical actions and is designed to guide the public to react safely and effectively as well as communicate correctly with emergency services. The powerful combination of organisation and treatment will save lives in dangerous situations.
Exercises	Allow personnel to validate plans and readiness by performing their duties in a simulated operational environment. Activities for a functional exercise are scenario-driven. A full-scale exercise would involve a live time simulation of a potential real event and involve multi-agency participation.
Hostile Incursion	As per MTA however the intent of those involved may be broader than terrorism.
Hostile reconnaissance	The information gathering phase by those individuals or groups with malicious intent, is a vital component of the attack planning process.
JESIP	A programme created specifically to further improve the way ambulance, police and fire and rescue services operate together on scene in the early stages of their response to major incidents.
Lockdown	Lockdown means locking doors and other physical barriers (such as turnstiles) to restrict entry to and/or exit from a site or one or more zones within a site. It is sometimes referred to as `dynamic lockdown'.
Maglocks	The Magnetic lock or mag lock uses an electrical current to produce a magnetic force. When a current is passed through the coil, the magnet lock becomes magnetised. The door will be securely bonded when the electromagnet is energised holding against the armature plate.
Marauding	As defined by Cambridge Dictionary - Going from one place to another killing or using violence, stealing, and destroying.

GLOSSARY

MTA	Marauding Terrorist Attacks can take many forms. • A lone attacker, multiple attackers or multiple groups of attackers • Arrival at a location on foot, in a vehicle or an attack perpetrated by insiders • Entering without using force or forcing entry using an explosive device, a vehicle, coercion of someone with access or a combination thereof • Attackers armed with bladed weapons, guns, pipe-bombs, petrol bombs or multiple weapons.
PA-VA	PA-VA systems are used for making announcements or providing public information and delivering automatic alarm and emergency messages. Public Address (PA) systems (often known as Tannoy Systems) and VA (Voice Alarm) systems provide a quick and simple means of direct and clear communication. Voice Alarm (VA) or Voice Evacuation Systems are used for delivering pre-recorded emergency messages.
Personnel	Used to describe any member of staff, contractor, visitor or other occupant to a building
RUN HIDE TELL	The National Counter Terrorism Policing's Stay Safe campaign to advise the public how to respond if they are caught up in an firearms or weapons attack.
Security Control Room	The hub of a site's security, continuously receiving information from a range of security staff and systems. Many of the principles of an SCR can be carried over into an event or operations control room.
Security Fog	Thermally generated white smoke specifically used as a security measure. Current security smoke machines use glycol or glycerine mixed with distilled water to produce a dense white fog which obscures vision and presents a confrontational barrier to any intruders.
Situational Awareness	Being aware of what is happening around you in terms of where you are, where you are supposed to be, and whether anyone or anything around you is a threat to your security and health and safety.
Table top exercise	Discussion based sessions where team members meet to discuss their roles during an emergency and their responses to a particular emergency situation. A facilitator guides participants through a discussion of one or more scenarios.
Vulnerable people	Those who may need to be provided with assistance or special arrangements made, such as children and people with health conditions or impairments.