Integrated Security

A Public Realm Design Guide for Hostile Vehicle Mitigation

CPNI
Centre for the Protection of National Infrastructure

Foreword

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The Centre for the Protection of National Infrastructure (CPNI) provides integrated security advice (spanning information, personnel and physical) to the businesses and organisations that make up the UK national infrastructure. Our advice aims to reduce the vulnerability of the national infrastructure to terrorism and other threats, keeping the UK's essential services safer.

The design of the public realm is an important consideration, particularly as many of the UK's critical assets are located in heavily populated, high density urban environments.

CPNI is continually developing physical security solutions and producing guidance for the application of Hostile Vehicle Mitigation (HVM) measures. Introducing HVM into the public realm is a significant challenge and must fulfil numerous requirements in order to integrate seamlessly, such as:

- Aesthetics
- Public Access
- Physical Constraints
- Health & Safety
- Cost
- Maintenance & Management

CPNI is keen to encourage public realm designers to consider protective security at project inception. There is a need to design innovative and integrated solutions that protect sites deemed to be vulnerable to vehicle-borne threat, whilst not diminishing functionality or aesthetics.

Contents

Integrated Design for Hostile Vehicle Mitigation in the Public Realm

Introduction

This publication provides information and inspiration to those responsible for integrating protective security measures into the public realm, in order to mitigate the threat from, and limit the damage caused by, terrorist attack.

It is important that our surroundings remain open and inclusive and that the addition of physical security measures is integrated and proportionate to the assessed threat. The purpose of this guide is to assist the public realm design process and to encourage a positive and creative response to the challenges of counter-terrorism and protective security.

Terrorist bombs (known as Improvised Explosive Devices – IEDs) can be person-borne, vehicle-borne, placed or delivered items. Understanding the potential threats, the consequences of a vehicle-borne attack and the intelligent application of Hostile Vehicle Mitigation (HVM) measures are the focus of this document.

The design of the public realm must consider the application of HVM measures carefully and holistically, to ensure that the correct level of protection is provided without compromising the ability to create aesthetic and functional public spaces.

There is no "one size fits all" response as with each and every situation requires an informed and specific solution. In addition, threat levels[1] as well as terrorist methods evolve over time, and as a consequence, necessitate consideration to both current and future security needs.

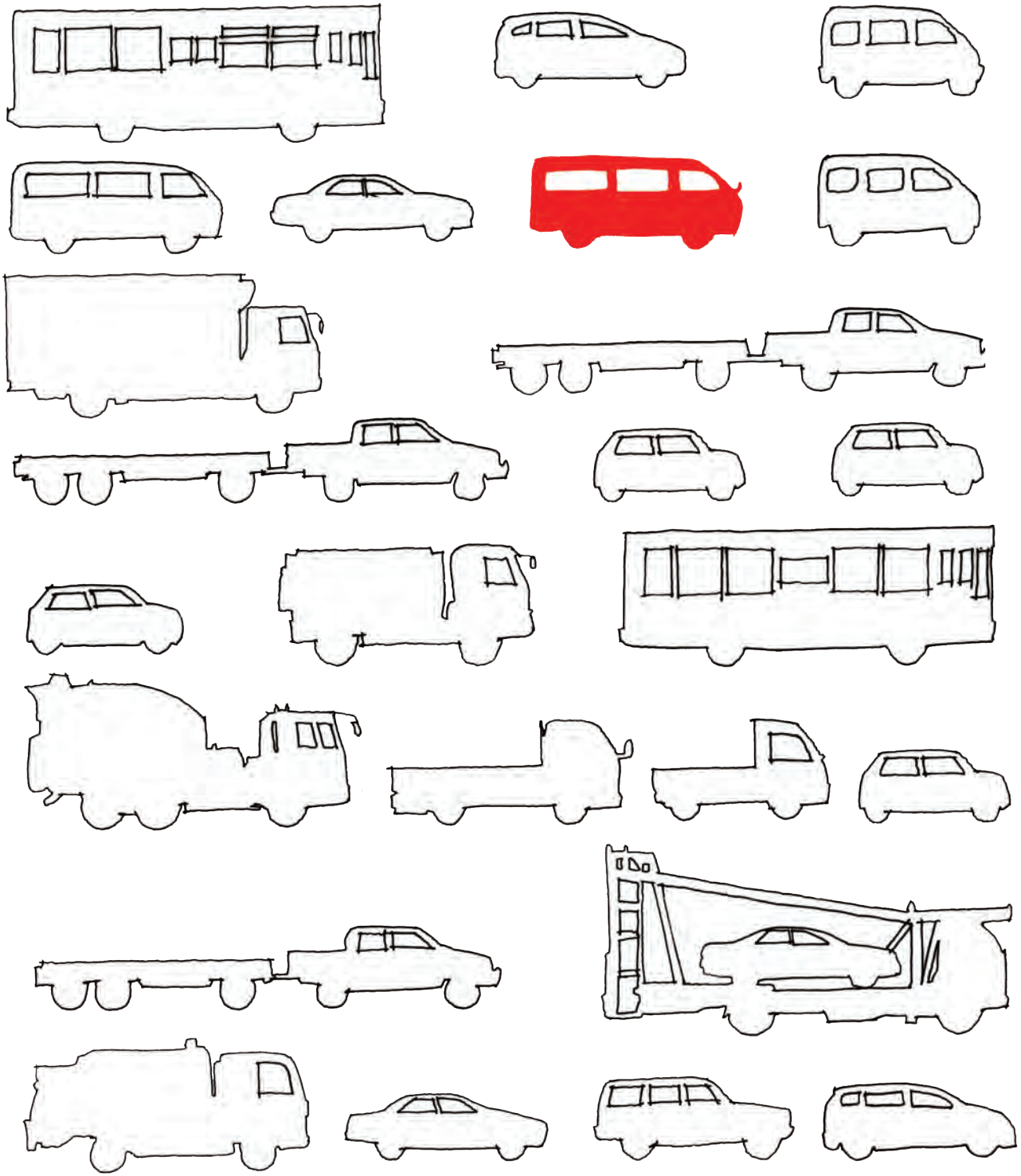
[1] *Assessment of the level and nature of terrorist threat to the UK is made by the Joint Terrorism Analysis Centre (JTAC).*

Part 1

Context

Vehicle-Borne Threats
Security should be proportionate to threat

Methods of Vehicle-Borne Attack
Blast Effects & Mitigation



Vehicle-Borne Threats

It is critical to have a clear understanding of the possible threat vehicle and attack method in order to design the most proportionate countermeasures. Vehicle-borne threats can range from opportunistic vandalism to well planned aggressive attacks by determined criminals or terrorists, with the load-carrying capability and manoeuvrability of a vehicle enabling delivery of a potentially large explosive device.

Whether detonated by timer, remotely or by suicide operative, the use of a vehicle bomb (known as a Vehicle-Borne Improvised Explosive Device – VBIED) is usually designed to maximise structural damage to property and local infrastructure, creating widespread disruption and publicity. Human casualties are inevitable with serious and fatal injuries being caused by blast effects, structural collapse and high-velocity fragmentation.

Specific methods employed by those with hostile intent to gain access to a public space or to deliver a VBIED can be expected to develop over time and will continue to exploit any vulnerabilities within the physical environment. Consequently, the design of our public spaces should have the flexibility to adapt to new threats.

Security

should be proportionate to

Threat

Methods of Vehicle-Borne Attack

There are five main types of vehicle-borne attack.

1. Parked vehicles

An attack may come from a VBIED in a parking area of unscreened vehicles which may be underneath or adjacent to an intended target.

2. Encroachment

Incomplete or incorrectly spaced countermeasures can allow a hostile vehicle to enter an area without the need for impact. A hostile vehicle may also be able to tailgate a legitimate vehicle through a Vehicle Access Control Point (VACP).

3. Penetrative attack

The use of the front or rear of a vehicle as a ram to breach a perimeter or target premises in order to get a hostile vehicle closer to the intended target.

Additional threats that exploit or manipulate human weakness include:

4. Deception

Various forms include use of stolen or cloned ID, verbal deception or Trojan (disguised) vehicle.

5. Duress

Duress imposed on the occupant of a legitimate vehicle to carry a hostile payload into a protected site or duress imposed on a guard to grant vehicular access through a vehicle access control point.

Layered attack scenario

A combination of the above methods may be employed, for instance where a penetrative attack creates a gap in perimeter defences to allow a follow-up encroachment by a VBIED.

The main causes of catastrophic structural damage and serious or fatal injury result both from the direct physical effects of an IED and subsequent building collapse or flying and falling debris.

Vehicle-Borne Improvised Explosive Device

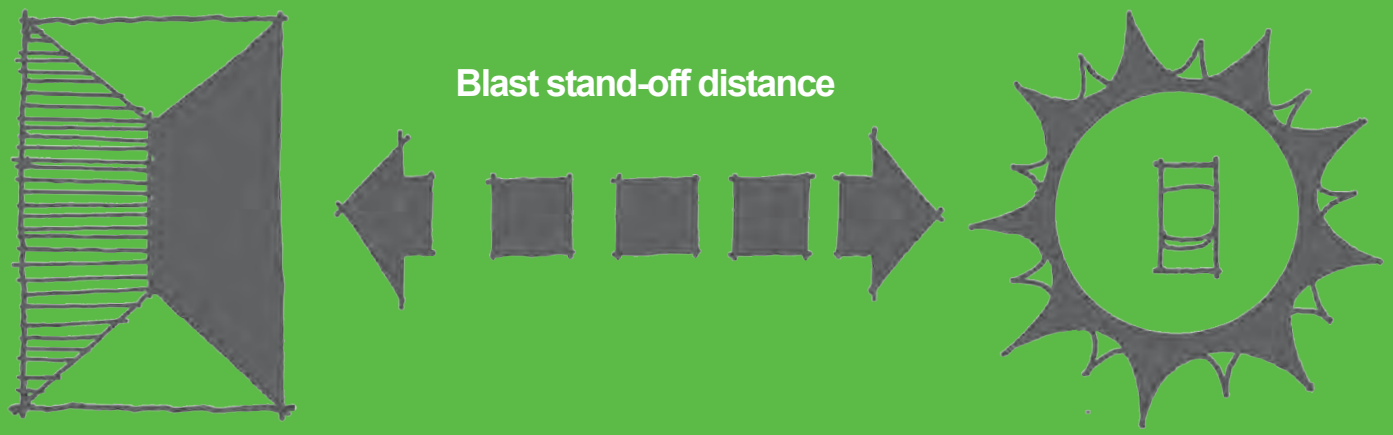
‘VBIED’

Blast Effects & Mitigation

The effects from a VBIED include a: blast wave, fire ball, primary and secondary fragment damage and ground shock.

Blast stand-off distance is the single most important factor in determining the extent of damage that can be caused by any VBIED. The ability to maximise this distance will always be site-specific, but early consideration in the design process will enable optimum solutions to be achieved.

Blast stand-off is used to keep a potential VBIED away from a protected asset thus limiting the damage caused by blast effects. Adequate blast stand-off distance can be enforced through the use of physical barriers and effective traffic management.



If retrofitting HVM measures in an existing built environment, it may be difficult to maintain ideal stand-off distances, particularly in high density urban areas. Careful planning is required as every additional metre of stand-off will have a significant impact on blast mitigation. In more constrained sites, particular emphasis should be given to site or district-wide security, avoiding direct approach routes, managing maximum vehicle approach speed and installing threshold HVM measures.

Every metre counts

Part 2

Design Response

The Role of Design
Inspiration > Innovation > Integration

Inspiration
Key Design Principles + Reference

Urban Scenarios
District + Site + Threshold

Process
Designer's HVM Checklist

· past historical defence mechanisms.

PAST — traps / spikes in ground.

- Gt. Wall of China — 1-2? lines of defence
- Hadrian's Wall → 'keeping people
- Motte & Bailey
- Martello.

H. wall. — Mt Ba

X Continuous physica

'Force field A

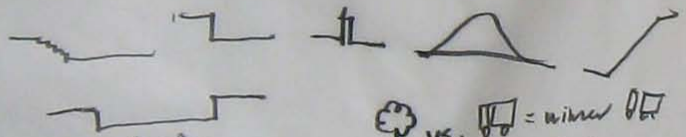
PRESENT:

"Bollards, Ban

→ Investigate →

1. Street furniture.

2. Levels.



vs. = winner

vs. = ?

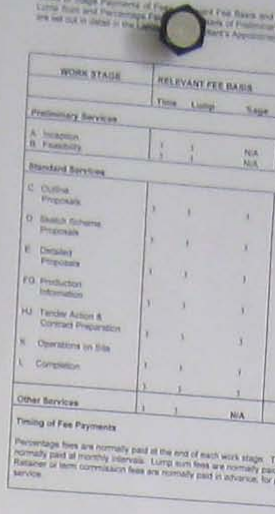
3. Water.

4. Soft Planting — Trees, shrubs, ?

5. Public Art + Sculpture.

VALUE OF SECURITY

"Buildings with a high level of effective security seem to be considered by tenants to have a higher value than those without."



WORK STAGE	RELEVANT FEE BASIS		
	Time	Lump	Sage
Preliminary Services			
A Inception			
B Feasibility			N/A
Standard Services			
C Outline Proposals			
D Sketch Scheme Proposals			
E Detailed Proposals			
F/G Production Information			
H/J Tender Action & Contract Preparation			
K Operations on Site			
L Completion			
Other Services			N/A

Timing of Fee Payments

Percentage fees are normally paid at the end of each work stage. T
normally paid at monthly intervals. Lump sum fees are normally pa
Retainer or term commission fees are normally paid in advance, for
service.

HSC

Managing health and

in construction

Construction (Design and Management) Re

METHODOLOGY : 12 URBAN QUALITY CRITERIA

Role of Design

A fresh approach is required from designers of the public realm to ensure that Hostile Vehicle Mitigation (HVM) measures are integrated seamlessly into the environment, providing proportionate security whilst also creating beautiful places. This section explores design thinking and technical information to demonstrate different approaches to these challenges.

Along with many other public realm design drivers, security issues should be considered from the outset to ensure that HVM measures are woven successfully into the fabric of new proposals. As security becomes an increasingly significant factor, it is important that a holistic approach is taken to develop integrated strategies that provide appropriate and balanced responses.

In some instances, particularly within existing built environments, HVM measures will not have been considered at the outset and solutions may need to be retrofitted. Unless well thought through and designed, these solutions may provide less effective security, be more costly and have a negative visual impact.

Interventions will vary from a macro scale of site masterplanning to a micro scale of detailed physical restraints. Some will be discreet and some may be overt. Every scenario will be different and solutions must always cater for site specific requirements.

Early Consideration + Creative Thinking

=

Successful Integrated Design Solutions

What Makes a Place Secure?

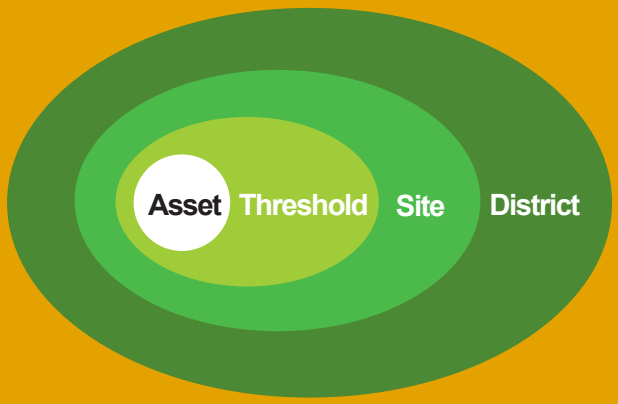
Holistic security

As well as integrating HVM measures into the public realm, it is important to follow a holistic approach to overall security. Such an approach will acknowledge and respond to the interdependence of physical measures with other electronic and procedural security measures to ensure that overall security is enhanced rather than compromised.

The particular level of threat in a public space may vary at different times of the day or year. Effective security design will recognise these fluctuations and schemes can be flexible using re-deployable or contingency solutions, perhaps at peak times of crowd density or during a special event.

Layered approach

Successful security is most effective when implemented on a number of geographic layers. In terms of HVM, layers can feature access control and vehicle management on a district level, design of approach routes, further vehicle management and stand-off distances within the local site context and finally, control of stand-off distances and secure threshold design to the immediate vicinity of the asset.



Worked examples of each scenario are shown on the ‘Urban Scenarios’ pages.

District

The wider site context - of varying scale but generally with multiple sites and land ownerships.

Outer level protection must include consideration of wider site planning, traffic management and access control. Asset protection is most effective when it is possible to implement security over a wide area. Holistic and well -managed protection to an outer 'perimeter' will typically lessen the risk to an asset, but may impact onerously on legitimate traffic and daily operations. Potential costs for wider interventions may be offset by a reduced need for individual asset protection.

Site

The local site context - can also include multiple land ownerships.

This second level of protection includes consideration of site planning, access control and traffic management but with more manageable on-site operational issues. With a particular emphasis on site planning it is possible to avoid direct vehicle approaches, reduce maximum hostile vehicle approach speeds and to create opportunities for increasing blast stand-off distances.

Threshold

The zone immediately around the asset.

This is typically the last line of defence and must be designed to control or prevent vehicular access and minimise blast effects in the event of a VBIED attack. Blast stand-off distance is therefore a priority consideration for this protective layer as well as the design, positioning and integration of HVM measures within the immediate context.

Asset

Typically, in terms of HVM, the assets include:

People – staff, visitors, contractors or customers.
Physical Assets – buildings, contents, equipment and sensitive materials.

Historic Design for Defence

Inspiration can be taken from the historic evolution of security measures and early approaches to defence which frequently utilised a layered strategy. A similar strategy known as 'defence-in-depth' is also familiar as a security policy in modern industries such as nuclear engineering and information technology.

Innovation is always required to respond to the evolving nature of threats but many principles will remain a constant. The motte and bailey is an excellent model demonstrating many of these principles as follows:

- Layered defences designed to weaken the attack on the advance towards the asset;
- Height advantage over the source of attack, providing natural surveillance, maintaining clear lines of sight and allowing early detection of attack;
- Strengthened fortifications and manipulation of the terrain to deter and delay an attack.

The additional use of a ditch or moat around a castle ensured that access was reduced and fewer points of entry had to be monitored. These fortified thresholds assisted in controlling access to the asset.

Motte and Bailey

Castle and Moat - controlled site access

Final layer of defence

Nature's Design Response

Flora and fauna have developed, through evolution, specific mechanisms which offer defence against attack and opportunity for survival. These are many and varied from overt visual warning and physical deterrents to more discreet camouflage and evasion strategies. The principal strategies include resistance, tolerance and diversion:

- Physical defence mechanisms, such as spikes, spines, serrations and body armour deter and protect in the natural world by establishing stand-off distances and preventing access to vulnerable parts;
- Mechanical response to touch (thigmonasty), most spectacularly demonstrated by the Venus fly-trap, is also used by plants as a deterrent to attack;
- Chemical defence, a resistance most commonly associated with plants, is also used by animals such as frogs and butterflies;
- Having the flexibility to adapt to situations and immediate context through camouflage and seasonal or daily variation in form can reduce the risk of attack and provide defence through diversion;
- Early warning can be provided by natural surveillance to ensure preparation and readiness against a potential attack. Alarm calls from prey animals are used to warn others and so provide protection to a wider community.

Fortified and layered protection

Surveillance provides early warning

Diversion through camouflage

Traffic Management

The level of intervention should be proportionate to the assessed vehicle-borne threat and sympathetic to the day-to-day site operations such as servicing, deliveries and visitor drop-off. Ideally the application of traffic management should create an enforceable blast stand-off perimeter around the protected asset and minimise the amount of traffic requiring site access. The following traffic management options can be utilised:

Vehicle exclusion

In certain situations total vehicle exclusion enforced by Vehicle Security Barriers (VSBs) may be appropriate.

Vehicle inclusion

In other instances, access for authorised vehicles such as emergency, utility and postal services may need to be accomodated through a Vehicle Access Control Point (VACP) and should be carefully managed.

Temporary protection

Temporary or re-deployable VSBs may be employed at times of heightened threat or pre-planned special events. These barriers require specialist equipment to deploy, tend to be more visually intrusive and less pedestrian-permeable than permanent solutions.

Traffic calming methods

The application of horizontal deflections (e.g. bends and chicanes) that are enforced by VSBs (to prevent over-running) will limit hostile vehicle approach speed thus reducing the effectiveness of a penetrative vehicle impact. In turn this can reduce the requirements and associated costs of countermeasures and provide opportunities to deploy discreetly integrated protection. Although effective for road-safety engineering purposes, traffic calming using vertical deflections (e.g. road humps) is not an effective security measure as it provides a negligible speed reduction against a determined vehicle-borne attack.


Royal Mail

A Small Decrease in Velocity

=

A Large Decrease in Energy *

* Correctly designed traffic calming methods will reduce potential hostile vehicle speeds (and the vehicle's associated energy)

=

Reduced Impact

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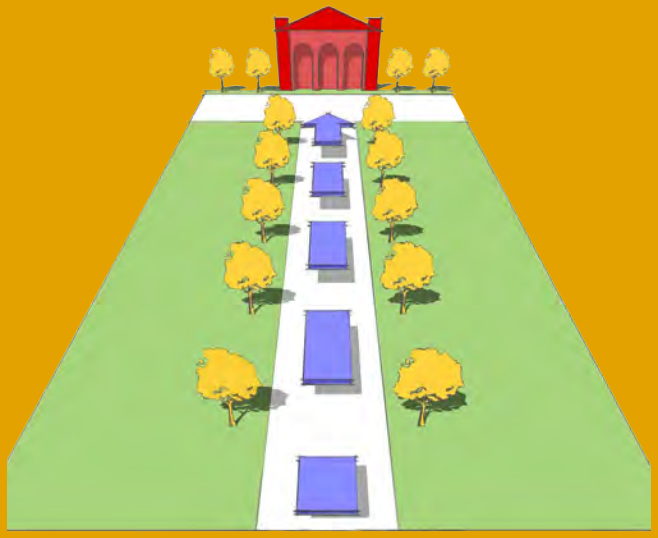
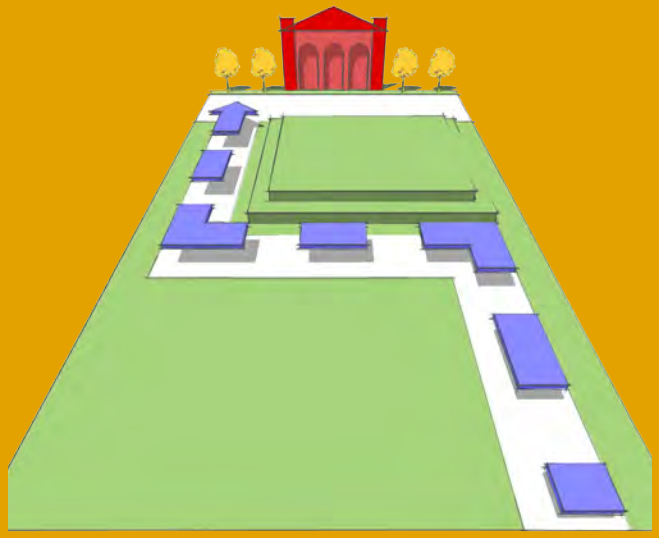
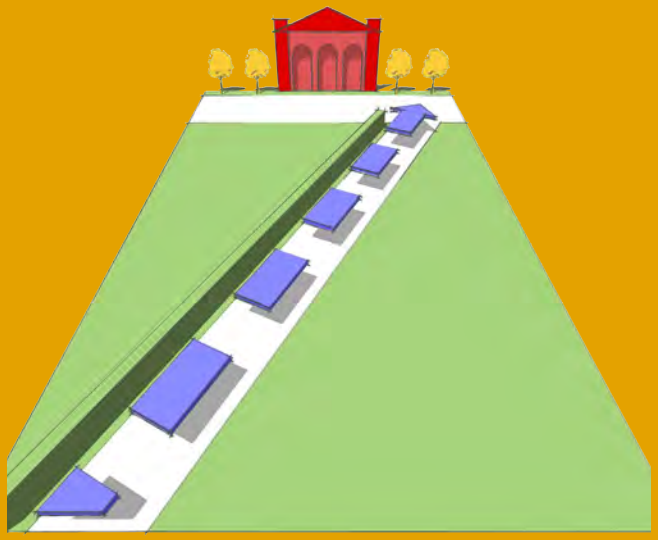
Less Intrusive / Smaller VSBs and Possible Reduced Cost



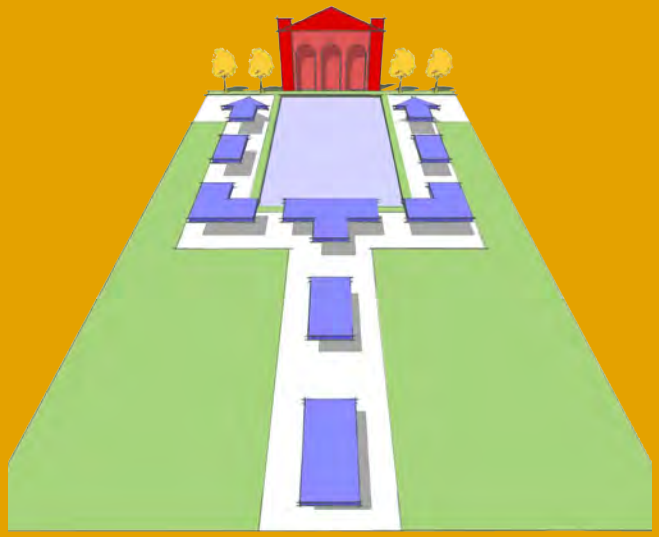
A direct route towards an asset allows a hostile vehicle to build up speed on approach.



Chicanes and offset approaches to an asset reduce hostile vehicle approach speed.



Moving a road, or an asset, to create an indirect approach will lead a hostile vehicle away from the asset and reduce potential impact speed.

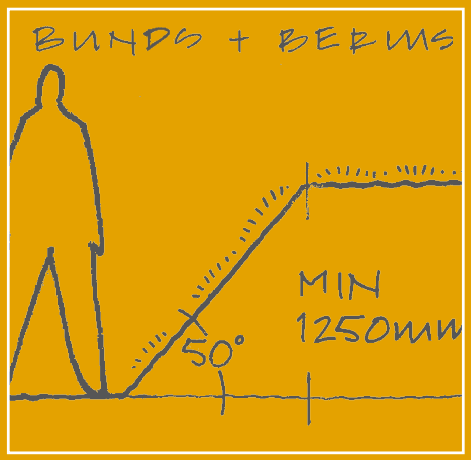


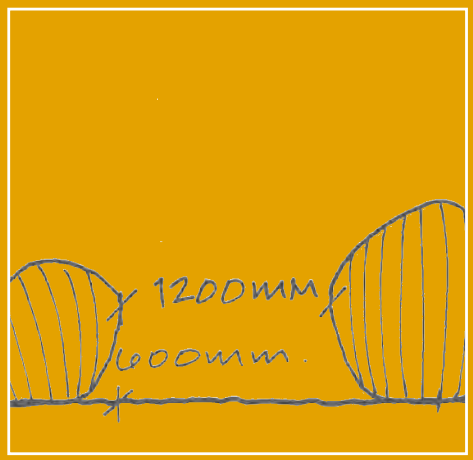
Removing vehicle access from the front of an asset removes the potential for using a vehicle as a weapon and establishes a stand-off distance from parked hostile vehicles.

Vehicle Security Barriers

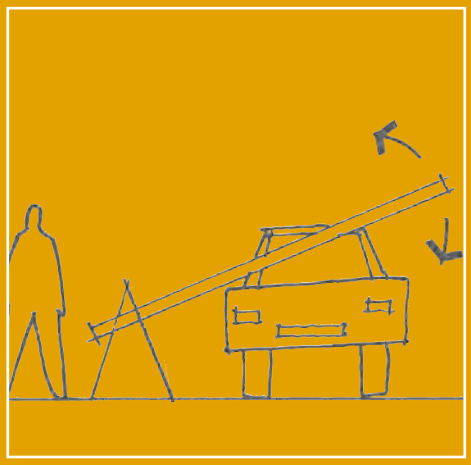
Vehicle Security Barriers (VSBs) can be passive (static), or active (operable). Active measures are vulnerable to duress and deception techniques and therefore passive measures are preferred wherever possible. Opportunities and responses will vary significantly, depending on the functional and aesthetic considerations that are of particular relevance to any given site.

Passive measures - static barriers, sculptural elements, landform, water, walls, fences, berms, bunds, ditches, raised planters or street furniture.





Active measures - operable blockers, gates, rotating, rising, sliding and retracting manual and automated elements.

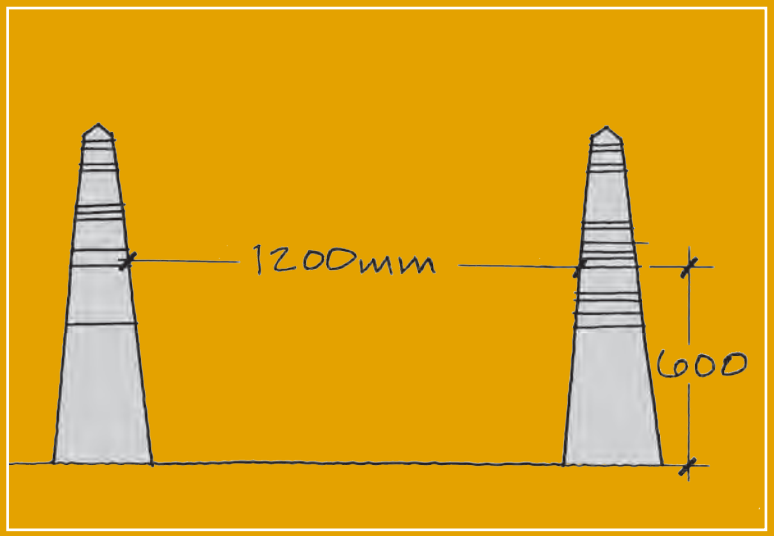


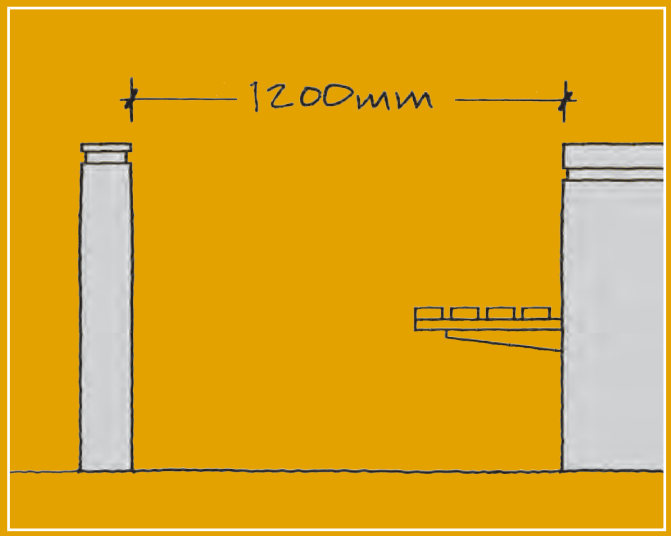
The maximum clear distance between adjacent VSB elements or other structural elements must be no greater than 1200mm. This dimension is designed to prevent encroachment of vehicles beyond the blast stand-off perimeter, whilst maintaining access for pedestrians, wheelchairs and pushchairs. The 1200mm clear dimension must be measured between structural elements at a height of 600mm above ground level.

The minimum height for vertical fixed structures is 500mm. However an increased height of 900mm or more will make the measure more conspicuous, assist the visually impaired and typically reduce the penetration of an impacting hostile vehicle.

All vertical elements selected to prevent vehicle access should be fit for purpose and successfully tested or conform to BSI Publicly Available Specification (PAS) 68 'Impact test specifications for vehicle security barriers' or CEN Workshop Agreement (CWA) 16221 'Vehicle security barriers - Performance requirements, test methods and application guidance'. Further advice for the application of these elements can be referenced to BSI PAS 69 'Guidance for the selection, installation and use of vehicle security barriers' or CWA 16221.

CPNI can assist in the selection of appropriate countermeasures or structural elements for incorporation within a designer's vision.





Inspiration

Six key principles have been identified in delivering successfully integrated hostile vehicle mitigation in the public realm. A site-specific response is essential in delivering effective and appropriate measures.

6 Key Design Principles

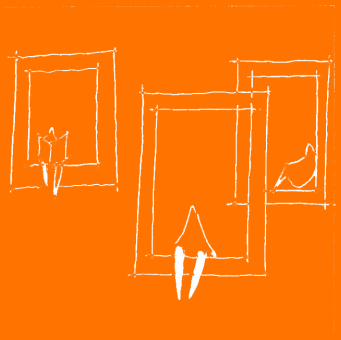
1. **Consider forward planning and flexibility to counter developing threats**
2. **Provide mitigation measures proportionate to the threats**
3. **Design to enhance the setting**
4. **Include multi-functional elements**
5. **Ensure an accessible and inclusive environment**
6. **Design with maintenance in mind**

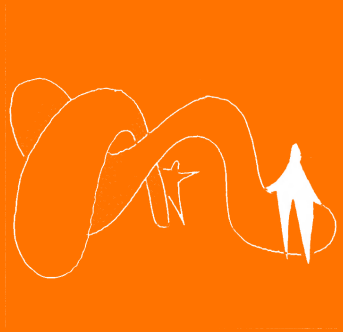
Design Reference

The following pages illustrate a selection of elements, from public art to street furniture, which could be adapted and developed (in terms of structure and dimensions) to provide integrated HVM:

- **Public Art & Culture**
- **Water**
- **Play**
- **Seating**
- **Street Furniture**
- **Topography & Levels**
- **Walls & Fences**
- **Incidental Street Elements**

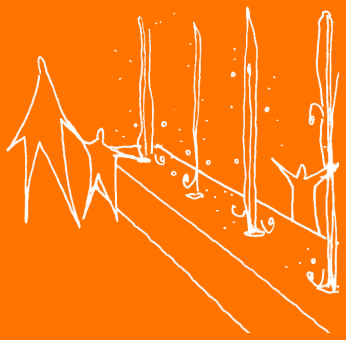
Public Art & Culture





Elements illustrated could be adapted and developed (in terms of structure and dimensions) to provide integrated HVM.

Water









Elements illustrated could be adapted and developed (in terms of structure and dimensions) to provide integrated HVM.

Play












Elements illustrated could be adapted and developed (in terms of structure and dimensions) to provide integrated HVM.

Seating









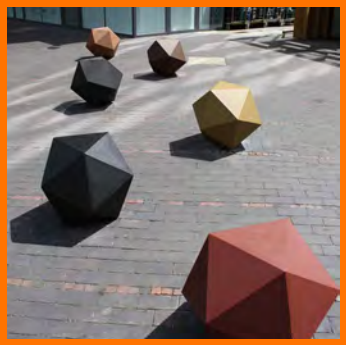


Elements illustrated could be adapted and developed (in terms of structure and dimensions) to provide integrated HVM.

Street Furniture





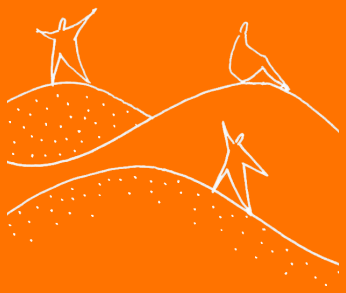




Elements illustrated could be adapted and developed (in terms of structure and dimensions) to provide integrated HVM.

Topography & Levels












Elements illustrated could be adapted and developed (in terms of structure and dimensions) to provide integrated HVM.

Walls & Fences












Elements illustrated could be adapted and developed (in terms of structure and dimensions) to provide integrated HVM.

Incidental Street Elements












Elements illustrated could be adapted and developed (in terms of structure and dimensions) to provide integrated HVM.

Diversity of the Public Realm

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Opportunities for Integrated HVM

Asset Threshold

Urban Scenarios

The following section examines potential strategies and proposals for three urban scenarios, each with varying requirements and constraints.

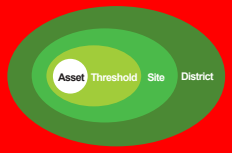
Scenario 1: District
Scenario 2: Site
Scenario 3: Threshold

Site

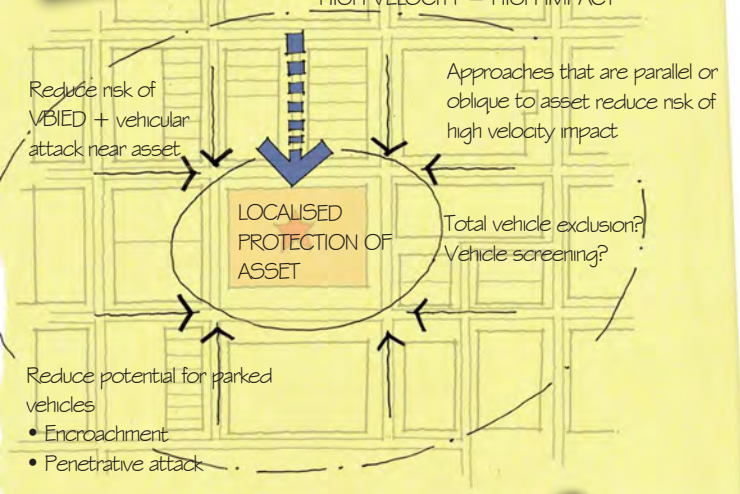
District

Scenario 1: District

Includes opportunities to influence the District, Site and Threshold



Analysis



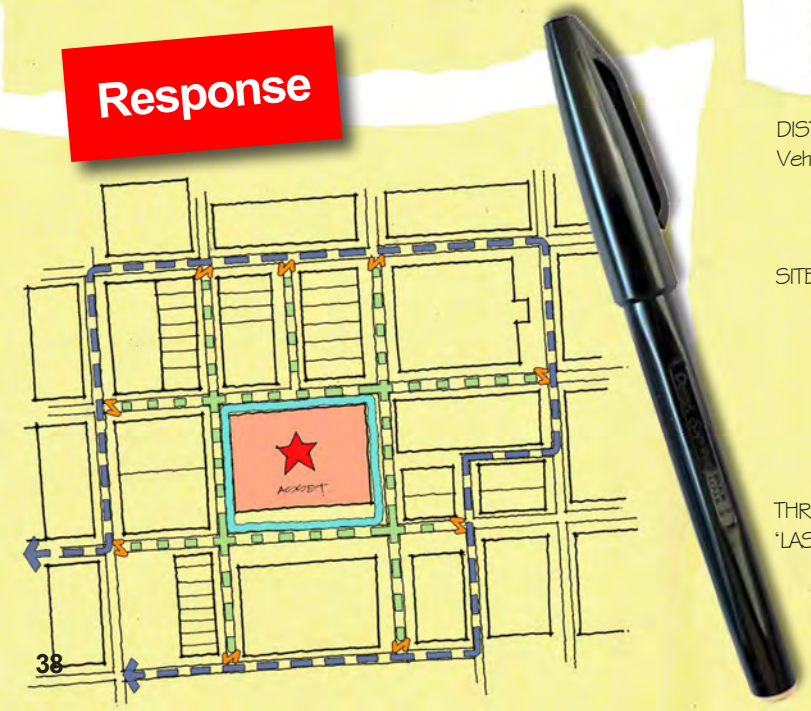
ASSET SET WITHIN TIGHT URBAN LAYOUT / STREETSCAPE MAY BE A CLUSTER OF ASSETS AND THEREFORE SENSITIVE LOCATION.

RISK FROM HOSTILE VEHICLES
- Either VBIED
- Or use of vehicle itself as a weapon

AT DISTRICT LEVEL CONTROLS CAN BE IMPLEMENTED AT A RANGE OF SCALES FOR MAXIMUM EFFECT INCLUDING
- Site planning
- Traffic management
- Access and control management

REDUCES THE ABILITY AND THEREFORE THE RISK OF A HOSTILE VEHICLE ACCESSING THE AREA AROUND AN ASSET

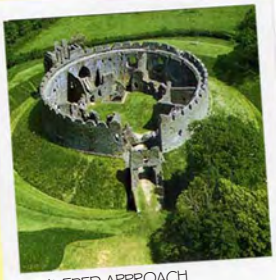
Response



DISTRICT
Vehicle screening
Manual / automated systems
Traffic management / vehicle exclusion

SITE
Emergency access only
Establish maximum stand-off distance in case distnct level controls are breached
Public realm - control vehicular approach speed to asset

THRESHOLD
'LAST LINE OF DEFENCE'
Physical barriers integrated into public realm and building apron
May include: water, seating, furniture, sculptural, arts, play elements



LAYERED APPROACH
DEFENCE STRATEGY

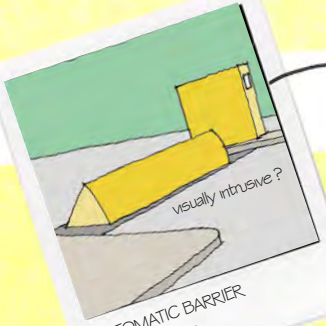
Considerations:
Mobility / pedestrian access
Aesthetics / physical constraints
Costs / maintenance

Opportunities

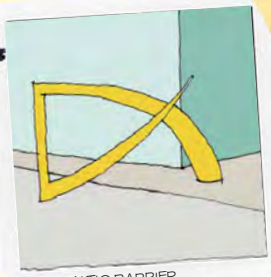
District

TOTAL VEHICLE EXCLUSION?

HUMAN SENTRY
Margin for error?
Duress/deception



AUTOMATIC BARRIER
Overt measure



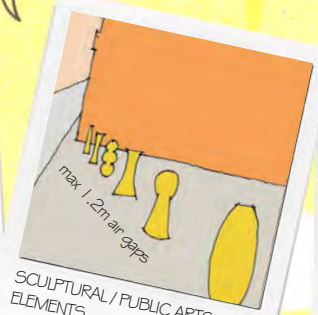
AUTOMATIC BARRIER
Opportunity for sculptural element

gateway threshold element with barrier

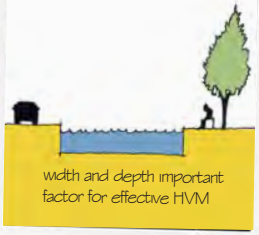
Site

CONTROL APPROACH SPEED OF VEHICLES
Use of chicanes

LEVEL CHANGES
Opportunity for soft landscape



SCULPTURAL / PUBLIC ARTS ELEMENTS

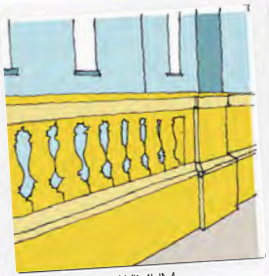


WATER BODY
Passive control

passive.

Threshold

INTEGRATED BARRIERS TO ENTRY
Soft landscape screening



ESTABLISH MAXIMUM STAND-OFF DISTANCES
Every metre counts

PLACES TO RELAX AND ENJOY
multi-functional element

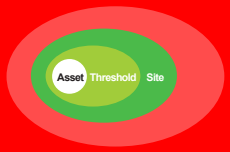
Active

temporary bigger methods

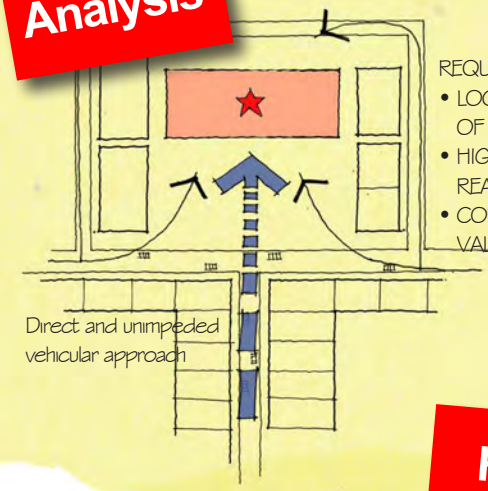
Batten down the hatches.

Scenario 2: Site

Includes opportunities to influence the Site and Threshold



Analysis



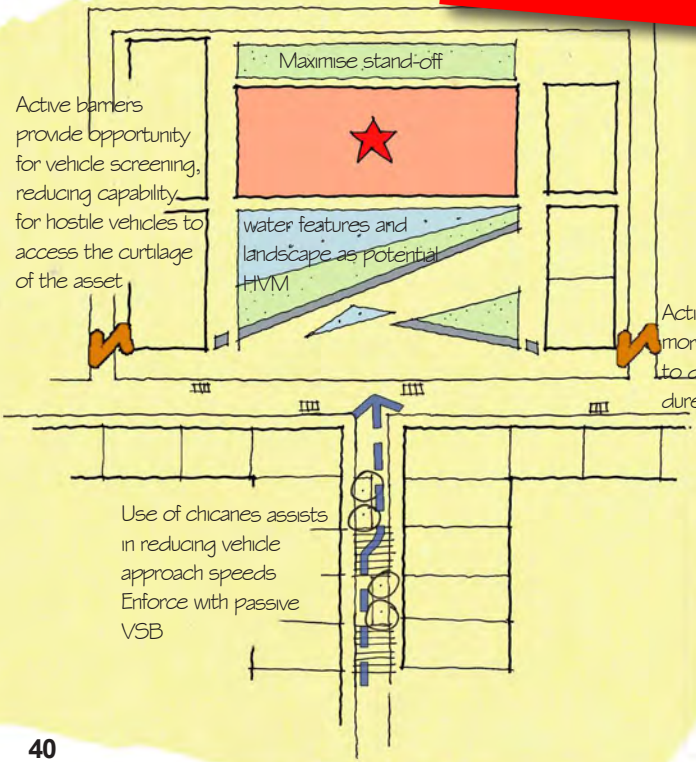
REQUIRES
- LOCALISED PROTECTION OF ASSET
- HIGH QUALITY PUBLIC REALM
- COMMUNITY AMENITY VALUE

AREA OF OPEN SPACE ADJACENT TO AN ASSET.

THE AREA OF OPEN SPACE OR PUBLIC REALM MAY ITSELF BE AN ASSET, ESPECIALLY DURING PEAK PERIODS OF ACTIVITY (EVENTS + FESTIVALS) WHEN ATTACK WOULD RESULT IN INCREASED LOSS OF LIFE.

NATURE'S DESIGN
simple and robust

Response



AVAILABLE TOOLS

AT SITE LEVEL, CONTROLS CAN BE IMPLEMENTED AT BOTH SITE AND THRESHOLD LEVELS

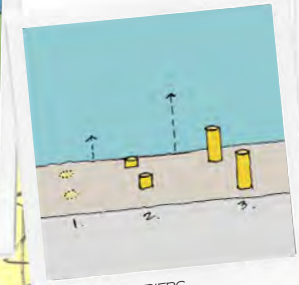
REDUCE HOSTILE VEHICLE APPROACH SPEEDS
Horizontal deflections
Vertical elements

CREATE OPPORTUNITIES FOR MAXIMISING STAND-OFF DISTANCES
Elements integrated into the fabric of the public realm
'Dual / multi-purpose' barriers
Holistic approach to security
Integrated public realm design

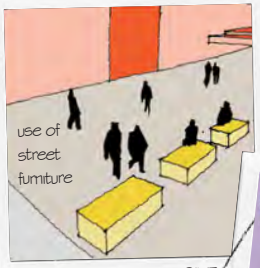
Opportunities

Site

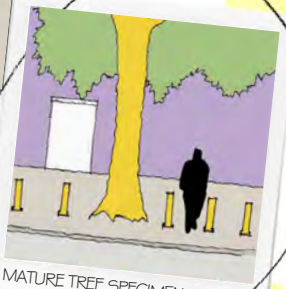
SCULPTURAL ELEMENTS
Ensure mitigation measure is proportionate to threat



ACTIVE BARRIERS
flexibility for changing threats



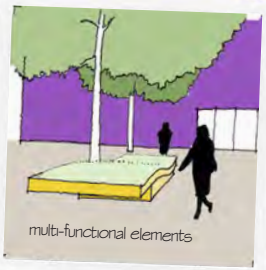
ATTRACTIVE AND INCLUSIVE PUBLIC REALM



MATURE TREE SPECIMEN MAY PROVIDE ADEQUATE PROTECTION

NOTE.
Potential issues with trees as HVM –
- Tree Health
- structural Integrity
- on-going maintenance + continual assessment.

Threshold

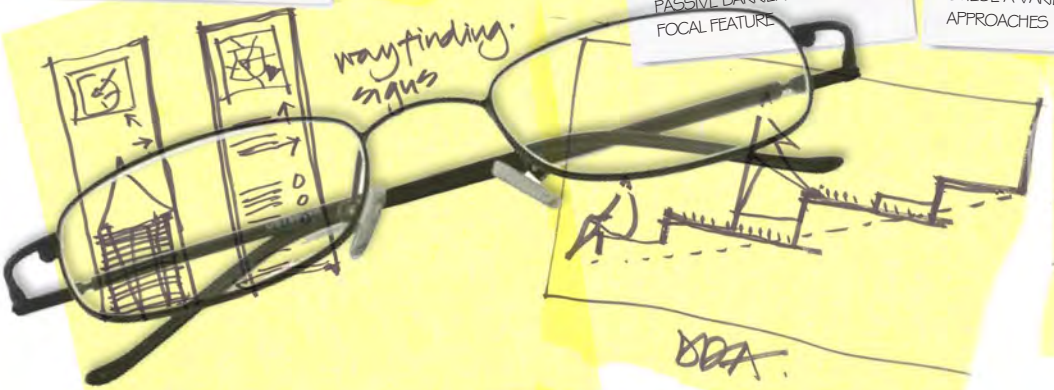


DESIGNED TO ENHANCE SETTING

PUBLIC ART + LANDMARK FEATURES

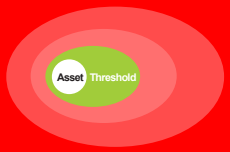
PASSIVE BARRIERS
FOCAL FEATURE

UTILISE A VARIETY OF APPROACHES

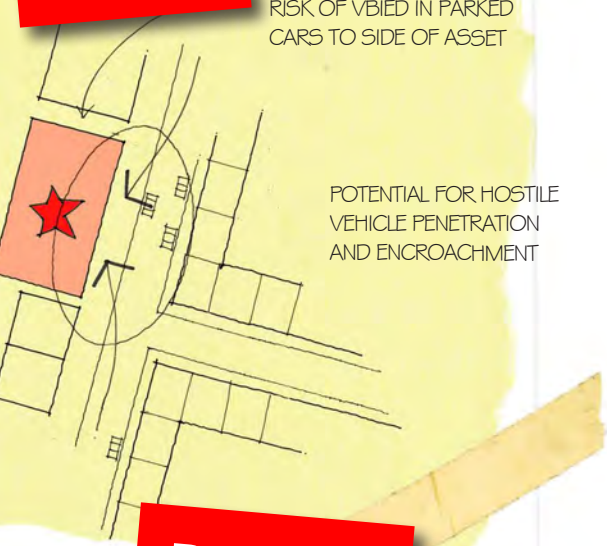


Scenario 3: Threshold

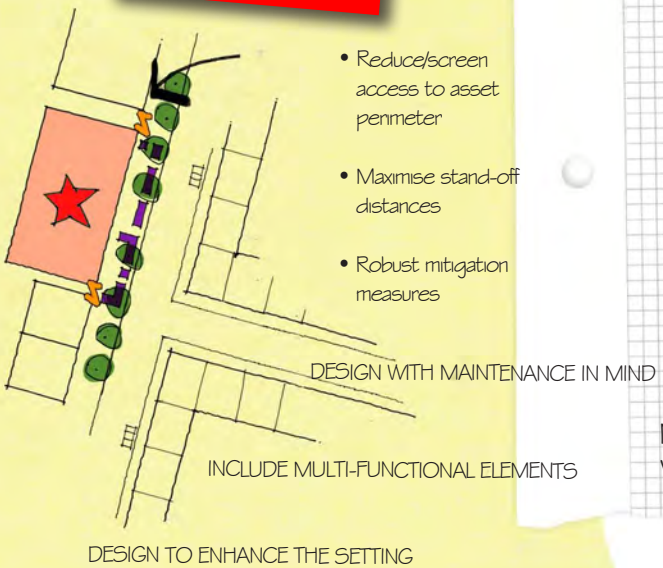
Includes opportunities to influence the Threshold



Analysis



Response



ASSET SET WITHIN TIGHT URBAN GRAIN

THIS SCENARIO LOOKS AT LOCALISED ASSET PROTECTION, WHERE DISTRICT AND SITE LEVEL CONTROLS ARE LESS FAVOURED

'LAST LINE OF DEFENCE'

RESTRICT VEHICULAR ACCESS
MINIMISE EFFECTS OF DAMAGE IN VBIED ATTACK

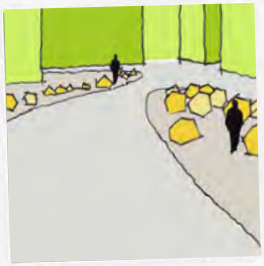
AVAILABLE TOOLS
- Passive barriers
- Active barriers

INTEGRATED DESIGN SOLUTIONS COULD INCLUDE USE OF
- Water
- Sculptural elements
- Flexible play
- Seating areas
- Areas of soft landscape
- Biodiversity
- Shade + shelter
- Topography and level changes
- Accessibilty and inclusiveness (to include access for people with disabilities, pushchairs, the elderly and infirm)
- Site furniture and seating
- Walls + fences

MAXIMUM 1200mm GAP BETWEEN BARRIERS TO PREVENT VEHICULAR ENCROACHMENT

Opportunities

Threshold

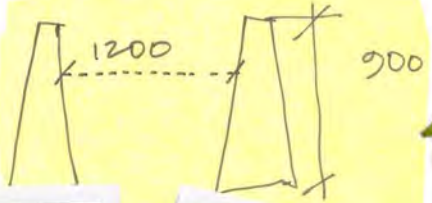


TRAFFIC MANAGEMENT
Passive barriers

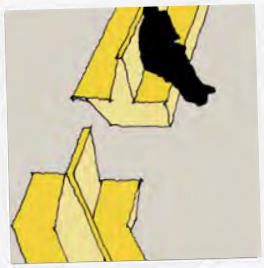
WATER WALL
*Design with maintenance in mind

PUBLIC ART
Integrated seating + flexible play

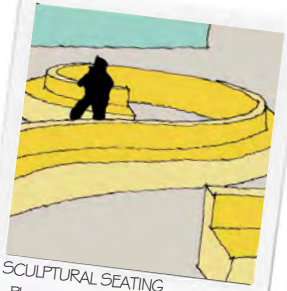
INTERACTIVE PLAY



family of fittings are capable of HVM.



1 200mm MAXIMUM GAP



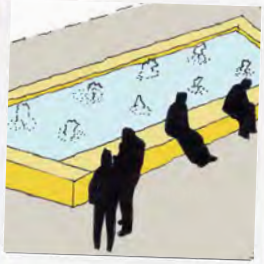
SCULPTURAL SEATING
Places to meet and socialise

SOFT LANDSCAPE
Crisp seating edge

SHADE + SHELTER
USE OF LEVEL CHANGE

Ensure changes in level do not compromise in delivering an inclusive + accessible public realm.

SENSITIVE DESIGN IN RETROFIT SCENARIOS



ANIMATED WATER
Acoustic benefit

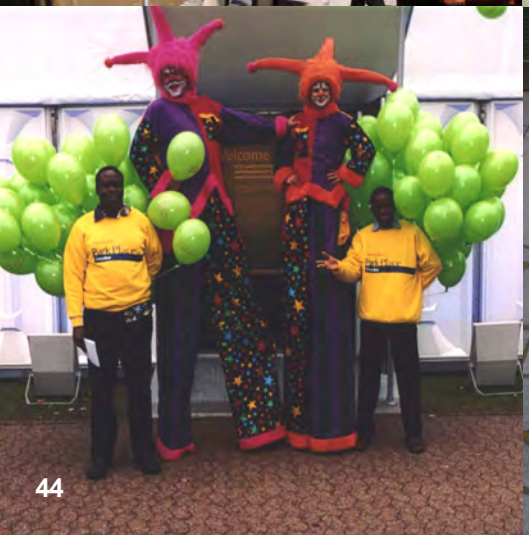
MULTI-FUNCTIONAL
Potential for temporary yet sculptural solutions during peak period of risk?

Historically sensitive barriers where appropriate.









Process

Designer’s HVM Checklist

Designer's HVM Checklist

As with many aspects of public realm design, early consideration of opportunities and constraints in relation to HVM is a crucial part of producing an integrated and holistic security strategy. It is equally important that these considerations are carried throughout the design process to delivery on the ground.

A long term commitment is also required to monitor and maintain the effectiveness of integrated security measures to ensure that design solutions continue to perform their role both in HVM and in providing beautiful places for all to enjoy. Particular issues for consideration at the various stages may include, but are not limited to, the following:

Stage 1
Preparation

Points to consider:

- Identify stakeholders
- Consider liability and due diligence
- Assess threat to the site and its adjacent buildings

- Review planning implications for wider area scheme
- Seek advice from CPNI, CTSAs and / or security professionals where necessary
- Consider wider strategic security proposal if applicable

- Explore options for asset re-location to mitigate the threat
- Assess possibility of security measures extending beyond the client's ownership boundary
- Liaise with adjacent landowners to explore wider scale opportunities
- Review requirement for security as an integral part of the design brief

Stage 2
Design

Points to consider:

- Sympathetic approach to public realm function and appearance
- Holistic approach to HVM
- Consider future flexibility and evolving threats
- Ensure strategic site planning and layout doesn't compromise security
- Develop proposals in the context of existing or proposed local security strategies and plans
- Explore opportunities for play, arts and culture
- Explore potential for multi-functional elements
- Clearly define boundaries to publicly accessible areas
- Review opportunities for vehicular approach and access management
- Consider the adoption of proposals and potential implications of ongoing maintenance
- Ensure security measures do not compromise accessibility
- Coordinate utilities with proposed VSB measures and required footings
- Design with maintenance in mind
- Ensure security measures are proportionate to the threat
- Consider Health and Safety implications
- Designs should be successfully tested or incorporate proven structural design

Stage 3
Use

Points to consider:

- Implement continual assessment of HVM measures against current threats
- Consider preparation of formal management plan
- Coordinate management plan with other local strategic plans
- Periodically review measures against changing threats or other varying circumstances
- Fully inform management and operators of site maintenance requirements
- Consider contingency plans

Part 3

Appendices

Appendix A

Further reference

Centre for the Protection of National Infrastructure (CPNI)
www.cpni.gov.uk
CPNI is the UK Government authority that provides protective security advice to businesses and organisations across the national infrastructure.

CPNI advice aims to reduce the vulnerability of the national infrastructure to terrorism and other threats, keeping the UK's essential services (delivered by the communications, emergency services, energy, finance, food, government, health, transport and water sectors) safer. Without these services, the UK could suffer serious consequences, including severe economic damage, grave social disruption, or even large scale loss of life. CPNI advice is targeted primarily at the Critical National Infrastructure (CNI); those key elements of the national infrastructure which are crucial to the continued delivery of essential services to the UK.

MI5
www.mi5.gov.uk
The Security Service (MI5) is responsible for protecting the UK against threats to national security.

Joint Terrorism Analysis Centre (JTAC)
www.mi5.gov.uk/output/joint-terrorism-analysis-centre
JTAC is a multi-departmental organisation that analyses the terrorist threat for the UK Government.

National Counter Terrorism Security Office (NaCTSO)
www.nactso.gov.uk
NaCTSO is a police unit co-located with CPNI. They are funded by, and report to, the Association of Chief Police Officers (ACPO).

NaCTSO trains, tasks and coordinates a nationwide network of centrally funded, specialist police advisers known as Counter Terrorism Security Advisers (CTSAs). The primary role of these advisers is to provide help, advice and guidance on all aspects of counter terrorism protective security (including HVM) across a variety of sectors.

Home Office
www.homeoffice.gov.uk/counter-terrorism
Responsibility for counter-terrorism sits within the Office for Security and Counter-Terrorism (OSCT), which is part of the Home Office. OSCT provides strategic direction to the UK's work to counter the threat from international terrorism.

The primary objective for OSCT is to protect the public from terrorism by working with others to develop and deliver the UK's counter-terrorism strategy, CONTEST. To achieve this, the OSCT coordinate the activities of many agencies and government departments, as well as having direct responsibility for certain aspects of the counter-terrorist strategy.

Register of Security Engineers and Specialists (RSES)
www.ice.org.uk/rses
RSES has been established to promote excellence in the field of security engineering by providing a benchmark of professional quality against which its members have been independently assessed.

RSES is sponsored by the Centre for the Protection of National Infrastructure (CPNI) and is administered and operated by the Institution of Civil Engineers (ICE).

Department for Transport (DfT),
www.dft.gov.uk/pgr/security
The Department for Transport (DfT) aims to protect the travelling public, transport facilities and those employed in the transport industry, primarily from acts of terrorism.

The DfT aim to retain public confidence in transport security without imposing requirements that impact on the way people travel and is also responsible for transport contingency arrangements in response to any actual or threatened disruption.

Secured by Design
www.securedbydesign.com
The official UK Police flagship initiative supporting the principles of 'designing out crime'.

Design Against Crime (DAC)
www.designagainstcrime.com
DAC is a practice-led design research project that emerged at Central Saint Martins College of Art and Design. The Centre's focus is based on the understanding that design thinking as well as design practice can and should address security issues without compromising functionality, other aspects of performance, or aesthetics.

Landscape Institute (LI)
www.landscapeinstitute.org
Royal Chartered body for Landscape Architects in the UK.

Royal Institute of British Architects (RIBA)
www.architecture.com
Professional Association of Architects in the United Kingdom.

Appendix A Continued

Protective security publications

- The United Kingdom's Strategy for Countering International Terrorism,

  'CONTEST - Pursue Prevent Protect Prepare', HM Government , March 2009
- 'Protecting against terrorism' – Third Edition, CPNI, 2010
- 'Secure in the knowledge', NaCTSO / The Security Service. Publisher London First, 2005
- 'Expecting the unexpected', NaCTSO / Business Continuity Institute. Publisher London First, 2003
- 'Blast Effects on Buildings', D. Cormie / G. Mays / P. Smith (Editors). Publisher Thomas Telford Ltd, 2009
- BSI PAS 68:2010 Impact test specifications for vehicle security barriers
- BSI PAS 69:2006 Guidance for the selection, installation and use of vehicle security barriers
- CWA 16221:2010 Vehicle security barriers. Performance requirements, test methods and application guidance

Guidance on the protection of crowded places, including design & technical issues and working with the UK planning system is available from the Home Office website, counter-terrorism section.

Appendix B

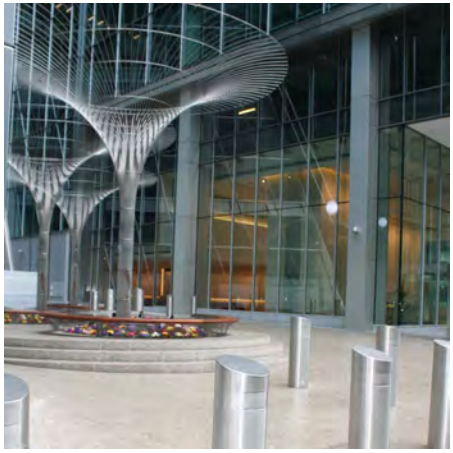
Precedents

This section illustrates a range of HVM measures both in the UK and overseas. The images include a variety of new developments from business districts to sports stadia as well as interventions that are part of existing built environments, both recent and historic. Not all elements illustrated are structural but could be adapted as required to become part of a HVM scheme.

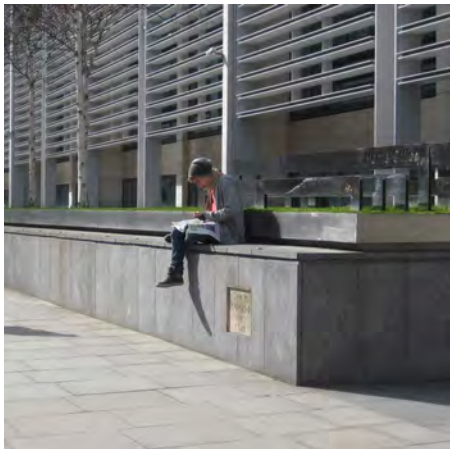
Business District

Precedents

Business District



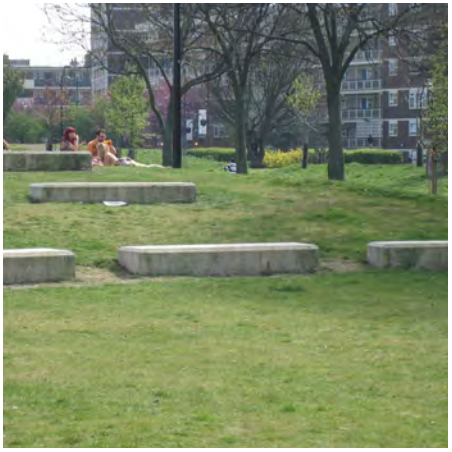
Government Buildings



Government Buildings

Precedents

Parliamentary Building

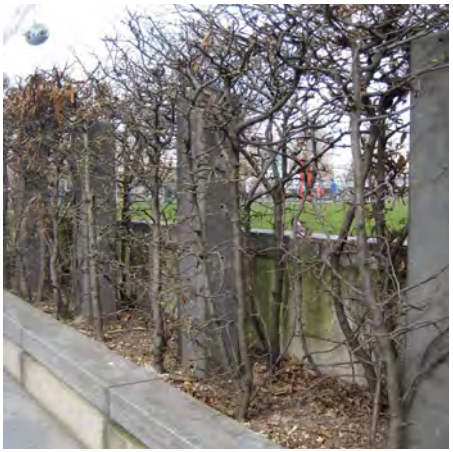


Landform

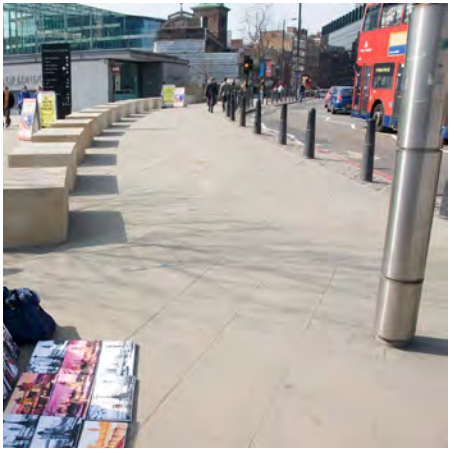
Railway Station

Airport

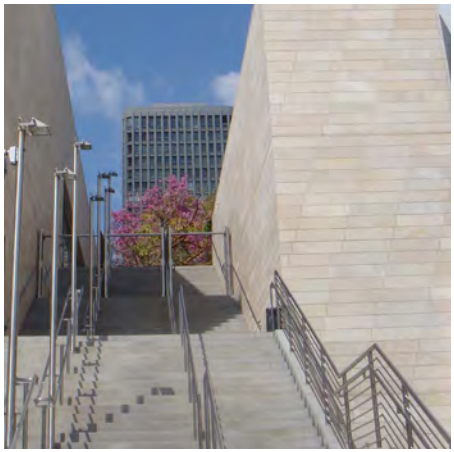
Precedents



Visitor Attraction



Visitor Attraction



Museum

Business Districts

Precedents

Passive Measures

Active Measures

Re-deployable Systems

Re-deployable Systems

Glossary

Blast Stand-Off - Distance from the source of blast.

BSI - British Standards Institution.

CEN - European Committee for Standardisation.

CPNI - Centre for the Protection of National Infrastructure.

Curtilage - The area of land around a dwelling or other structure.

CWA - CEN Workshop Agreement.

District - A region or locality.

HVM - Hostile Vehicle Mitigation.

IED - Improvised Explosive Device. An IED is a bomb fabricated in an improvised manner incorporating destructive, lethal, noxious, pyrotechnic, or incendiary chemicals and designed to destroy or incapacitate personnel or vehicles.

MO - Modus operandi is a Latin phrase, approximately translated as "method of operating".

Motte and Bailey
A form of castle situated on a raised earthwork and surrounded by a protective fence.

Layered Approach - A multi-tiered approach to addressing the opportunities and challenges.

PAS - Publicly Available Specification.

PBIED - Person-Borne Improvised Explosive Device.

Public Realm - The public realm incorporates all areas of a village, town or city to which the public has open access.

Streetscape - The street patterns, furnishings and landscape that form the built environment.

Urban Grain - Pattern (morphology) of streets, buildings and other features within an urban area.

VACP - Vehicle Access Control Point.

VBIED - Vehicle-Borne Improvised Explosive Device.

View Corridor - A wide sightline within an urban context.

VSB - Vehicle Security Barrier.

CPNI

Centre for the Protection
of National Infrastructure