



**CPNI**

Centre for the Protection  
of National Infrastructure

# CCTV within the perimeter of a site

## A guidance document

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# Contents

Aim

04

Why have CCTV coverage between your site perimeter and any buildings or compounds?

05

Tracking

09

Illumination

11

Monitoring and response

12

Compliance with CCTV codes of practice and legislation

12

Summary

13

Further reading

13

An aerial photograph of an industrial site, possibly a construction or manufacturing facility, surrounded by dense green trees. The site features several large buildings, one with a prominent blue roof, and a large paved area with various materials and equipment. A large white circle is overlaid on the left side of the image, containing the text. The background shows a forested hillside under a bright sky.

## Aim

The aim of this document is to provide guidance to a CNI site on the definition and effective use of CCTV in the open spaces between the site perimeter and site compounds and buildings.

## Why have CCTV coverage between your site perimeter and any buildings or compounds?

A typical site may have significant open areas between the site perimeter and any critical assets. In these areas, activity could take place or incidents occur.

Natural surveillance from site users, visitors and security personnel is unlikely to provide comprehensive coverage throughout the day, and this will become even more difficult at night. Appropriately implemented CCTV, utilising pan-tilt-zoom (PTZ) and/or fixed cameras, can help address this. Also, it might provide some beneficial coverage of surrounding areas.





## Understanding your requirements

As with any security system, it is important to systematically think through the operational requirements prior to procurement and installation. The recommended approach is to develop operational requirements (OR) at a high level (OR level 1) and, once this has been agreed by stakeholders, at a detailed level (OR level 2).

The OR1 seeks to document the security risks faced by a site, identifying options by which the risks can be mitigated to an acceptable level. As part of this, a strategic security plan (SSP) should be developed to identify how the security needs of the organisation will be met. The purpose of these documents is to bound the problem and provide sufficient evidence for stakeholders to approve an outline business case for investing in the plan.

**When considering CCTV the OR is key**

The OR2 follows on from the OR1 and is used to:

- Document site vulnerabilities to the risks identified during the OR1.
- Identify the mix of solutions that will best mitigate the vulnerabilities.
- Develop the detail against which solutions can be procured.
- Assess the environment in which solutions will need to operate.

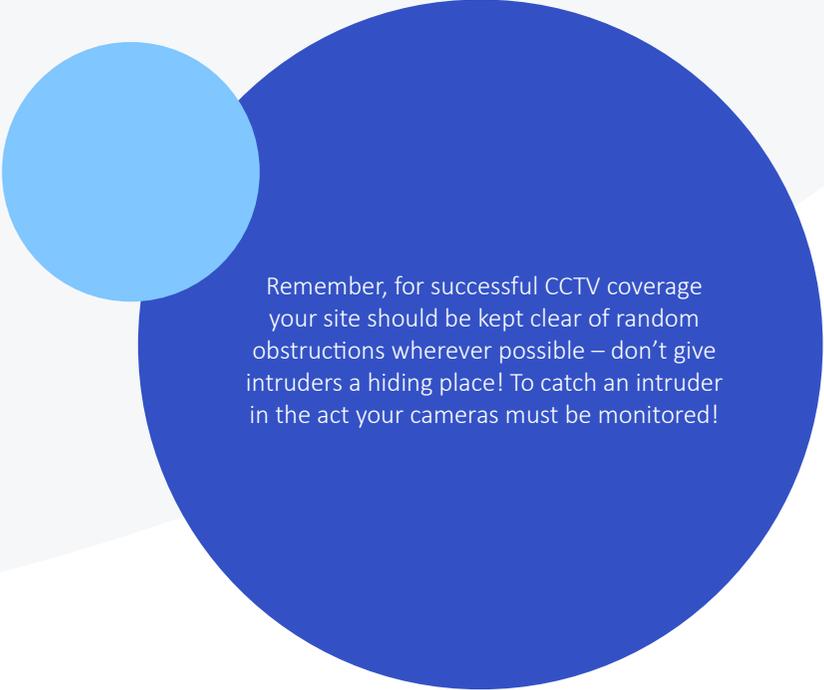
A key part of the OR process is to consider issues beyond the pure technology, such as organisational readiness.

When defining your requirements, it is important to consider the variety of potential uses for site CCTV. These uses, addressing both safety and security concerns, include:

- 01 Area coverage to provide general oversight of open space. This will enhance your situational awareness and help you detect potential issues before they occur, while also providing an extra level of support to ground-based security personnel.
- 02 Monitoring pedestrian and vehicle movement routes.
- 03 Detecting and monitoring unexpected or unwanted activity.
- 04 Tracking people and items around your site. This helps you both protect them or track their suspicious activity.
- 05 Providing situational awareness to both security control room and response personnel.
- 06 Providing additional coverage to supplement that provided by perimeter and building CCTV systems. This may also extend to integration with existing site alarm systems.
- 07 Enhancing the deterrent effect of existing CCTV.
- 08 Monitoring pedestrian and vehicle movement routes.

You should also bear in mind the following considerations to ensure that requirements are appropriate:

- Will the images potentially be used as evidence in a court of law? If so, the requirements must ensure sufficient image quality and reliable record and storage.
- Integration with existing control room systems, processes and procedures. Existing staffing levels should also be reviewed to confirm they will be able to cope with additional complexity.
- Integration to existing CCTV systems at the site.
- Will there be any need to supplement or enhance existing lighting systems?
- Are the prevailing weather conditions suitable for the type of CCTV being proposed?
- Are there plans for development of the site, potentially with the erection of new structures and/or removal of existing ones? If so, the requirements should take account of these. Remember that landscaping activities also have the potential to obstruct current fields of view.
- Additional vegetation management plans may be required to ensure that fields of view remain clear.
- Can the CCTV see beyond the site perimeter? If so, consider the requirement for operators to be appropriately licensed and for masking of images where they would otherwise overlook private residences.
- Requirements associated with relevant legislation such as the Data Protection Act.
- Will the system be pro-actively monitored or set to alarm on detection? If not, then it cannot help you prevent issues occurring, but might provide a retrospective view of what took place.



Remember, for successful CCTV coverage your site should be kept clear of random obstructions wherever possible – don't give intruders a hiding place! To catch an intruder in the act your cameras must be monitored!

## Tracking

If one of your requirements is the ability to track people or objects, either manually or using auto tracking, as they move around the site, the specification and design of any CCTV system will need to consider the following:

- 01 Camera positioning and types of camera
- 02 Will tracking be automated or manually controlled?



## Camera positioning and types of camera

The fields of view for adjacent cameras need to overlap and cover the blind spots that often exist at the bottom of camera poles. This ensures that the people or objects being followed do not disappear from coverage at any point.

Requirements must also specify whether coverage should be provided by fixed cameras, PTZ cameras, or by a mixture of the two.

PTZ cameras offer the potential of covering areas with fewer cameras, but each of them can only be monitoring part of the area at any point in time, potentially leaving some zones unmonitored. Also, if it is possible to determine which way the camera is pointing, adversaries might be able to plan how to avoid detection.

Coverage with static cameras allows the fields of view to be known at all times, but is likely to require a larger number of CCTV units.

A mix of static and PTZ units may therefore be required to provide a balance between certainty of coverage and affordability. Understanding the security risks faced by the site and the site's vulnerabilities, coupled with the site response plans, will help determine the requirements for the level of coverage in each area.

A fundamental requirement of tracking is that the people or objects being tracked must be detectable within the image. While smart systems using video analytics (VA) may be able to detect very small changes in an image, particularly if thermal imaging (TI) technology is used, there is likely to be a need for a control operator to verify the alarm before initiating any kind of response, and to potentially take over manual tracking. To achieve this, the operator must be able to see enough detail in the image to determine whether it is an alarm requiring action or one that can be closed (for instance, an animal that has triggered the system).

Properly implemented TI will allow an operator to determine whether they are dealing with people, vehicles or animals but will not allow recognition or identification of individuals.

Modern day/night cameras combine visible light capability for daytime use with an IR capability for use during the hours of darkness. The differences between these two, for instance colour or black-and-white images, might alter the way in which tracking and identification can take place at different times. Even with advances in day/night technology, there may still be a requirement to provide supplementary illumination.



### Will tracking be automated or manually controlled?

If tracking is automatically initiated by a system, using VA, it may lessen the initial load on operators to determine whether tracking is required and result in a quicker decision. Balanced against this is the possibility of multiple tracking activities taking place at once, each of which will need to be assessed by an operator to determine an appropriate course of action.

There is also the possibility that automated tracking may seek to move PTZ cameras that are currently being used by operators for other activities.

# Illumination

As with all CCTV systems, there may be a need to supplement existing site lighting to ensure effective operation of the system.

It is recommended that lighting surveys, covering both good and poor environmental conditions and different seasons of the year, are produced to help inform the kind of illumination that may be required. Other environmental concerns, e.g. the needs of protected wildlife such as bats, should also be addressed.

When considering the types of illumination to be deployed it is also worth considering related requirements such as lighting to support the response force.



## Is there a need to identify individuals?

If there is a requirement to be able to identify individuals in the field of view, it may be necessary to increase the number of cameras and to somehow make people of interest look at the cameras. This will increase both the complexity and cost of a system, and it may therefore be more appropriate to try and identify chokepoints where identification can take place.

## Integration with other CCTV and alarm systems

The site may well have both a perimeter CCTV system and CCTV systems on the exterior and interior of key buildings within the site. If either or both of these are present, there are several potential benefits to integrating any new area coverage system with them:

- The area system may provide enhanced coverage / different views of activity taking place both at the perimeter and adjacent to any buildings, thus providing increased situational awareness for control room and response staff.

- Possibility of being able to track people and objects before they have breached the perimeter, or as they enter buildings.
- Additional complexity will be minimised. In particular, control room staff will not be required to learn how to operate and manage an additional system.

Balanced against these potential benefits there are a couple of potential issues to be considered:

- Integration activities might disrupt current operations.
- It may not be possible to expand the existing systems to cope with the new cameras.

The former of these issues will require a contingency plan to be developed, while the latter will require consideration of whether the project should be expanded to include replacement of the existing CCTV control systems.

There may also be alarm systems associated with both site and compound/building perimeters. Integration with these systems could provide an enhanced response capability through configuration of the extra cameras to automatically observe the location of activated alarms.



## Monitoring and response

When defining the requirements for any CCTV system, it is important to consider how the system will be monitored and how it will be used to support response to any incidents.

If the site has existing systems with which you need to integrate the site-wide CCTV, it is suggested that there are minimal changes to the way that operators interact with the system. This will reduce additional training requirements. If there are no existing systems, or they need to be replaced to cope with the enlarged system, it is recommended that human factors specialists are consulted to deliver methods of operating that will maintain operator vigilance without overloading them.

Without a site-wide CCTV monitoring capability, response plans have probably focussed on points close to the perimeter or at buildings. These plans may require review and adjustment to take account of the additional coverage now available.

## Compliance with CCTV codes of practice and legislation

As with all CCTV deployments, there is a need to ensure that current legislative requirements are met.

It is also highly desirable to follow the good practice contained within the relevant codes of conduct issued by the Information Commissioner's Office, the ICO Code of Practice, and the Home Office, the surveillance camera Code of Practice.

## Summary

The deployment of CCTV within the perimeter of a site can greatly enhance the ability of the Control Room Operators to locate, identify and track intruders. It is important that the cameras are of suitable quality to offer the level of detail required to initially confirm an intruder and then track them successfully. As with all CCTV deployment, it is always advisable to conform with the relevant codes of practice. This will ensure you are both operating a compliant system and having an operationally fit system that gives you the best results from you CCTV.

## Further Reading

CPNI CCTV for Perimeter Security  
[CPNI.GOV.UK](https://www.cpnigov.uk)

CPNI CCTV Within the Workplace  
[CPNI.GOV.UK](https://www.cpnigov.uk)

Surveillance Camera Code  
of Practice  
[GOV.UK](https://www.gov.uk)

Information Commissioner's  
Office Code of Practice  
[ICO.ORG.UK](https://www.ico.org.uk)