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Guide to Public Safety on Flood and Coastal Risk Management Sites

Science report SC060076/SR1

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Steve Killeen

Head of Science

Executive summary

The perceived fear of prosecution or litigation relating to health and safety regulations has led to the tendency to install risk control measures that are unnecessary, inconsistent, costly and impinge on the public's use and enjoyment of the asset in question. Risk control measures can also intrude into an otherwise natural and beautiful environment and examples of this can be seen at a variety of sites owned and maintained by different organisations across the country.

Regardless of qualifications or experience, those giving instructions on modifying or altering new or existing sites or installing control measures will be a "designer" as defined by the Construction (Design and Management) Regulations 2007 (CDM) and, this status must be recognised by those who fall into this category. An asset manager or assessor specifying the addition or removal of control measures will be a designer and have duties under CDM.

Funds and resources are limited, so the application of sensible risk management and achieving best value is vital for all organisations. While there is a need to use reasonable caution at all times with regards to safety, advice is also needed to show that specifying and installing unnecessary, expensive and inappropriate control measures is not the preferred option.

There is a requirement to maintain continuous monitoring of the risks at each site and monitoring programmes need to be established.

The Scope and Aspirations

This guide seeks to provide advice on what are reasonably practicable steps and measures to take to protect the public on Flood and Coastal Risk Management (FCRM) sites, whilst not impinging upon operational access. It reviews the concepts and processes behind hazard identification and risk assessment and is targeted at the technically competent asset manager/assessor. It seeks to instill confidence and comfort in the asset managers when choosing to install reasonable and appropriate control measures.

The Audience

The key audience for this document is technically trained asset managers and assessors within Defra organisations e.g. Environment Agency, Internal Drainage Boards, Local Authorities and consultants working for these parties. The audience will have key roles in the management process of public safety and it is important that the role required of them is fully understood.

This guide is aimed at helping users identify, eliminate and reduce hazards which would be a risk to the public when they are on or near flood or coastal risk management sites/assets.

The Detail

This guide is principally focused on public safety. Detailed aspects of operational safety are not included. It also concentrates on existing sites rather than new build, as construction and demolition is already subject to the rigours of modern day designer's risk assessments, who are often specialists in this field.

Legislation places duties on organisations to ensure that specified duties are undertaken.

An organisation or department must be able to answer yes to the following requirements:

- That the business (undertaking) is conducted in such a way so as to ensure so far as is reasonably practicable that the public are not exposed to risks to their health and safety;
- That persons who may be affected by your business (undertaking) are given appropriate information as to how the business (undertaking) might affect their health and safety;
- That the hazards the asset has created are identified, as is who might be harmed and how;
- That there is a suitable and sufficient assessment of the risks (risk assessment) to the health and safety of the public and the workforce whilst they are affected by the asset (undertaking);
- That the premises over which the business has control are safe and without risks to health so far as is reasonably practicable;
- That the business takes reasonable care for the health and safety of its employees and the public who may be affected by its acts or omissions whilst employees are at work; and
- That the business records the significant findings of the risk assessment and acts upon those findings.

The guide sets out background legislation for safe design and provides detailed worked examples of the risk assessment process. Case studies are provided of the more complex sites, providing illustrated practical examples of how others have improved the safety of the public.

The Construction (Design and Management) Regulations 2007 places duties on designers and others to eliminate hazards at source and communicate significant residual risks to all other relevant parties. The guide gives assistance on how this can be achieved. It also provides guidance on prioritising the risks and gives photographic examples of the way some common flood and coastal risk management assets have had control measures applied in an attempt to reduce the inherent risks to the public and the workforce employed to maintain the asset. The photographs and examples are intended to illustrate and provide discussion on hazards and risks that are common to any flood or coastal risk management site.

Case law examples are provided to highlight relevant judgments made in favour of the asset manager where accidental actions of the public have been shown to be just an unfortunate incident.

Case/subject studies are provided to illustrate how different organisations eliminate or reduce hazards. Topics/aspects covered include fencing/railings, steps and signs as these are frequently recurring control measures on the majority of assets.

Worked examples of the risk assessment process are included based upon the Health and Safety Executive's five steps to risk assessment. Photographic examples of assets from around the country where different organisations have established their own standards for public safety are provided. The guide gives suggestions as to how public safety might be improved for example with better public education or if a better value solution might be available.

Conclusion

It is important that employees within all organisations recognise early on that they will become a 'designer' when specifying public safety measures. Employees must understand what the definition of a designer is, and the duties and responsibilities that they need to fulfil in terms of hazard identification, hazard elimination and the assessment and recording of public safety risk.

Asset managers, assessors and other personnel involved in specifying public safety control measures must use their experience and judgement to determine the level of protection needed at any given site i.e. specify control measures that are fit for the asset and location concerned. This guide is intended to be used as a support tool to the decisions being taken by the technically competent practitioner.

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1 Introduction

1.1 Purpose and rationale

There is plenty of general health and safety guidance for practitioners and authorities involved with the design and management of infrastructure in public places. There is also guidance for the safety of the public, but this is often written for a specific situation rather than practice appropriate to organisations responsible for Flood and Coastal Risk Management (FCRM) sites. Many organisations have their own operating guidelines or forms.

This guide seeks to provide advice on what are reasonable and practicable steps and measures to take to protect the public on FCRM sites, whilst not impinging upon operational access. This guide starts by reviewing the concepts behind hazard identification and risk assessment and is targeted at the technically qualified user. The guide then presents a variety of case law and case studies, seeking to provide the asset managers and assessors with the confidence to choose and install reasonable and not excessive control measures.

The guide principally looks at public safety. Detailed aspects of operational safety are not included. It also concentrates on existing sites, rather than new build, as new build sites are already subject to the rigours of modern day designer's risk assessments, and the opportunity to eliminate hazards at the outset is far greater. Ultimately, it falls to the asset manager to use their own experience, local knowledge and judgement to determine the level of protection needed at any given site. Section 7 of this guide has sub-sections that a designer, project manager or owner may find useful when seeking guidance on **how** to assess risks, or **what** to take account of or specify.

This guide is intended to be used as a support tool for when decisions are being taken by the technically competent practitioner.

1.2 Scene setting

All those who own or manage flood and coastal defences are required by law to ensure that other people, including the public and trespassers, are not harmed by the assets. There are well defined processes, which must be followed by those responsible, to demonstrate that they have discharged the duties imposed on them by criminal and civil law. The level of remaining risk may vary depending upon local circumstances.

For example, consider weirs or gauging stations. Photographs 1.1 and 1.2 show an example of weirs in a rural environment. Each example displays minimal control measures. Photographs 1.3 and 1.4 show equivalent weirs in an urban location where fencing and signage have been added as control measures.



Rural environments

Photograph 1.1 - minimal environment friendly control measures



Photograph 1.2 - minimal control measures



Urban environments

Photograph 1.3 - gathering point for youths



Photograph 1.4 - supermarket and picnic area

Whilst the hazards from the physical structures presented within the photographs above might be identical, the risks to the public are different. Accordingly, the control measures necessary to keep the risks to the public as low as is “reasonably practicable”, will also vary. It is essential to consider each asset on its own merit.

It is sometimes important to help the public to undertake their own risk assessment by alerting them to the hazards, especially those that are not obvious, and this will be elaborated upon in later sections. While hazards associated with being near water are obvious, the behaviour of the water under different circumstances may not be so clear cut. This is where the asset manager and/or assessor is deemed to have more expert

knowledge than others and they will use this knowledge in determining suitable control measures.

This guide aims to help asset managers and assessors by providing a framework and checklists, to prevent essential considerations from being overlooked and ensuring the decisions made are recorded for the benefit of others. In Section 7 worked examples have been provided so that the reader may assess the impact each asset has on the public and then decide if the control measures are appropriate. There will be no single correct answer. In so far as is “reasonably practicable”, risks should be addressed according to the “hierarchy of control”:

- eliminate the hazard at source;
- substitute the risky with the less risky;
- technical control measures;
- provide information to the public and to the workforce.

1.3 Background to the law and relevant legislation in England and Wales

There are currently many forms of legislation and regulations with respect to the health and safety responsibilities of persons working within the built environment. Many of the generally recognised duties arise from the following four principal sets of legislation and regulations relevant to the safety of the public and people at work.

1. Health and Safety at Work etc. Act 1974 (HSWA)

This is the primary legislation covering occupational health and safety in the United Kingdom. It focuses on the activities of employers, employees and the self-employed, and identifies the duties of individuals for the protection of the general public from health and safety risks associated with work activities, as well as for people at work. Actions arising from these duties should be carried out so far as is reasonably practicable and proportionate to the risk.

2. Management of Health and Safety at Work Regulations 1999 (MHSWR)

These regulations give help on **how** you can discharge your duties. They focus on the requirements of employers to manage their duties as defined in the HSWA (see above). An Approved Code of Practice (ACoP) has been published to provide practical guidance for these regulations.

Amongst many other issues, the ACoP provides guidance as to how you should:

- undertake risk assessments;
- identify hazards;
- reduce the risks where possible (principles of prevention);
- record your thoughts (assessment);
- provide information and communicate;
- review and revise your original thoughts periodically (re-assess).

3. Construction (Design and Management) Regulations 2007 (CDM)

These regulations and their ACoP are provided specifically for the construction industry and those involved with modifying, designing and constructing assets. They advise clients, designers and others of what they must do to comply with the law.

The main aims of CDM are to:

- integrate health and safety into the management of the project;
- improve the planning and management of projects from the start;
- identify hazards early on so they can be eliminated, or risks reduced, at the planning or design stage, and the remaining risks properly managed.

4. The Occupiers' Liability Acts of 1957 and 1984 (OLA)

These acts place a duty on the occupier to take such care as in all the circumstances of the case is reasonable, to see that the visitor will be reasonably safe when using the premises or asset for the purposes for which they are invited or permitted by the occupier to be there (1957 Act). A slightly lesser duty exists on the occupier for trespassers (1984 Act).

An occupier may expect that a member of the public will appreciate and guard against any special risks so far as the occupier leaves him free to do so. An occupier must be prepared for children to be less careful than adults.

In determining whether the occupier of premises has discharged the common duty of care to a visitor, regard is to be had to all the circumstances. However, where harm is caused to a visitor by a danger of which he had been warned by the occupier, the warning may be sufficient if in all the circumstances it was enough to enable the visitor to be reasonably safe.

Other Legislation

Many other forms of legislation exist, all of which must be complied with. However, the four listed above are particularly relevant to the health and safety of the public and staff and are the primary forms of legislation that are the focus of this guide.

1.4 Existing guidance

Most organisations provide safety guidance for their staff in one form or another. Often they will provide operating procedures in an attempt to standardise the way individual organisations operate. The procedures also help prevent staff from overlooking important issues that may be particularly relevant to their business. Existing guidance on safety issues is plentiful.

Finding the appropriate public safety guidance on flood and coastal risk management sites can sometimes be a difficult prospect. This guide has case studies showing how other owners control their residual risks, and gives some worked examples on how control measures are decided upon for the safety of the public without detriment to their own staff or the environment.

However, there is plenty of other guidance, available on the internet, particularly from organisations that exist for the safety of others e.g.

Health and Safety Executive's home page:
<http://www.hse.gov.uk/pubns/index.htm>

Royal Society for the Prevention of Accidents:
<http://www.rospa.com/>

Visitor Safety in the Countryside Group
<http://www.vscg.co.uk/>

National Water Safety Forum
<http://www.nationalwatersafety.org.uk/>

Safety in Design
<http://www.safetyindesign.org/designguides.html>

1.5 Where this guide sits

The hierarchy of law and guidance relevant to this guide can be summarised as follows:

Acts of Parliament

- Health and Safety at Work etc. Act 1974 (HSWA)
- Occupiers' Liability Acts 1957 and 1984 (OLA)

Regulations

- Management of Health and Safety at Work Regulations 1999 (MHSWR)
- Construction (Design and Management) Regulations 2007 (CDM)

Approved Codes of Practice (ACoPs)

- Documents that provide elaboration on the implementation of the regulations. These documents explain what is reasonably practicable. Failure to follow them is not a breach but you must be able to demonstrate (record) that something equally good or better has been provided to successfully defend a case brought under the parent legislation.

Health and Safety Executive (HSE) Guidance

- HSE guidance has no legal status and is only advisory.

Industry Guidance

- These provide specific information for specific tasks. They are often produced using contemporary evidence and feedback from standard operating procedures from prominent users.

This guide falls within the **Industry Guidance** category above.

2 Roles and responsibilities

This section discusses the roles and responsibilities of various parties directly and indirectly involved with public safety by highlighting them in terms of the legislation they need to comply with. Employers and employees are required to comply with the Health and Safety at Work etc. Act 1974, whilst owners and occupiers' need to comply with the Occupiers' Liability Acts of 1957 and 1984. The Construction (Design and Management) Regulations 2007 places additional responsibilities on those who modify existing assets or design new assets used by the public and others.

2.1 Employers and employees

Under the Health and Safety at Work etc Act 1974, all employers must ensure, so far as is reasonably practicable, the health, safety and welfare at work of all employees. It is also their duty to conduct their undertaking in such a way as to ensure, so far as is reasonably practicable, that persons not in their employment but who may also be affected are not thereby exposed to risks to their health and safety.

The Management of Health and Safety at Work Regulations 1999 requires the employer to identify hazards and record what key steps have been taken to reduce the risk of an accident occurring. The record should be of "significant factors". There is no need to record everything one can think of.

Employees must take reasonable care for their own safety.

2.2 Owners and occupiers'

The Occupiers' Liability Acts of 1957 and 1984 do not define who an occupier is. However the "test" for it was under *Wheat v E Lacon & Co Ltd* [1966] AC552; 1 All ER 582 as:

"In order to be an occupier it is not necessary for a person to have entire control or exclusive occupation over the premises. Suffice it that he has some degree of control."

It is therefore reasonable to assume that those who have some degree of control over the layout of an asset are likely to be deemed an occupier under the meaning of both Acts. There may be more than one occupier for any given site.

In addition, if a risk assessment is undertaken by a suitably trained assessor as part of "controlling" the asset, a person who decides what control measures to put in place is a designer under the Construction (Design and Management) Regulations 2007.

Occupiers' should take "such care as in all circumstances of the case, is reasonable to see that a visitor will be reasonably safe when using the premises for the purposes for which the visitor is invited or permitted to be there". The occupier also needs to prevent a visitor straying into danger on adjoining land (owned by others) should the occupier know of any hazards on that adjoining land.

Occupiers' do not have to warn of dangers nor fence hazards when it is reasonable to assume that they are obvious to the visitor (or trespasser). Although children are often less careful than adults and may not be able to read warning signs it is reasonable to expect very young children to be supervised by their parents when adjacent to natural hazards. Section 6.9 "Young children and toddlers" gives more information on acceptable control measures for those less able to identify risk.

2.3 Designers

The Construction (Design and Management) Regulations 2007 (CDM) defines a designer in various ways, one of which is anyone who specifies the use of a particular material or method of work. The designer must be trained and competent for the task in hand. See section 4.1 for further discussion on who might be a designer.

The traditional meaning of a “designer” as only being someone who is a consultant engineer does not apply under CDM. See Section 4.1 for further discussion on designers.

Designers’ responsibilities extend beyond the construction (or modification) phase of the project. They also need to consider the health and safety of those who will use, maintain, clean and finally demolish the asset at the end of its useful life.

CDM also prompts for co-ordination amongst designers and this aspect provides the link between safety for public and safety/co-ordination with operations staff.

To determine if you are a “designer” as defined by CDM, refer to section 4.1.

2.4 Public and visitors

The public will often not know what is required of them as they may not have an understanding of the relevant regulations. However, case law provides advice on what is or is not required for public protection. One of the most quoted case law examples is *Tomlinson v. Congleton Borough Council*.

Section 5.1 provides a fuller account of the judgment in this case but the essence is that visitors voluntarily accept some risks, where the hazards are clear/obvious. There is therefore no need to warn visitors of the obvious hazards, only the less obvious ones, to allow them to assess the risks and make decisions as to whether to accept them.

3 Planning and managing for public safety

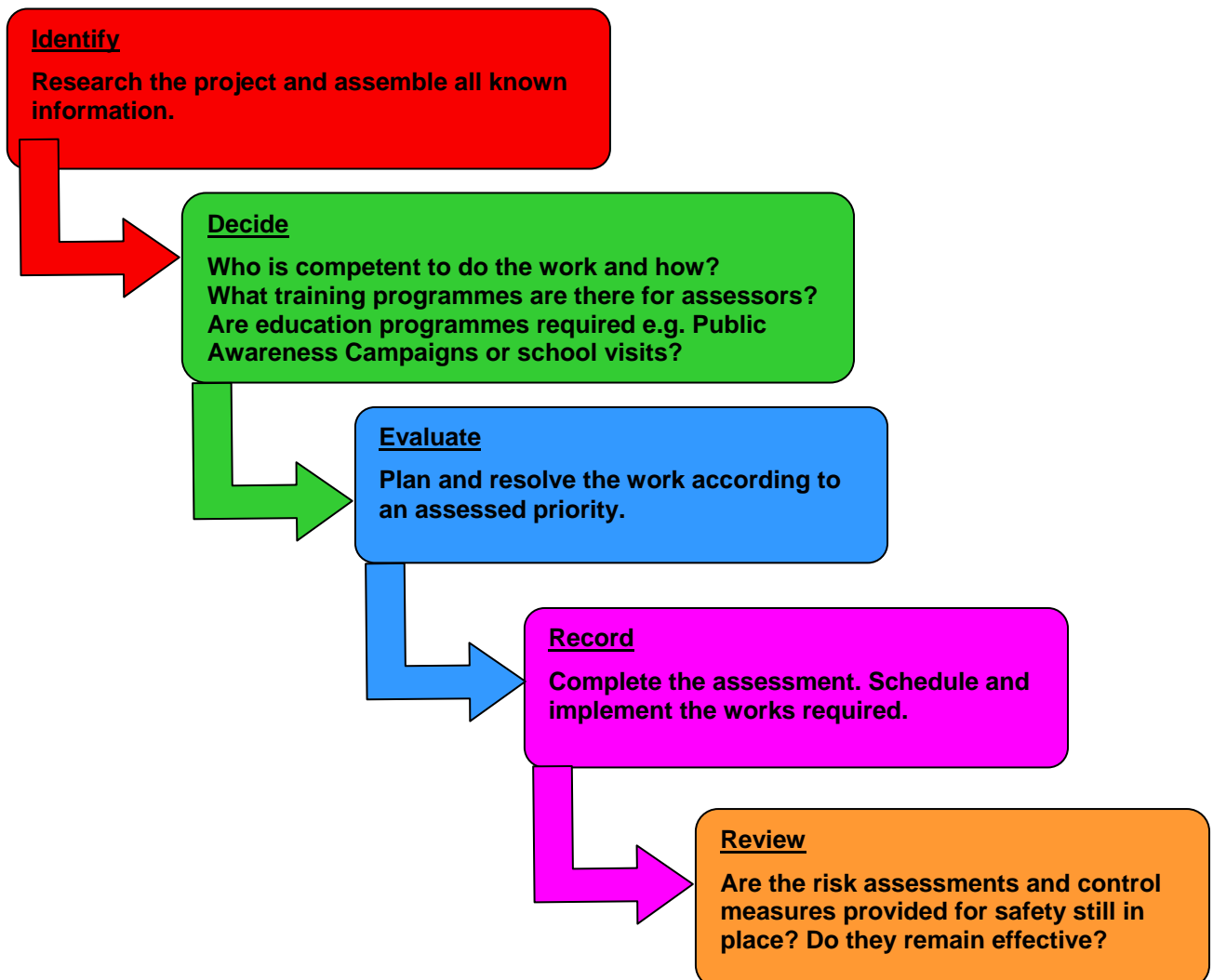
Statistics show that poor planning and managing of projects accounts for a significant proportion of accidents. This section gives examples of procedures that, if overlooked, may put a strain on the timescale of a project, thus leading to the use of shortcuts which become more prevalent on poorly planned projects. Visitor safety is also discussed in this section drawing upon the good and relevant work produced by the Visitor Safety in the Countryside Group.

3.1 Management process

A cost effective business is likely to succeed where others may not. Good planning and management is a key objective for a successful business or organisation. The overall cost of running a business or operating an asset can be reduced where it has been derived from within an effective management system, where the focus is on training, awareness, prioritisation and communication. In addition, a well managed business or operation is likely to be safer than one which is poorly managed. It is therefore essential that not only should the system or process satisfy the law, but that it includes planning for and managing the safety of the public as well as employees.

Recent legislation and guidance has been introduced, concentrating on planning and management throughout the whole lifecycle of the asset, from concept to completion and decommissioning. The effort devoted to planning and managing health and safety however, should be in proportion to the risks and complexity associated with the project. Even at the concept stage the project team needs to be thinking about public safety. A good management system will help in this regard.

Whilst often complex, a management system process for implementing the management of safety can be summarised in five basic steps.



Be aware of your organisation's safety policy. The policy is likely to include an outline of the overall philosophy for health and safety, the organisation of the people and their duties and describe the arrangements (systems and procedures) provided for safety.

3.2 The requirements of CDM 2007

CDM 2007 is primarily aimed at improving the planning and management of projects from the very start. The objective of these regulations is to focus on planning and management throughout the whole process from concept to completion. Regardless of the size of the project CDM 2007 applies. The main aims are to:

- identify hazards early on so they can be eliminated or reduced early in the design process;
- target effort where it can do the most good;
- discourage unnecessary bureaucracy.

The CDM 2007 and its supporting ACoP highlight the need to allocate appropriate time to planning and management. Taking shortcuts due to insufficient time inevitably leads to less safe solutions whether it is during planning, design, construction or scheduled maintenance. Unscheduled or impromptu actions without a plan are often more hazardous than the same actions fully planned and resourced.

Some principal activities that consume valuable time and may well be indirectly related to the safety of any scheme or asset are:

- appointment of competent contracting parties;
- service diversions;
- public consultation;
- public rights of way;
- wayleave rights issues;
- permissions and consents e.g. planning, land drainage, etc.;
- tender periods;
- design periods.

Larger projects will generally have larger budgets. Early appointment of professional assistance such as that provided by the CDM Co-ordinator will often produce a safer project.

Smaller projects, including remedial works on existing assets, will also need to consider the requirements of CDM 2007, and in particular the requirements to use competent designers. **Such projects may use staff to specify works who would not normally consider themselves to be “designers”**, but who, by their training and understanding of the issues, are more than competent to specify the measures needed to safeguard the public.

In the majority of cases, public risk mitigation can be planned for and managed during the serviceable lifespan of the asset when routine maintenance is carried out.

3.3 Checklist of duties

Organisations have a **duty** to ensure:

- their business (undertaking) is conducted in such a way so as to ensure so far as is reasonably practicable that the public are not exposed to risks to their health and safety (HSWA Section 3);
- they give appropriate information as to how their business (undertaking) might affect their health and safety (HSWA Section 3) to persons who may be affected;
- they identify hazards and identify who might be harmed and how (MHSWR 1999 Regulation 3);
- they make a suitable and sufficient assessment of the risks (risk assessment) to health and safety of the public and their workforce whilst they are affected by their asset (undertaking) (MHSWR Regulation 3 (1));
- the premises over which they have control are safe and without risks to health so far as is reasonably practicable;

- they take reasonable care for the health and safety of their employees and the public who may be affected by acts or omissions whilst at work (HSWA Act 1974 Section 7);
- they record the significant findings of the risk assessment and act upon those findings (MHSWR Regulation 3);

The difficulty lies in knowing when you have discharged these duties. The Health and Safety Executive (HSE) provide a guide called “*Five steps to risk assessment*” aimed at helping to achieve this. It is available from HSE’s website, the link for which is in Section 1. In simple terms, you are required to carry out five steps in the process and make sure the actions that result from your findings are carried out and periodically reviewed. Section 4 describes this in more detail.

3.4 Assets on other people’s land

Resolving the different requirements on assets which are operated and maintained on other people’s (third party) land is not always straightforward. An organisation which owns and/or operates and maintains such an asset may desire operational and public safety measures that may conflict with the wishes of the landowner.

In all such cases, the owner/operator of the asset needs to carry out an assessment of the safety hazards and risks in the normal way, although the implementation of any measures to eliminate or mitigate the risks may be affected by the relationship with the landowner.

It is important that the results of any risk assessment are shared with the landowner. It is good practice to use this opportunity to develop and enter into formal agreements with the landowner as to future liabilities. The outcome of such agreements may depend upon the respective land and property rights held by the owner/operator and landowner and the degree to which each can be said to “control” the asset under the terms of the Occupiers’ Liability Acts (see Section 2.2 above).

3.5 The Principles for Managing Public Safety

An excellent set of principles for managing Public Safety has been prepared by the Visitor Safety in the Countryside Group (VSCG). This group was set up in May 1997 to look at how to create safe access to the countryside in ways that do not spoil the landscape and heritage or lessen the visitor’s sense of exploration and adventure.

The VSCG comprises of the following organisations: British Waterways, Cheshire County Council, English Heritage, the Environment Agency, Forestry Commission, Historic Scotland, the National Trust, Natural England, Peak District National Park, the Royal Parks, Royal Society for the Protection of Birds and the Woodland Trust.

All members of the VSCG own extensive land and property and encourage public access. All are committed to protecting and enhancing the environment. The VSCG has produced the following document which is considered to be essential reading for those assessing assets:

Managing Visitor Safety in the Countryside: principles and practice

It is particularly relevant to assets in rural environments but the principles it sets out can be widely applied.

The principles it sets out for managing safety are listed below:

1. *Fundamentals:*

- take account of conservation, recreation and landscape objectives;
- as far as possible, avoid compromising people's sense of freedom and adventure;
- avoid restrictions on access.

2. *Awareness:*

- ensure, as far as possible, that all risks are taken voluntarily;
- inform and educate visitors about the nature and extent of hazards, the risk control measures in place and the precautions which visitors themselves should take.

3. *Partnership:*

- recognise that people taking part in similar activities will accept different levels of risk;
- recognise that risk control measures for one visitor group may create risks to others;
- work with visitor groups to promote understanding and resolve conflict.

4. *Responsibility:*

- it is important to strike a balance between user self-reliance and management intervention;
- it is reasonable to expect visitors to exercise responsibility for themselves;
- it is reasonable to expect visitors not to put others at risk;
- it is reasonable to expect parents, guardians and leaders to supervise people in their care.

5. *Risk control:*

- assess risks and develop safety plans for individual sites;
- risk control measures should be consistent;

- monitor the behaviour and experiences of visitors to review visitor safety plans;
- ensure work activities are undertaken to avoid exposing visitors to risk.

VSCG advice can be found on the web at: <http://www.vscg.co.uk>.

4 Designing for public safety

This section describes who a designer is and sets out some of the principal duties required of them when considering public and operational safety. It gives high level guidance on the identification of hazards and how to carry out a simple risk assessment following the Health and Safety Executive's guidelines.

For more detailed risk assessments reserved for more complex designs, guidance is given on establishing if the hazards identified are probable/likely and if so how severe any harm arising might be.

4.1 Definition of a “designer”

If you recognise at least one of the items below as “you” then you have statutory duties for the safety of the public as a designer.

A **designer** is someone who:

- gives instructions to alter or modify an existing asset;
- specifies how work is to be done including decommissioning and the demolition of existing assets;
- purchases materials for construction where the choice has been left open;
- specifies materials;
- prepares drawings, decides details, produces specifications, compiles Bills of Materials, prohibits the use of items, articles or substances and carries out analysis;
- arranges for their employees or other people under their control to prepare designs relating to a part of a structure.

4.2 Factors influencing safety

While a comprehensive description of designers' duties is beyond the scope of this guide, it is relevant to note that their responsibilities start at the start of a project and continue throughout the operation and maintenance phases, for the whole life of the scheme.

Designers need to ensure that they prepare their design(s) so as to eliminate or reduce hazards as far as reasonably practicable and that they communicate any significant risks to the appropriate people.

Significant risks are not necessarily those which pose greatest risk but those which are:-

- not likely to be obvious to competent designers or contractors;
- unusual; or
- likely to be difficult to effectively control.

This guide focuses on the application of these principles for the safety of the public on Flood and Coastal Risk Management assets.

There are particular factors which affect the safety of the public and groups of people at these sites including:

4.2.1 The natural environment

Many of the assets are located in areas which are particularly sensitive to natural environmental influences, either because, at times, they are exposed to extreme natural conditions, such as wind, tides, storms or high water flows, or because they are in areas of particular importance to people as special places where they can enjoy the surroundings.

A number of these aspects will be expanded upon in the case studies in Section 6 and relate to advising the public of hazards which may not be obvious, such as the rapid ingress of the tide, delayed operation of bypass channels (not necessarily associated with rainfall events), unexpected start up of pump stations or screens, the lack of buoyancy in the white foam on the downstream side of weirs, etc.

4.2.2 The built environment

Almost all assets are built for a specific purpose and need to be maintained so they operate effectively. While their function may not always be entirely obvious to everyone, it is often very important as it tends to involve protecting lives and property during extreme events.

4.2.3 The human environment

Many different groups of people will come in contact with the assets and their safety is a priority. Those groups who need to be considered include construction workers, operational staff, ramblers, the very young, teenagers, the fit, the disabled, the wise and the uninformed. Each group may need to be considered separately and jointly.

The sections below set out how the hazards, to which the different groups may be exposed, can be methodically assessed. They describe a system which needs to be applied with care and thought, adapted to local circumstances. The system starts with the identification of the hazards which are likely to cause harm.

4.3 Hazard identification and elimination

The “Principles of Prevention” (or “hierarchy of control”) are referred to in many publications. In simple terms, the aim during the design process is to **eliminate the hazard** and be aware that different groups of people are likely to be at risk from different hazards. Thereafter, a designer has to reduce the residual risks and replace the dangerous with the non-dangerous. A designer should record the significant residual hazards arising from this process.

A British Standards Institution (BSI) “list” of hazards is shown (BS 8800:2004) in the table below. The hazards are generic such that a competent designer can modify them to suit each asset or project and if developed creatively should be quite thorough. The list is reproduced in its entirety although some hazards are more relevant to public

safety than others. For example: the hazard “Moving air” will include hazards such as doors banging, wind blown dust and debris, exposure to unexpected forces, etc. The hazard “Ingestion” should prompt the designer to make a sufficient and suitable assessment of anti-climb paints, wood preservatives, odours, contaminated land, etc.

With care and without focusing on the trivial, experienced designers and assessors should be able to review these generic hazards and focus quickly on the significant issues during the hazard elimination process. As the project develops, the record of hazards can be expanded as more details become known or the hazard is “designed out”.

The hazard elimination process is a simple process of avoiding risks at source by deciding to do things differently or not at all. Substituting the dangerous for the less dangerous is also to be encouraged.

As slipping, tripping and falling are the most common hazards for the public, the “designer” is advised to focus on these issues by paying particular attention to surface texture, pavement alignment and falls onto hard surfaces.

Table 4.1 List of generic hazards (derived from BS 8800:2004).

Hazards	Examples
Mechanical	
Slippery or uneven surfaces	Leading to falls on a level
Persons falling from height	Distances of the fall from ditches, stairs, ladders, parapets, etc.
Objects falling from height	Tools, materials, stored objects impacting the public
Moving objects	Gates, barriers, machinery, unstable/wobbly pontoons
Moving water	Waves, rivers, excessive rainfall
Moving air	Wind and its action, doors banging, overturning, trees, slender walls/columns, narrow walkways
Machinery movement	Automated movement, rotating shafts, reciprocating pushrods, escalators, conveyors and guillotine actions
Manual lifting	Heavy units, awkward shapes, awkward gates
Poor ergonomics	Work space, passing points, narrow spaces, shortcuts
Entrapment	Poor access or egress, incoming tides, rip tides, sandbanks
Transportation	Vehicle movements, parking arrangements, lines of sight, footways entering blind spots
Stored energy	Coiled springs, closers, counterbalances
Chemical	
Lack of oxygen	Confined spaces
Gas enriched areas	Poor ventilation, carbon dioxide, carbon monoxide, battery charging
Contact with hazardous substances	Touching, working with absorption of chemicals
Ingestion	Entry via mouth, e.g. paint thinners, wood preservative, anti-climb paint
Degradation of stored materials	Oxidation of materials, fumes, acids, spontaneous combustion
Biological and Psychological	
Inhalation	Odours, fumes, dust
Transmitted by personal contact	Needles/fluids
Ingestion	Contaminated food, personal hygiene
Excessive workload	Repetitive maintenance, too onerous
Lack of communication or control	Uninformed repetition of mistakes
Physical violence, bullying, intimidation	By the public and in the workplace
Unfamiliarity	Uncertainty of access, egress and how things operate

4.4 Toolkit for assessing risks

The Management of Health and Safety at Work Regulations 1999 requires suitable and sufficient risk assessments to be undertaken. The Health and Safety Executive (HSE) suggests that this may be undertaken in a simple way and suggests a “*Five steps to risk assessment*” process is used to achieve this.

Take care that the simple principles contained in HSE’s advice are not overlooked as you develop your own detailed bespoke methods for carrying out such assessments.

Whether you are assessing the risk of harm to the public, your staff, your workplace or indeed anything, the steps are broadly identical:

Step 1	Identify the Hazards
Step 2	Decide who might be harmed and how
Step 3	Evaluate the risks and decide on your precautions
Step 4	Record your findings and your proposed actions and then implement them
Step 5	Review your assessment and update if necessary

Source - Five steps to Risk assessment HSE INDG 163.

The risks to the public may vary significantly due to your methods of working, or how the asset is to be visited. Be sure you record how you propose to control each risk for your specific situation (Step 4). It is vital that the steps you propose to reduce the risks for one group of people (Public) do not adversely affect the risks to another group (Maintenance staff) to any significant extent.

A simple risk assessment form based on the HSE’s “*Five steps to risk assessment*” is shown in the table below. Provided it has been well thought out (suitable and sufficient) this is all that is needed to satisfy current legislation for risk assessment:-

Table 4.2 Example of prioritising risks and environmental impact.

Name of Site: ID No./Grid Ref.:	Name of Assessor:	Date of Assessment:	Date of next Assessment:	Frequency of monitoring* (months):
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Describe the site/element with relevant factors (scene setting):

List the principal natural hazards over which you have no control:	a.
	b.
	c.

List all the additional hazards for each group of people:	Assessment without control measures fitted or precautions arranged:			List how you intend to reduce the risk:	Environmental impact: Not Significant Minor Moderate Major Severe	Assessment after control measures fitted or precautions arranged (This will give you a prioritised list – the significant ones to be communicated to others)			Initial here to confirm the measures adopted for one group do not adversely affect another group:
	Likelihood	Severity of harm	Risk rating			Likelihood	Severity of harm	Risk rating	
Group 1 (Public):									
Group 2 (Operations):									

Likelihood	Very unlikely	A single known occurrence or less		Severity of harm	Minor	First aid only
	Unlikely	Occasional recorded occurrence			Moderate	Off work for 3 days
	Likely	Occurrences typically every 5 years			Major	Detained overnight by a medical practitioner
	Very likely	Occurrences typically every 6 months			Fatal	Death or life shortening

Risk Derived from Table 4.3

* Checking that risk control measures specified remain in place

Although it is not a requirement of legislation or the HSE, more complex assessments seem common within organisations. Personnel often spend too much time identifying the likelihood of the hazard occurring and the severity of the injury likely to be sustained. This has been found to be a common discussion point within offices and assistance on these issues is contained below. The intention of these more complex assessments is to help with identifying the more significant residual risks so they can be dealt with early on in the process.

4.4.1 Estimating Risk

Risks are estimated according to their likelihood and potential to cause harm. It is done by combining the following two categories:

- likelihood of harm occurring
- severity of harm

Only reasonably foreseeable risks need to be considered. Extremely unlikely events do not need to be considered. Table 4.3 provides guidance on the difference in likelihood and severity of harm.

4.4.2 Likelihood of harm

The likelihood of harm to the public and maintenance staff is a subjective issue. A number of groups of 'public' exist such as those participating in watersports, ramblers, the disabled, etc. all of whom should not be overlooked when considering likelihood of harm. Each group will have a different view of the same hazards.

There are recorded incidences where control measures provided for the safety of the public have increased the risk to the maintenance staff. Consultation suggests that notwithstanding the complexity of the maintenance work itself, the ease of access to the asset can be directly related to the safety of the operation. The more difficult it is to gain access to the asset the more likely harm will result. This should be borne in mind when erecting physical barriers across access routes used for maintenance.

Deciding upon the **likelihood** of harm should be established using straightforward principles. Often this can be as simple as referring to historical records arising from similar circumstances. See column 1 of table 4.3 for an example of four categories of likelihood based on previous records.

4.4.3 Severity of harm

This is more subjective than the likelihood of harm. For an identical hazard, one member of the public may trip and fall and require first aid (minor harm) while another may require a visit to a medical practitioner and incur the equivalent of an "over three day injury" (moderate harm). It is important that you do not get overly absorbed with the scoring matrix; instead concentrate on the "what further action is necessary and eliminate the hazard" aspect of the process. In this case, look for ways of removing the trip hazard.

Try adapting the principle established in section 4.4.2 using historical records or local knowledge to establish if a three day injury is unlikely or likely. Concentrate on the hazards associated with more serious likely outcomes in developing your risk assessment.

Note that it is unusual for severity of harm to change even after installation of control measures. Control measures tend only to influence the likelihood of harm.

4.4.4 Environmental Impact

The Countryside Act (1968) requires that when exercising any functions relating to land, there shall be “*due regard to the desirability of conserving the natural beauty and amenity of the countryside*”.

As this requirement may seem to be at odds with the reduction of risk to safety so far as is reasonably practicable, it will mean that when specifying control measures care should be taken such that the overriding natural beauty of the countryside is conserved.

The significance of the effect control measures have on the environment is dependant upon the sensitivity of the environment (e.g. Area of Outstanding Natural Beauty) and the magnitude of the change to the environment (e.g. dense palisade fencing).

Matrices exist for determining the impact but these are often subjective as with the risk matrices discussed elsewhere in this guide. Control measures are rarely beneficial to the natural beauty of the environment and therefore the following categories of environmental impact should be considered to be adverse rather than beneficial.

- not significant;
- minor;
- moderate;
- major; or
- severe.

Those assets with a rating of major or severe impact should be referred to an environmental specialist for further advice.

4.4.5 A simple risk estimator

Table 4.3 below is an example of a risk estimator provided by the British Standards Institution (adapted from a combination of Tables E2 and E3 from BS8800:2004).

It is good practice to prioritise the risks using a matrix such as table 4.3 as it permits the user to focus on the most risky events first when considering the mitigation measures necessary to reduce the risk yet further.

The categories of “harm” or “likelihood” are not defined by law and are subjective. Different organisations have developed their own definitions for their own purposes. It is important that mitigation measures focus on the most likely risks first, whatever the hazard.

Table 4.3 Risk estimator (derived from BS 8800:2004).

Likelihood of harm	Severity of Harm			
	Minor injury (First Aid only) or temporary ill health	Moderate injury e.g. off work more than 3 days or ill health e.g. minor fractures	Major injury or chronic ill health e.g. major fractures, detained overnight.	Fatal injury or life threatening disease e.g. amputations, Weil's disease, life shortening incidents.
Very Unlikely Single known occurrence	Very Low Risk Acceptable if as low as reasonably practicable	Very Low Risk Acceptable if as low as reasonably practicable	Low Risk Acceptable if as low as reasonably practicable	High Risk Reduce to tolerable level and record risk assessment
Unlikely Occasional recorded occurrences	Very Low Risk Acceptable if as low as reasonably practicable	Low Risk Acceptable if as low as reasonably practicable	Medium Risk Reduce so far as reasonably practicable and record risk assessment	Very High Risk Unacceptable without substantial risk mitigation measures
Likely Occurrences typically every 5 years	Low Risk Acceptable if as low as reasonably practicable	Medium Risk Reduce so far as reasonably practicable and record risk assessment	High Risk Reduce to tolerable level and record risk assessment	Very High Risk Unacceptable without substantial risk mitigation measures
Very Likely Occurrences typically every 6 months	Low Risk Acceptable if as low as reasonably practicable	High Risk Reduce to tolerable level and record risk assessment	Very High Risk Unacceptable without substantial risk mitigation measures	Very High Risk Unacceptable without substantial risk mitigation measures

This matrix can be adjusted to suit the needs of different organisations taking into account that frequency of injury will be dependent on the population at risk.

It is worth noting that a fall into water and drowning are two separate hazards; falling and drowning. The falling may cause moderate or slight harm, yet the harm from drowning is extreme. The likelihood of falling may be reduced by providing a wider footpath, while drowning can be reduced by the installation of refuges or grab chains.

Take care that the control measures provided for the safety of the public do not reduce the safety of the operation and maintenance staff. One must not be at the expense of the other. A suitable and sufficient risk assessment will look at the issues from the point of view of all groups of people at risk. Most inevitable residual risks will become tolerable if a safe system of work is developed, recorded and adhered to during maintenance periods.

Make sure that the access for maintenance is not made more difficult and therefore more risky after the control measures have been decided upon.

Safe systems of work must be developed in conjunction with the risk assessments made.

Table 4.2 above introduces a simple method for prioritising the risks. The table has been created as an example of developing the simple “*Five steps to risk assessment*” into a method for prioritising risks and therefore the actions required. The important point regarding the risk assessment process is to focus on those risks that matter. Using this table is not prescriptive although the principles it describes are good practice.

You are expected to consider a realistic combination of reasonably foreseeable events, but there is no need to consider extremely unlikely events unless the potential consequence is disastrous.

Any scoring system, such as the product of two factors, a colour coded system (red, amber, green for example) or a High, Medium and Low system that assists in the judgement of prioritising risks is a useful aid but not a statutory requirement.

4.5 Checking the end result will be acceptably safe

A substantial amount of discussion and problem solving is often carried out to ensure large projects are acceptably safe, with established safe systems of work recorded in Health and Safety files and such like. Nevertheless, consider arranging for a final safety audit to be performed on the asset prior to final handover.

By virtue of CDM, the larger projects will be under the control of persons very experienced in safety. The CDM Co-ordinator will have been appointed at the outset of the project and will help to make sure that competent personnel will be appointed to the appropriate roles. In these circumstances, the following actions by the owner, assessor or designer will help make the end result safe:

- seek advice from the CDM Co-ordinator;
- where possible try to seek advice from a competent contractor during the design stage on safe methods of construction (Early Contractor Involvement);
- plan to hold design reviews regularly, with a safety item on the agenda. Invite all parties, including the ultimate client, to design review meetings;
- make the county council, local councils and end users aware of any public safety issues at an early stage;
- check the need for modifications or diversions to existing public rights of way and ensure that the public can be segregated from the works;
- specify sufficient working space for the works;
- record all significant safety outcomes and record who is responsible for the actions.

Small projects or minor modifications to existing assets rarely have the luxury of benefiting from detailed discussions and a final safety review. In these circumstances consider undertaking the following actions during the design period and working lifetime of the asset:

- visit the area involved to determine local issues;
- seek advice from a specialist safety representative;
- check for accident statistics on similar assets;
- review and update your risk assessment according to your findings (dating your review);
- periodically check the HSE's website for free health and safety information.

4.6 Abandonment and decommissioning

The decision to abandon, decommission or withdraw maintenance from an existing asset is beyond the scope of this document. However, such a decision may have an impact upon the residual risks the public have become used to at the site.

It is important that the abandonment and decommissioning thought process is fully recorded. Following the standard “*Five steps to risk assessment*”, take time to make a suitable and sufficient assessment of the following issues and record the findings:

- inform all interested parties (e.g. landowners, tenants, highway authority, local authority, the public, Natural England, English Heritage or equivalent) of the reasons why the asset is to be decommissioned;
- assist the landowner to develop a suitable future management option, if they show an interest in continuing with its maintenance;
- if assets are abandoned and not maintained by the landowner record why they will not pose additional hazards to the public as they deteriorate;
- where the risk of injury to the public increases if the asset is abandoned try to eliminate the hazard during the decommissioning process, recording the actions taken;
- in conjunction with the local highway authority check and record that public rights of way are not made unsafe in the process of abandonment;
- visit site and re-assess.

4.7 Communicating residual hazards

A fully completed risk assessment is not the whole answer to a safe project or asset. The risk assessment is a tool for forming a structured, well thought out management plan. The management plan may require an action plan which must be communicated to those affected by the asset or project.

Crucially, a suitable and sufficient risk assessment will produce the need for actions and you have a duty (under the Health and Safety at Work etc Act 1974) to implement them. Even after the hazard elimination process is completed and the control measures have been installed some risks will remain. These are known as residual risks.

Categories of hazards include:

- natural hazards;
- trivial hazards;
- obvious hazards (to those not disadvantaged or young);
- significant (and not obvious) hazards.

The phrase “***The right information for the right people at the right time***” is written in the Approved Code of Practice (ACoP) for CDM. This message is saying don’t simply distribute risk assessments, forms, lists of eliminated hazards, etc. in an attempt to give everything to everyone and hope for the best. It is important that the significant residual hazards are communicated quickly and effectively to the correct personnel.

CDM requires everyone appointed to the project to be “competent” and therefore only ***unusual or unexpected*** significant hazards discovered by the designer need to be communicated to the team and in due course the public.

A good way of communicating the residual risks to everyone involved in designing for public safety is to use the construction/record drawings or sketches as your medium for communication. Table 4.4 below shows a successful method of communicating the significant

residual hazards without the need to copy forms, files and documents to all and sundry. Consider adding similar “information” to all your construction/record drawings.

Table 4.4 Communicating residual hazards.

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION
<p>In addition to the hazard/risks normally associated with the types of work detailed on this drawing, note the following significant residual hazards or risks:</p>
<p>CONSTRUCTION</p> <ul style="list-style-type: none"> - RECORD HERE the residual risks the contractors building your designs will face which ARE NOT usual construction hazards. They will be obtained from the significant residual risks identified on the Designer’s Risk Assessment or risk register. - For Example: <ul style="list-style-type: none"> - <i>Unavoidable noxious fumes from specified (and essential) paint;</i> - <i>Damaged flap valves permitting tidal waters into manholes;</i> - <i>Boating movements (speed X and tonnage Y) affecting craneage and access;</i> - <i>Flash flooding/strong stream advice at 2 hours notice;</i> - <i>Fibres/dust present from previous building usage; and</i> - <i>Strong rip tides are common here, here and here.</i>
<p>MAINTENANCE/CLEANING</p> <ul style="list-style-type: none"> - RECORD HERE any special requirements expected of the client, needed to maintain or clean the asset shown on this drawing. - For Example: <ul style="list-style-type: none"> - <i>Check risk control measures are in place and remain functional</i> - <i>Flash flooding can inundate manholes X, Y and Z;</i> - <i>Egress points need checking 6 monthly;</i> - <i>Anchor points X, Y and Z are provided for special equipment (models a, b and c); and</i> - <i>Information regarding cleaning of XYZ is contained within the H&S file or O&M manual.</i>
<p>DECOMMISSIONING/DEMOLITION</p> <ul style="list-style-type: none"> - RECORD HERE the special requirements expected of the client, needed to decommission or demolish the asset shown on this drawing. - For Example: <ul style="list-style-type: none"> - <i>Walls X, Y and Z to be propped prior to removal of roof;</i> - <i>Lighting column to be supported when bolts removed;</i> - <i>Flood defence to contour height X will be lost if removed;</i> - <i>X, Y and Z paint is hazardous to skin/eyes/flammable; and</i> - <i>Footbridge spanning the walls acts as a prop for the walls.</i>
<p>It is assumed that all works will be carried out by a competent contractor, working, where appropriate, to an approved method statement written in cognisance of the current HSE performance standards.</p>

On as-built drawings the construction information can be removed in favour of emphasising the safety, health and environmental information associated with longer term operation and maintenance and usage/public access.

5 Case law

Section 1.3 provides the background to the law and legislation pertaining to safety. No matter how well written the law/legislation may be, there will inevitably be different interpretations. The official interpretations are those from the courts when a case is brought before them – known as case law. A range of case law examples are provided below, with the pertinent points for public and operational safety highlighted in **bold font**. This selection of case law examples is intended to provide a level of comfort to the asset manager and assessors making judgements about control measures.

The text for sub-sections 5.1 and 5.2 was written by the VSCG Administrator. Text for sub-section 5.3 was written by the Royal Society for the Protection of Birds. Each was published on VSCG's website, from which they have been reproduced.

5.1 Brereton Heath Country Park

Tomlinson v Congleton BC [2004] 1 AC 46



Photograph 5.1 Brereton Heath Country Park

An attractive lake bordered by sandy beaches forms the centrepiece to Brereton Heath Country Park in Cheshire. Families visit the park to play on the beach. It was common for people to swim in the lake, ignoring the Council's "no swimming" signs and the advice of park rangers. Mr Tomlinson ran into the water up to his knees and plunged forward. He struck his head on the sandy bottom of the lake, breaking his neck and was rendered tetraplegic.

The case examined the liability of the Council under OLA57 and 84 in respect of dangers due to the state of the premises or things done or omitted to be done on them.

The judges found that there was nothing about the lake at Brereton Heath which made it any more dangerous than any other ordinary stretch of open water in England. There was nothing special about its configuration; there were no hidden dangers. It was shallow in some places and deep in others, but that is the nature of lakes. Nor was the council doing or permitting anything to be done which created a danger to persons who came to the lake. No power boats or jet skis threatened the safety of either lawful windsurfers or unlawful swimmers. **It seems that Mr Tomlinson suffered his injury because he chose to indulge in an activity which had inherent dangers, not because the premises were in a dangerous state.**

Lord Hoffmann observed:

“The risk was that he might not execute his dive properly and so sustain injury. Likewise, a person who goes mountaineering incurs the risk that he might stumble or misjudge where to put his weight. In neither case can the risk be attributed to the state of the premises. Otherwise any premises can be said to be dangerous to someone who chooses to use them for some dangerous activity.”

Even if the risk had been attributable to the state of the premises the question of what amounts to “such care as in all the circumstances of the case is reasonable” depends upon assessing, as in the case of common law negligence, not only the likelihood that someone may be injured and the seriousness of the injury which may occur, but also the social value of the activity which gives rise to the risk and the cost of preventative measures. These factors have to be balanced against each other.

It is necessary to take into account the social value of the activities which would have to be prohibited in order to reduce or eliminate the risk from swimming.

“The majority of people who went to the beaches to sunbathe, paddle and play with their children were enjoying themselves in a way which gave them pleasure and caused no risk to themselves or anyone else. This must be something to be taken into account in deciding whether it was reasonable to expect the council to destroy the beaches.”

There is also the question of whether the council should be entitled to allow people of full capacity to decide for themselves whether to take the risk. Mr Tomlinson was freely and voluntarily undertaking an activity which inherently involved some risk.

Lord Hoffmann’s opinion is that

“It will be extremely rare for an occupier of land to be under a duty to prevent people from taking risks which are inherent in the activities they freely choose to undertake upon the land. If people want to climb mountains, go hang-gliding or swim or dive in ponds or lakes, that is their affair. Of course the landowner may for his own reasons wish to prohibit such activities. He may think that they are a danger or inconvenience to himself or others. Or he may take a paternalist view and prefer people not to undertake risky activities on his land. He is entitled to impose such conditions, as the Council did by prohibiting swimming. But the law does not require him to do so.”

“...there is an important question of freedom at stake. It is unjust that the harmless recreation of responsible parents and children with buckets and spades on the beaches should be prohibited in order to comply with what is thought to be a legal duty to safeguard irresponsible visitors against dangers which are perfectly obvious.”

5.2 Hampstead Heath swimming case

Hampstead Heath Winter Swimming Club v The Corporation of London [2005] EWHC 713 (Admin)



Photograph 5.2 **Hampstead Heath**

The Hampstead Heath Winter Swimming Club won the right for its members to swim when London Corporation's lifeguards were not on duty at a pond on the heath. The judge ruled that:

“if an adult swimmer with knowledge of the risks of swimming chooses to swim unsupervised, the risks he incurs are the result of his decision and not of the permission given to him to swim. The criminal law respects the individual freedom upheld by the House of Lords in Tomlinson.”

5.3 Cwm Clydach case

Mills-Davies v Royal Society for the Protection of Birds (RSPB) March 2004



Photograph 5.3 Cwm Clydach

Cwm Clydach is an RSPB nature reserve in South Wales. Mr Mills-Davies, a visitor walking on a trail cut through the more remote part of the woodland reserve, apparently tripped on a small sapling stump left behind from the path clearance work. He alleged that he fell face-first onto another stump, which caused the loss of sight in one eye. The judge dismissed the claim on the basis that Mr Mills-Davies failed to prove that the accident occurred in the manner alleged by him. However, and more importantly, the judge also went on to consider the scope of RSPB's duty assuming that he had satisfied the court that the accident happened in the way he alleged.

The judge held that even in this case, the claim would still have failed. It was found that stumps such as these were commonplace in woodlands and on woodland trails and the presence of such a stump on the footpath was not a breach of duty under the 1957 Occupiers' Liability Act. **This took into account the nature of the area in question, the type of visitor who could be expected there, the small number of visitors who walked in this part of the reserve and the absence of any previous accident or complaint.** The judge held that the accident was not reasonably foreseeable and even if it was the risk was very small. It was also unreasonable to require the RSPB to remove all protruding stumps and all other sharp pieces of bracken, sticks and other materials resulting from path clearance and subsequent maintenance work that could conceivably cause a penetrating injury.

5.4 Conclusion: Case law and best practice

In general, the Courts have been reluctant to conclude that the occupiers' of land have a duty to protect visitors against obvious dangers associated with features of the environment, particularly where these are natural features. This reluctance extends to artificial features that are similar to natural features e.g. a railway embankment, pond, canal or reservoir.

Recent case law, including the House of Lords judgment in Tomlinson v Congleton Borough Council [2004] draws on decisions dating back to the early 20th Century, with

the principle that **visitors can be expected to look after their own safety in relation to permanent and familiar features of the landscape.**

Different considerations apply if dangers are unusual, unfamiliar or concealed, perhaps as a result of the construction of an asset which makes the environment inherently more hazardous. This principle, drawn in the Tomlinson case, originated in the decisions of *Hastie v Magistrates of Edinburgh* 1907 S.C. 1102 and *Stevenson v Glasgow Corporation* 1908 S.C. 1034, in each case arising from a child drowning, in an artificial pond in a city park and in the River Kelvin respectively. In the *Stevenson* case, Lord McLaren commented:

"In a town, ...there are physical features which may be productive of injury to careless persons or to young children against which it is impossible to guard by protective measures.....a town on the banks of a river is a familiar feature; and whether the stream be sluggish like the Clyde at Glasgow, or swift and variable like the Ness at Inverness, or the Tay at Perth, there is always danger to the individual But **in none of these places has it been found necessary to fence the river to prevent children or careless persons from falling into the water.** Now, as the common law is just the formal statement of the results and conclusions of the common sense of mankind, I come ... to the conclusion that **precautions which have been rejected by common sense as unnecessary and inconvenient are not required by the law.**"

The principle established in the *Hastie* and *Stevenson* cases has been followed, with minimal development, in subsequent case law relating both to the common law and to occupiers' liability legislation enacted in the United Kingdom and elsewhere. However, in the *Tomlinson* case, Lord Hutton added that:

"there might be exceptional cases where the principle stated in *Stevenson* ... should not apply and where a claimant might be able to establish that the risk arising from some natural feature on the land was such that **the occupier might reasonably be expected to offer him some protection** against it, for example, where there was a very narrow and slippery path with a camber beside the edge of a cliff from which a number of persons had fallen. "

Despite the legal position of providing protection measures for unusual, unfamiliar or concealed dangers, modern practice is tending towards extending the measures to cater for hazards that are obvious. Good practice promotes an approach which reflects the level of risk, with a balance between providing protective measures (such as fencing, means of deterring access to a hazard and/or warning signage) whilst avoiding unnecessary impact on the environment or loss of amenity (e.g. associated with access restrictions or adverse visual impact).

6 Case studies

The following case studies have been prepared to prompt alternative thinking in the approach to, or need for, extensive control measures. This is not to say that there is only one answer, and inclusion of these examples is not saying that the solution implemented in the photograph was correct or not, solely that one can argue and support a case that the measures could be of a lesser nature. To be able to draw out certain good practice points the scene setting or designer's thinking may have been adjusted from reality and therefore no longer represent the true site illustrated in the photograph. Please therefore disregard any site names.

This section also includes subject studies, such as looking at steps, handrailing and fencing.

6.1 Case study 1: Long linear sea wall (first example)



Photograph 6.1 Sea wall out of town but along a tourist coastline and near to an advertised tourist site.

Scene setting: Assessor's Thinking

- the top of sea wall is ideal for people, notably children, to run/walk along;
- people can approach "structure" from any direction;

- with limitation on practical sign size (and hence font size) the range of visibility between signs is limited and hence signs replicated at set intervals.

Discussion: Alternative Thinking

The visual impact of multiple signs is significant, as is the maintenance cost of the signs, especially in a coastal setting. The sea wall has steps on the seaward side, thus reducing the harm from any potential fall. The top of the wall is wide, reducing the chance of someone who walks along the top becoming unbalanced and falling. The hazards of walking (or cycling) along the top of the wall, or along any of the steps, are obvious and can be deemed to have been considered by individuals when they undertake their own assessment of the dangers before deciding to walk or cycle on the wall. As it is in a relatively remote location, young children are unlikely to be unsupervised. This site is hard to reach without adults bringing children to the general area. This style of sea wall is not uncommon along various coasts and can be regarded as having become a standard coastal feature.

From the above, signage more sympathetic to the environment may be more appropriate. Surface mounted signs and signs at all primary access points could be considered.

The wording on the sign also needs careful consideration as the current wording of Keep Clear and Danger Vertical Fall is at conflict with the invitation to cross the wall onto the concrete steps at the locations where handrails are provided at intervals.

6.2 Case study 2: Long linear sea wall (second example)

This case study looks at a typical sea wall stretching some 3 miles, with a raised upstand on one side which provides the defence level. The top of the sea wall is used frequently and is a recognised route for pedestrians and both adult and child cyclists. It also accommodates maintenance vehicles.



Photograph 6.2 Typical sea wall.

A claim was made by a cyclist who fell off the sea wall. The claimant was represented by a no-win no-fee lawyer. The defence statement noted the following points:

- There is no record of accidents associated with the structure;
- the cost of erecting fencing is between £130,000 – £250,000 in materials, plus labour, and then ongoing maintenance costs;
- any fencing would interfere with maintenance activities by obstructing access to the slopes;
- the fencing would experience coastal storm effects which could result in the damaged fence protruding into the pathway, therein posing a new hazard.

The conclusion was that no control measures (other than signs) were deemed necessary. The summary defence statement included a notable section as follows:

“So far as the provision of a guardrail or handrail to prevent people from falling from the sea defence top would in my view be impracticable. Signs have been erected. The signs warn of danger of falling. **There is nothing unique about the North Sea wall not having a guardrail or fence** there being many similar examples around the coastline.....”

The claimant’s lawyer dropped the case before it reached court. Although this means it was not tested in the courts, the defence case was deemed sound, especially where it referred to other examples which took a consistent approach to the estimation of public safety aspects.

6.3 Case study 3: Navigation moorings

This case study looks at a new 48-hour navigation mooring with an associated flood wall. The control measure is the black coloured handrailing on top of the flood wall. The choice of handrail is deemed to be sympathetic to the surrounding environment but attracts some complaints for its overbearing impact.



Photograph 6.3 Black coloured hand railing on top of flood wall.

Scene setting: Assessor's Thinking

- the low height of the flood wall is a trip hazard;
- people could cycle on top of wall (and fall) within close proximity to river;
- there is already a need to provide railing at both the disabled access ramp and steps over the new wall in accordance with "Guide to Best Practice on Access to Pedestrian and Transport Infrastructure";
- the above approach amounts to designing out foreseeable risks.

Discussion: Alternative Thinking

The wall can be regarded as high enough to not be a trip hazard. Although it is wide enough for someone to attempt to cycle along the top of it, there is no need to pre-empt someone wishing to undertake their own personal risk assessment (in their mind as they approach the wall) and decide to cycle along it. Even if a cyclist or walker does decide to mount the wall, there is a reasonably large space between the wall and the river such that the likelihood of a fallen cyclist reaching the river is low. The photograph does not illustrate how the end of the wall joins with the footpath and whether there is a step change, or whether it reduces in brick course making it easy for a cyclist to mount the wall. A pragmatic approach would be to install the wall without a handrailing except where one is determined to be needed at the ramps and steps, and monitor whether or not there is a problem over time.

Should cycling prove to be a concern either here or at similar sites, an alternative surface finish or profile to the top of the wall could be considered.

6.4 Case study 4: Private land

This case study looks at an asset on private land but adjacent to a public footpath which crosses the private land. It is a scenic area but the extent of overgrowth indicates little use. A sign was erected on a post on the private land. The owner complained. The sign and post were removed and a letter was sent to the owner advising that they, as landowner, were now responsible (and liable) for all persons visiting the structure and that they should inform such people of the hazards and risks associated with the structure.



Photograph 6.4 Bypass Weir.

Scene setting: Assessor's Thinking

- Assessed as low risk; and
- Used a standard sign to identify the asset and highlight standard issues (no swimming, underwater obstacles, strong currents and child supervision needed).

Discussion: Alternative Thinking

The unapparent hazard is that in the photograph the bypass weir is dry but it will become wet when water levels are high and the bypass comes into operation. However, on the basis that the adjacent footpath is little used and the site is in a relatively remote and isolated location it could be justified and recorded that no public safety measures are necessary. Access to the dry weir area is difficult and should deter casual enquirers. When flowing, the enquirers should be equally deterred. To be flowing would generally imply wet conditions in the surrounding area, deterring visitors from this location altogether. As the bypass structure is of low risk and not unusual, a letter to the landowner is necessary to advise/remind them of their responsibilities, with a reduction in the signage if appropriate.

6.5 Case study 5: Walls and railings



Photograph 6.5 Handrailing to flood wall.

A rail has been added to the top of a flood wall to deter the public from walking along it. The rail is not completely effective for preventing walking as a reduced width is still available for climbers and walkers. Skateboarders are known to “grind” or skate similar rails for recreation.

Without the rail the width of the wall is sufficient to walk along and the height is convenient for parents to lift their children onto or for youths to climb onto or jump from.

As this photograph shows just one section of the wall the discussion here is intentionally limited to the aspects raised by this single view, though the wall dimensions may change along its length. The fall is limited on either side of the wall and the road is separated from it by a footpath. The hazards are obvious. It can be argued that parents and youths can undertake their own mental assessment of the hazards and decide how to act. There would be a greater hazard if the width of the wall was such that it was not immediately obvious if one could walk safely along its top with relative ease or not. In such an instance, the “design out the hazard/attraction” approach would be profiling the top of the wall to eliminate the attraction. The potential cost of adding and maintaining the rail is a relevant factor, particularly if the benefit of increased safety is marginal.



Photograph 6.6 Unexpected drop.

In Photograph 6.6 it can be seen that the ground on the right falls away and the wall is actually protecting against a large vertical drop. This will not be apparent to the casual walker and is therefore an unexpected hazard. Consequently, the railing is protecting against this unexpected hazard by deterring someone climbing up onto the wall and then falling.



Photograph 6.7 Seaside ramp.

In the background of Photograph 6.7 it can be seen that the wall has no railing as the hazards are obvious. The introduction of a ramp with steps down to the beach (though the steps cannot be seen in this view) causes there to be an unexpected gap in the otherwise continuous wall. Handrailing has been provided to force anyone walking

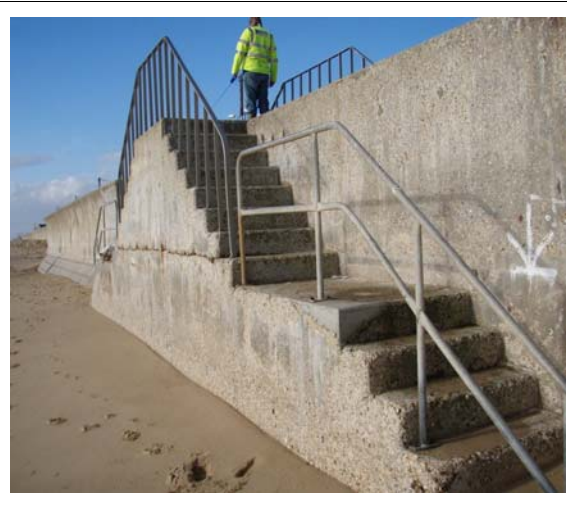
along the wall to return to the path. Handrailing has also been provided on the right hand side of the ramp. Given the width of the path and the generally remote location it could be anticipated that people using this path at this location would generally be fit and knowledgeable of outdoor conditions. The ramp is not steep, nor is the fall great and it could be argued that the right hand railing could have been omitted or substituted for edge marking (though this may be debatable). The railing does not look out of place and is not excessive.

6.6 Case study 6: Steps

The following photographs are used to illustrate handrailing on steps. Whilst care must be taken to consider British Standard requirements for geometry and such like, these aspects are not covered here.



Photograph 6.8 Exposed lower steps.



Photograph 6.9 Full length railing.

In Photograph 6.8 the railing stops short of the bottom whereas ideally the railing on stairs should be continuous as once provided people will rely on it to make their entire journey. The distance and consequences of a potential fall have been accounted for and deemed as acceptable in this case, primarily because the adjacent ground is soft (sand) and its height is variable; usually higher than seen here.

Photograph 6.9 shows a better situation. At the top, the railing is vertical where the fall is greatest. At a lower level the railing changes to a cheaper and more maintainable solution where the hazard is less. No infill mesh is needed as parents are deemed to be in control of young children at this location. Other considerations are that beach levels may vary over time and open handrailing is less susceptible to wave damage.



Photograph 6.10 Double handrail.



Photograph 6.11 Single handrail.

In photograph 6.10, handrailing is provided on both sides of the steps. A turn has been provided at the bottom to stop people from running off the bottom of the steps and onto the adjacent roadway. Depending upon how heavy the traffic on the steps is (i.e. frequency of two-way traffic vs. one-way), savings could have been made by limiting the railing to one side only. Consideration to the setting will influence the choice of material. Different environments will require different materials to be used so they remain sympathetic to the environment they are in. (Photograph 6.11).



Photograph 6.12 Loose chain.



Photograph 6.13 Operational access.

In Photograph 6.12, the alignment of the steps leads the user to an opening, protected only by a loose chain. The loose chain is not a preferred option but might be adequate were it not in a position directly at the bottom of the steps. Compare that with the turn used in Photograph 6.10. Infill mesh is not used due to its rural location and the unlikelihood of young children being left unsupervised.

Photograph 6.13 shows another set of steps leading down a long slope. The sign states no unauthorised access, promoting the need for a locked gate at the top of the steps. Such a gate would avoid the need to have rails on both sides of the steps as the frequency of two-way traffic is low. The type of fencing changes part way down, because the wooden railing was already in place whilst the key clamp was added later. It would have been more in keeping with the existing environment if the railings added

afterwards had also been wooden. Infill mesh is unnecessary given that there is no unauthorised access, and it is inconsistent to be providing infill at the lower end when the danger is greater at the top end. Similarly, infill mesh in the fencing around the culvert opening in the background is unnecessary given the rural location of the structure.



Photograph 6.14 Sandy steps.



Photograph 6.15 Short handrail.

Photograph 6.14 illustrates how providing steps in a coastal environment can introduce other issues, such as slipping hazards caused by a build up of sand. Although the distance and consequences of a potential fall may represent a low risk, it may be reasonably practicable to provide handrailing on one side to allow support to the less able and reduce the risk further. Any mesh infill for very young may introduce an unacceptably high maintenance burden. Photograph 6.15 shows a simple key clamp railing (albeit tailored specially for the site) to aid the less able people to traverse the steps.

6.7 Case study 7: Signs

Where a hazard has not been eliminated during the design phase or reduced to an acceptable level of risk, the public will need to be informed of unexpected danger. The Health and Safety (Safety Signs and Signals) Regulations 1996 do not place any duty on employers to provide signs to warn people such as visitors but they are helpful when used to decide how to inform the public of significant obvious risks required by other legislation.

“A safety sign gives a general safety message, by means of a combination of a safety colour and geometric shape and which by the inclusion of a graphical symbol, gives a particular meaning”. (Ref. BS 5499-1 2002)

Case law has shown us that only unexpected danger needs to be communicated to the public but even so, a wide range of signs are available. It is important that the correct information is given in an understandable form.

Significant man-made residual hazards will have been identified within a risk assessment. When deciding how to inform the public of the significant residual risks a number of questions need to be asked:

- Do the public need to be informed of this risk?
- What must the sign say to be helpful?
- Will a pictogram sign be more helpful than words alone?
- What size and material should the sign be, remembering the environment is also an important factor.

Good tips:

- Do keep signs as simple as possible;
- Think about identifying the hazard (e.g. strong currents) first and then use supplementary text to give an instruction (e.g. no swimming). This way the reader will read the warning and know what to do about it;
- Make sure the signs are the correct size and any wording can be read at a suitable distance. Check with your sign supplier or the relevant British Standard.



Photograph 6.16 Low level wall.

Photograph 6.17 Unexpected drop.

Public approaching the wall from the right (landward side) in Photograph 6.16, would not see the true hazard of this site which is better seen in Photograph 6.17, which is a vertical drop. A warning sign advising of this potentially unexpected hazard would not go amiss.



Photograph 6.18 Stencilled warning.



Photograph 6.19 Surface mounted.

A sign introduces an unwelcome visual intrusion, not to mention added maintenance costs, especially in a coastal environment. An alternative, less intrusive approach, would be to use a stencilled warning as shown in Photograph 6.18 or surface mounted sign fixed to the side of the wall as seen in Photograph 6.19. This would also be less intrusive on the environment.



Photograph 6.20 Information sign.



Photograph 6.21 Surface mounted sign.

Signs need to warn of unexpected hazards. For a pile of large rocks, the hazards tend to be sharp edges and falling into/between the voids. On the coast, an added hazard might be the speed with which the tide rises onto the rocks and the potential for drowning if trapped. The sign in Photograph 6.20 is more informative than the “Do not climb on rocks” sign in Photograph 6.21 as it gives a pictogram warning with supplementary text telling of how to avoid the dangers.



Photograph 6.22 Exposed groynes. Photograph 6.23 Submerged groynes.

For a recurring feature, such as timber groynes, see Photographs 6.22 and 6.23, it may not be reasonably practicable to mount a sign at every location as this may be considered excessive. For timber groynes, as with rock groynes, the general hazards are apparent, except perhaps when they are submerged. In this instance, a warning beacon may be sufficient.

For these more frequently occurring items, other approaches are needed, such as general informational signs within the car parks. These could be combined with signs owned by others.

6.8 Case study 8: Edge markings



Photograph 6.24 Operation and maintenance burden.

For long linear structures, the cost of installing fencing/handrails with mesh infill is excessive, not to mention the burden to maintain and repair the fence (see Photograph 6.24). This is where the balance between cost and risk reduction comes into play and needs to be carefully assessed. Environmental and location factors must be taken into account. If we look at accident statistics for coastal locations the incident rate is low for falls from wide promenades or similar features.



Photograph 6.25 Tactile edging.

Apart from the fact that the slope in Photograph 6.25 is gentle, the promenade is also behind the main sea defences and therefore it is apparent to people crossing the main defence that they are entering an area prone to sea attack. The crossing points may well have signs to that effect. The photograph shows a change of material at the edge, effectively a form of edge marking or tactile paving.



Photograph 6.26 Edge line marking.

A brighter, more visual way of denoting the edge is to use line marking (see Photograph 6.26). This serves to draw attention to the edge.



Photograph 6.27 Line marking.

In Photograph 6.27 the new white line, replacing the fading red line, has been offset from the edge thus allowing more space between them. A change of material type also assists with edge warning. Photograph 6.27 shows that railings have been omitted to maintain the beauty of the area.



Photograph 6.28 Extensive line marking.

A single yellow or white line could also be expanded upon as shown above in Photograph 6.28. This is obviously more work but does convey a message built into the edge marking. Wording on such messages does need to be carefully considered. The term “please” is suggestive that there is no immediate danger but is more along the lines of an advisory notice. The line marking in Photograph 6.28 could be considered to be garish.

6.9 Case study 9: Young children and toddlers

As a general principle, there is an increased duty of care towards children.

A **toddler** will have little or no perception of danger. The toddler is generally always accompanied and is unlikely to be left alone for more than a few moments. The “**toddler test**” is a question that asks if a toddler is likely to be in significant danger (e.g. near a drop in height or from falling into a watercourse) if they were to be unsupervised for a few moments. If so, then consider a barrier that will prevent toddlers from getting to the hazard and which prevents them getting stuck in the barrier. Toddlers are very unlikely to be walking alone on open footpaths in the countryside. They are more likely to be carried, transported or holding hands with a responsible person.

A “**10-year old**” child (the exact age is not important) does tend to have a perception of danger and is often unaccompanied. A “10-year old” will take calculated risks as part of growing up. The “**10-year old test**” is a question that asks “is the child who has freedom to visit a local park, woodland or canal likely to be in significant danger?” given that they have a much greater appreciation of the risks associated with **obvious** hazards than a toddler.

Consider a river walk in a park near a city centre which is popular with nature lovers, dog walkers, anglers and families. The park has grassed areas which include swings and picnic tables.

Paths lead from the grassed areas to the river paths, which are not hard landscaped and include steep steps. Toddlers are unlikely to use the river walk paths and therefore the 10-year old test is an appropriate standard against which to establish control measures.



Photograph 6.29 Traditional masonry walled protection.

Photograph 6.29 shows an ancient wall protecting a “10-year old” from a sheer drop into what is frequently fast flowing water.



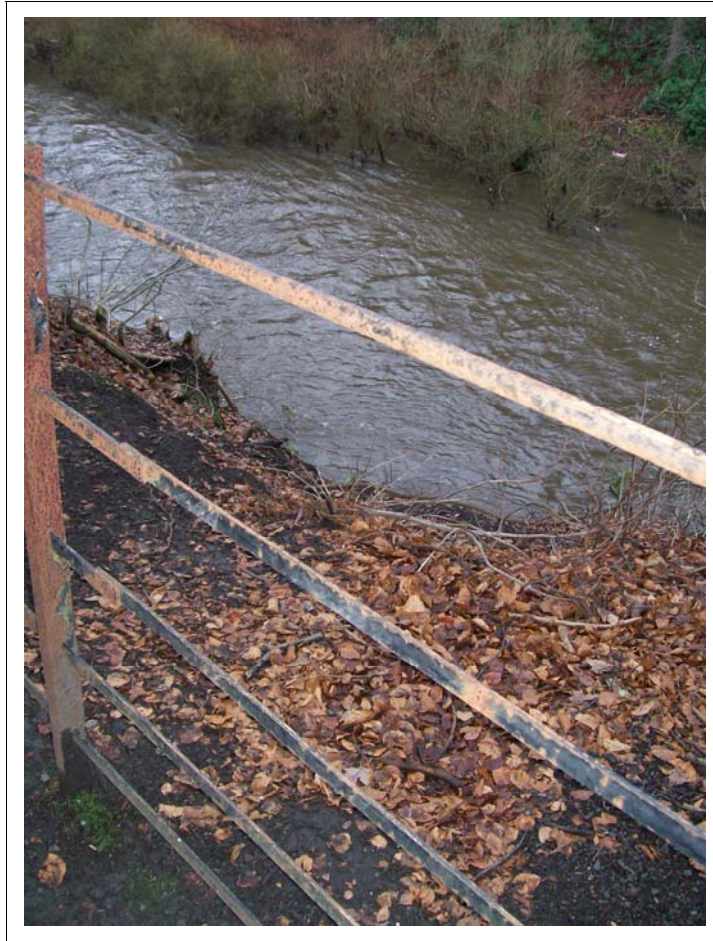
Photograph 6.30 Beach beside river.

Photograph 6.30 shows a beach that requires a reasonable level of fitness for access. There is little, if any, risk of falling into the water as the angle of the beach is shallow, hence residual risks relate to deliberate access.



Photograph 6.31 Verge beside path.

Photograph 6.31 shows a riverside walk near a city centre which has a verge offering a degree of protection from the risk of falling down a slope of some 45 degrees. Railing is not provided and the risk remains low.



Photograph 6.32 Five rail barrier at near vertical drop alongside path.

Where the valley becomes steeper (Photograph 6.32), a five rail barrier without mesh infill is considered to meet the “10-year old” test as the potential outcome of climbing over the barrier should be obvious.



Photograph 6.33 Four rail barrier at a leisure centre.

Photograph 6.33 shows a walkway beside a slow flowing but deep river passing through a city. Much of the route is also part of the National Cycle Network. The highest level of protection is provided at locations with large numbers of people at risk e.g. a leisure area. Here an aesthetically pleasing four rail barrier with the top rail raked in makes the railings difficult to climb.

Following the development of the local council's Water Safety Action Plan, the railing has been upgraded with the addition of mesh infill and the installation of rescue ladders.



Photograph 6.34 City centre path and cycleway.

Photograph 6.34 is another pedestrian area in the city centre. Similar railings are erected alongside the river edge, but without infill. This standard is considered more than adequate, given the population at risk is mainly adults out for a stroll at lunchtime or cyclists passing through. The railings would be difficult for a 10-year old to climb over. Toddlers are very unlikely to be taken here for leisure purposes.

7 Assessing assets

This section includes worked examples of the risk assessment process. It shows how the application and recording of the “*Five steps to risk assessment*” provided by the HSE can be adapted to suit different assets. The worked assessment examples show that it is important to check that the introduction of control measures for one group of people does not adversely affect another group.

This section also provides photographic examples of assets from around the country where different organisations have established their own standards for public safety. It gives suggestions as to how public safety might be improved or if a better value solution might be available. The examples include backgrounds to the assets and suggestions as to where they might fit into a specially developed scale of “Good Practice”.

The answer is not always about erecting control measures such as fences and signs. Eliminating the hazard is the ideal answer but the cost to do so might be prohibitive. By recording the thinking behind the assessment, it is acceptable in some cases to conclude that minimal control measures are all that may be needed. Monitoring is needed to determine the effectiveness of the control measures over time.

7.1 Why existing assets are included and new build excluded

The methods for assessing existing assets are similar to the methods for assessing “new build” assets but with one significant exception. Designers of new assets have a greater opportunity to eliminate the hazards at source.

Even though the designer will have used due skill, care and diligence when carrying out his work, the result is often subject to a further review of the control measures prior to the asset being fully commissioned. It is generally easier to assess an asset on site after construction than from the drawings. It is for this reason that this guide contains photographic examples of existing assets and how they have been modified, rather than how the designer carries out his hazard elimination and risk reduction processes.

Notwithstanding the above, the principles, approach and process embodied in this guide remain valid for new builds.

7.2 Field guide

When assessing an existing asset and identifying the potential hazards of a site, it is important that the use of the site, the type of user and the historical and environmental impacts of the site are all considered. A suitable and sufficient assessment of these factors can only be achieved by visiting the site.

When carrying out the risk assessment of an existing site, the assessor should identify all the potential hazards that the site may contain; both natural and man-made.

Each site may well have its own particular unique hazards, and the use of suitably trained and experienced assessors with local knowledge of the site is very important.

Once the hazards have been identified, other factors which could contribute to the likelihood of an incident occurring and the harm that could be caused should be

determined. For example, a set of steps over a seawall adjacent to a very popular beach provides a very different scenario to a set of steps frequented only by experienced ramblers.

At this stage a judgement on the level of risks should be made. Existing safety measures provided can be reviewed to see if they are adequate to reduce the risk to an acceptable level. Additional measures may be required and these need to allow for the public to accept their own responsibility for their own safety.

During all stages of the risk assessment, it is very important that the thought processes of the assessor are recorded. Many of the forms provided by organisations for recording such decisions are produced electronically. In such cases the form may well expand to accommodate a record of all the decisions. Similarly when using paper copies there needs to be sufficient space on the form to record all the relevant factors which lead to a decision about the risks and/or control measures which are considered necessary.

7.3 Worked assessments

7.3.1 Worked assessment example 1 – Coastal assets - Rock Groyne

Scene Setting

Rock Groyne
A man-made rock groyne is an important asset in mitigating long shore drift along the coastal front in this area. The surrounding beach is used regularly by the public. The rocks are slippery when wet and are deposited in a way that has created deep voids between them. Not all of the rocks are submerged at high tide.



Identify the hazards the public negotiate before encountering the asset

	NATURE	Record of hazards
1	Principal Natural Hazard(s) Ambient site conditions so no action required.	1.1 Tidal and wave actions.

Assessment without control measures in place

	PUBLIC	Record of hazards	Likelihood of harm	Severity of harm	Risk Rating (from Risk Estimator)
2	Additional hazard(s) created by the asset excluding those items in 1 above (excluding control measures).	2.1 Slip/trip on slippery rocks. 2.2 Entrapment of limbs in voids. 2.3 Falling off rocks.	Likely Likely Likely	Moderate Moderate Moderate	Medium Medium Medium
	SUMMARY				Medium

	OPERATIONS	Record of hazards and access requirements for specific duties	Likelihood of harm	Severity of Harm	Risk Rating (from Risk Estimator)
3	Operational Requirements including access and maintenance	3.1 Day to day access. 3.2 Access for routine maintenance 3.3 Access for major maintenance	Very unlikely Very unlikely Very unlikely	Moderate Moderate Moderate	Very Low Very Low Very Low
	SUMMARY				Very Low

Overarching risk of site without control measures is Medium (from Section 2)
Control measures are therefore required

4	CONTROL MEASURES REQUIRED (address all medium, high and Very high hazards/Risks in 2 and 3)	<p>Proposed Control Measures</p> <p>2.1 Signage. Warn of hazard on slippery rocks. 2.2 Signage. Warn of entrapment. 2.3 Signage. Warn of falling.</p>
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PUBLIC	Record of hazards	Likelihood of harm	Severity of harm	Risk Rating (from Risk Estimator)	
5	Residual hazards with control measures (shown in photograph)	<p>2.1 Slip/trip hazard on slippery rocks 2.2 Entrapment of limbs in voids 2.3 Falling off rocks</p>	<p>Unlikely Unlikely Unlikely</p>	<p>Moderate Moderate Moderate</p>	<p>Low Low Low</p>
6	Effect of control measures have on public	Control measures dissuade the public from clambering on the rock formation thus making it less likely an incident will take place. The most significant risk may be that of entrapment.			
SUMMARY				Low	

OPERATIONS	Record of hazards	Likelihood of harm	Severity of harm	Risk Rating (from Risk Estimator)	
7	Residual hazards with control measures (shown in photograph)	Unchanged	Very Unlikely (Unchanged)	Moderate	Very Low
8	Effect control measures have on operations	Structures such as sign posts may provide an obstacle for vehicles recharging sand on the beach, should this practice be undertaken at the site. Therefore signs are placed on the rocks. Risks to operations are not increased by the provision of control measures			
SUMMARY				Very Low	

ENVIRONMENTAL	Category	Impact of Control Measures	Sensitivity Rating	
9	Environmental Balance Effect on the following:	<p>9.1 Landscape 9.2. Recreation 9.3 Conservation (plants & animals) 9.4 Sustainability</p>	<p>1. Minor visual intrusion. Beachscape largely unaffected 2. Recreational use of surrounding area is unaffected 3. Habitat opportunities for wildlife improved. 4. Recyclable material for signs used.</p>	<p>Minor Not significant Not significant Minor</p>
SUMMARY			Minor	

DISCUSSION	Record of thinking
10	<p>10.1 The asset is principally a Semi-Natural feature. The risks faced by the public are similar to those faced should the asset have been created naturally (i.e. not man-made). As a result, overbearing control measures are not necessary.</p> <p>10.2 The public are unlikely to appreciate the hazard of entrapment on a rising tide. Signage should concentrate on this issue.</p> <p>10.3 The addition of signage will advise the public of the risks, thus making it unlikely that the asset will pose an "unexpected hazard".</p> <p>10.4 The environmental balance is considered to be Minor. Signs on posts detract from the natural beauty of the environment.</p>
Review period	Overall therefore this site is considered to be adequate for the safety of the public, (Low), operational staff (Very Low) and is somewhat sympathetic to the immediate environment (Minor). Suggested review period (1 Year) .

Excessive	Enhanced	Good Practice	Adequate	Insufficient
			●	

7.3.2 Worked assessment example 2 – Coastal Assets - Sand dunes and sea marsh

Scene Setting

Wide open public space leading to an isolated area incorporating sand dunes and sea marsh. This is a prominent access and egress focal point into an area which is much less defined as a recreational space. The area in the background is not normally below Mean High Water and rarely gets flooded. Normally no maintenance is undertaken in this marshland. Potential for entrapment by incoming tide in one isolated area and the occasional deep water rock pool.



Identify the hazards the public negotiate before encountering the asset

	NATURE	Record of hazards
1	Principal Natural Hazard(s) Ambient site conditions so no action required.	1.1 Tidal water splash zones 1.2 Isolated environment 1.3 Uneven ground 1.4 Rural and exposed environment 1.5 Waves 1.6 Soft ground or marshland

Assessment without control measures in place

	PUBLIC	Record of hazards	Likelihood of harm	Severity of harm	Risk Rating (from Risk Estimator)
2	Additional hazard(s) created by the asset excluding those items in 1 above (excluding control measures).	2.1 Trapped by incoming tide. 2.2 Poor access for rescue. 2.3 Unexpected deep water pools.	Unlikely Unlikely Likely	Major Minor Moderate	Medium Very Low Medium
SUMMARY					Medium

	OPERATIONS	Record of hazards and access requirements for specific duties	Likelihood of harm	Severity of harm	Risk Rating (from Risk Estimator)
3	Operational requirements including access and maintenance	3.1 No day to day access is required. 3.2 Access for routine inspection of asset is rare. 3.3 Access for major maintenance of asset occasional.	N/A Very unlikely Very unlikely	N/A Minor Moderate	N/A Very Low Very Low
SUMMARY					Very Low

Overarching risk of site without control measures is Medium (from Section 2)
Control measures are therefore required


4	CONTROL MEASURES REQUIRED (address all medium and high hazards/risks in 2 and 3)	Proposed Control Measures
		2.1 Signage. Warn of incoming tides 2.3 Signage. Warn of unexpected deep water pools. All other risks are very low or low. No action required if it is as low as reasonably practicable.

	PUBLIC	Record of hazards	Likelihood of harm	Severity of harm	Risk Rating from (Risk Estimator)
5	Residual hazards with control measures (shown in photograph)	2.1 Trapped by incoming tide. 2.3 Unexpected deep water pools.	Very Unlikely* Very Unlikely	Major Moderate	Low Very Low
6	Effect of control measures on public	Effective advice is given to the users of the land. Giving warning of the unexpected hazard should reduce the likelihood of an incident occurring. Whilst the severity of harm of being trapped by the tide is extreme, the likelihood is close to nil* as egress is easily identifiable and available albeit with discomfort. The risk matrix has its own limitations. The residual risk of entrapment is low or very low due the negligible risk after the warnings have been posted. The high risk is therefore tolerable in this instance. A review of the control measures should be frequent.			
SUMMARY					Low Risk

	OPERATIONS	Record of hazards	Likelihood of harm	Severity of harm	Risk Rating (from Risk Estimator)
7	Residual hazards with control measures (shown in photograph)	3.1 No day to day access is required. 3.2 Access for routine inspection of asset is increased. 3.3 Access for major maintenance of asset occasional.	N/A Very Unlikely Very Unlikely	N/A Moderate Moderate	N/A Very Low Very Low
8	Effect control measures have on operations	The introduction of signage creates an additional hazard for maintenance. Safe plans of work will be required to make sure that the maintenance is carried out in a safe way with knowledge of the tide and safe access routes. In this case the residual risk will be reduced further for operational staff with a safe plan of work in place. Hazards remain unchanged with the introduction of the control measures. The risk increases for operations but mitigated with a safe plan of work.			
SUMMARY					Very Low Risk

	ENVIRONMENTAL	Category	Impact of Control Measures	Sensitivity Rating
9	Environmental balance Effect on the following:	9.1 Landscape. 9.2 Recreation. 9.3 Conservation (plants and animals). 9.4 Sustainable.	1. Natural hard landscaping adopted. Prominent sign. 2. Land not adversely affected. 3. Habitat opportunities for wildlife not adversely affected. 4. Recycled plastic signage used.	Minor Not significant Not significant Minor
SUMMARY				Minor

	DISCUSSION	Record of thinking
10		10.1 Numerous principal natural hazards have been recognised. This has made it a simple task to identify those hazards which are not natural. Where little or no additional risk is posed by the asset, no action is required. 10.2 The unusual aspect to this site is that the occupier knows that there is a risk to the visiting public that is not obvious to the casual visitor. A duty of care will apply. 10.3 The environmental balance is considered to be 'minor adverse' with the use of recycled plastic signage positioned sensibly. Sharing signs with other organisations may ease congestion.
	Review period	Overall therefore this site is considered to be adequate for the safety of the public (Very Low Risk), operational staff (Low Risk if a permit to work or safe plan is in use for the entrapment issue). Suggested review period (1 year)

Excessive	Enhanced	Good Practice	Adequate	Insufficient
				

7.3.3 Worked assessment example 3 – River - pumping station

Scene Setting

Located within an urban environment, the asset shown is part of a much larger facility (Pumping Station). The Guillotine gates operate on demand although the facility is continuously manned when in use. A public highway runs adjacent to the lifting frame for the Guillotine gates. The depth to the invert is significant. The flow of the water can be fast and treacherous during certain conditions. Operational access is required for periodic maintenance only. Egress gates/ ladders and safety chains are present.



Identify the hazards the public negotiate before encountering the asset

	NATURE	Record of hazards
1	Principal Natural Hazard(s) Ambient site conditions so no action required.	1.1 Urban/Industrial Environment 1.2 Adjacent Highway

Assessment without control measures in place

	PUBLIC	Record of hazards	Likelihood of harm	Severity of harm	Risk Rating (from Risk Estimator)
2	Additional hazard(s) created by the asset excluding those items in 1 above (excluding control measures).	2.1 Fall/slip/diving from height into watercourse. 2.2 Injury from mechanical actions. 2.3 Poor egress from watercourse.	Unlikely Unlikely Unlikely	Major Moderate Fatal	Medium Low Very High
	SUMMARY				Very High

	OPERATIONS	Record of hazards and access requirements for specific duties	Likelihood of harm	Severity of harm	Risk rating (from Risk Estimator)
3	Operational Requirements including access and maintenance	3.1 Day to day access. 3.2 Access for routine maintenance. 3.3 Access for major maintenance.	Likely Likely Likely	Major Major Fatal	High High Very High
	SUMMARY				Very High

Overarching risk of site without control measures is Very High (from Section 2 and 3)
Control measures are therefore required

4 CONTROL MEASURES REQUIRED (address all medium, high and Very high hazards/Risks in 2 and 3)	Proposed Control Measures
	2.1 Railings to prohibit diving into the river channel, asset structure and access to machinery. 2.3 Ladders for safe egress. 3.1 Provide railing adjacent to work stations. 3.2 Provide easy access to machinery requiring frequent maintenance. 3.3 Safety chains upstream of gates or boom.

	PUBLIC	Record of hazards	Likelihood of harm	Severity of harm	Risk Rating (from Risk Estimator)
5	Residual hazards with control measures (shown in photograph)	2.1 Fall/slip/diving from height into watercourse. 2.3 Poor egress from watercourse.	Very Unlikely Very Unlikely	Major Fatal	Low High Risk
6	Effect of control measures on public	By prohibiting access to the river channel and machinery, the hazard is effectively removed and so the risk reduced. The severity remains high. The site is manned when in operation. The risk could be reduced further with a written plan indicating that the gates will only be operated when the area has been inspected for trespassers/vandals etc. Consider CCTV. Control switches for operating the gates are located remotely (such that the operative is less likely to fall into the watercourse) but this is more risk to the public.			
SUMMARY					High

	OPERATIONS	Record of hazards	Likelihood of harm	Severity of harm	Risk Rating (from Risk Estimator)
7	Residual hazards with control measures (shown in photograph)	3.1 Day to day access. 3.2 Access for routine maintenance. 3.3 Access for major maintenance.	Unlikely Unlikely Unlikely	Major Major Fatal	Medium Medium Very High
8	Effect control measures have on operations	By providing safety barriers along the footbridge, the previous fall hazard is effectively removed and so the risk almost eliminated. Control measures permit easy access to carry out routine and major maintenance and do not adversely impede the staff. The severity of harm is not reduced. The risk could be reduced further with a written plan indicating that the gates will only be operated when the area has been inspected for trespassers/vandals etc. Consider CCTV.			
SUMMARY					Very High

	ENVIRONMENTAL	Category	Impact of Control Measures	Sensitivity Rating
9	Environmental Balance Effect on the following:	9.1 Landscape. 9.2 Recreation. 9.3 Conservation (plants and animals). 9.4 Sustainable.	1. Due to the industrial/urban landscape, the use of steel railings is appropriate and does not unnecessarily detract from the landscape. 2. Land not used for recreation. 3. Habitat opportunities for wildlife not adversely affected 4. Steel used, recyclable.	Minor Not significant Minor Minor
SUMMARY				Minor

	DISCUSSION	Record of thinking										
10		<p>10.1 Few principal natural hazards have been recognised. This has made it a simple task to identify those hazards which are not natural.</p> <p>10.2 The additional non natural hazards are the responsibility of the owner and the maintainer. With and without control measures this site has a Very High risk rating. Control measures are not necessarily sufficient in their own right. (See risk Estimator).</p> <p>10.3 It is considered very unlikely that the public will be in this area accidentally. The high risk of extreme harm is therefore Tolerable.</p> <p>10.4 Despite the ease of access via the footbridge across the river channel, the severity of harm should operatives fall into the river channel due to the lack of control measure is extreme. For Operations the control measures applied have not adversely affect their safe working practices. Easy access for working remains after the installation of the control measures indicating that it is unlikely that harm will occur. However the risk remains very high and is normally Unacceptable. A written method statement for a safe method of working near to the hazard will be required to make the risk tolerable.</p> <p>10.5 The environmental balance is considered to be minor as the area is not particularly sensitive to development.</p> <p>10.6 The addition of the control measures listed reduce the risk rating for the public and have no detrimental effect on operational staff. The maintenance of the asset is not compromised by the introduction of the control measure(s).</p>										
	Review period	Overall therefore this site is considered to be adequate for the safety of the public (High), operational staff (Very High but tolerable with a written safe system of working in place) and is sympathetic to the immediate environment (minor). Suggested review period (5 years).										
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="background-color: #FF4500; color: white; text-align: center;">Excessive</td> <td style="background-color: #9ACD32; color: black; text-align: center;">Enhanced</td> <td style="background-color: #9ACD32; color: black; text-align: center;">Good Practice</td> <td style="background-color: #FF8C00; color: black; text-align: center;">Adequate</td> <td style="background-color: #FF0000; color: white; text-align: center;">Insufficient</td> </tr> <tr> <td style="width: 20%;"></td> <td style="width: 20%;"></td> <td style="width: 20%;"></td> <td style="width: 20%; text-align: center;">●</td> <td style="width: 20%;"></td> </tr> </table>			Excessive	Enhanced	Good Practice	Adequate	Insufficient				●	
Excessive	Enhanced	Good Practice	Adequate	Insufficient								
			●									

7.3.4 Worked assessment example 4 - River - flood storage

Scene Setting

Located on third party private land. 300mm diameter culvert passes under access track. Occasional flooding of gabion baskets occurs. Maximum depth of water is 1.2m with approximately only 150mm of soft silt on the invert. Flow rate through culvert is generally at a slow pace. Access by the public is not common but is not impossible due to footpaths nearby.



Identify the hazards the public negotiate before encountering the asset

	NATURE	Record of hazards
1	Principal Natural Hazard(s) Ambient site conditions so no action required.	1.1 Shallow to medium depth of water nearby 1.2 Steep but undefined edges nearby 1.3 Trips on uneven ground 1.4 Semi Rural Environment

Assessment without control measures in place

	PUBLIC	Record of hazards	Likelihood of harm	Severity of harm	Risk Rating (from Risk estimator)
2	Additional hazard(s) created by the asset excluding those items in 1 above (excluding control measures).	2.1 Potential slip down grass slope 2.2 Cuts on gabion tie wire 2.3 Falling/diving from gabion basket	Very unlikely Likely Likely	Minor Minor Moderate	Very low Low Medium
SUMMARY					Medium

	OPERATIONS	Record of hazards and access requirements for specific duties	Likelihood of harm	Severity of harm	Risk Rating (from Risk Estimator)
3	Operational Requirements including access and maintenance	3.1 No day to day access is required. 3.2 Access for routine maintenance of asset is by wading. Good firm bed. 3.3 Access for major maintenance of asset is by wading. Good firm bed.	Very unlikely Very unlikely Very unlikely	Minor Minor Moderate	Very Low Risk Very Low Risk Very Low Risk
SUMMARY					Very Low Risk

Overarching risk of site without control measures is Medium (from Section 2)

Control measures are therefore required

4	CONTROL MEASURES REQUIRED (address all medium, high and Very high hazards/Risks in 2 and 3)	Proposed Control Measures
		2.3 Signage. Warn of shallow water. All other risks are very low or low. No action required if it is as low as possible.

	PUBLIC	Record of hazards	Likelihood of harm	Severity of harm	Risk Rating (from Risk estimator)
5	Residual hazards with control measures (shown in photograph)	2.3. Falling/diving from Gabions	Very Unlikely	Moderate	Very Low Risk
6	Effect of control measures on public	Advice is given to the users of the land, public (trespassers or otherwise). The additional hazards imposed by the asset on the landowners are likely to be fully understood due to their familiarity of their surroundings. Giving warning of the hazard should reduce the likelihood from unlikely to Very Unlikely reducing the Risk rating down from Medium to Very low Risk. The sign is in a prominent position but remote from the Hazard of "Gabions". Consider alternative of a surface mounted sign on or near the gabions.			
	SUMMARY				Very Low Risk

	OPERATIONS	Record of hazards	Likelihood of harm	Severity of harm	Risk Rating (from Risk Estimator)
7	Residual hazards with control measures (shown in photograph)	3.1 Grass cutting adjacent to signpost 3.2 Access for routine maintenance of asset unchanged 3.3 Access for major maintenance of asset unchanged	Very unlikely Very unlikely Very unlikely	Minor Minor Moderate	Very Low Risk Very Low Risk Very Low Risk
8	Effect control measures have on operations	No change from original assessment as it remains Very Low Risk . Control measures permit easy access to carry out routine and major maintenance and do not adversely impede the staff.			
	SUMMARY				Very Low Risk

	ENVIRONMENTAL	Category	Impact of Control Measures	Sensitivity Rating
9	Environmental Balance Effect on the following:	9.1 Landscape. 9.2 Recreation. 9.3 Conservation (plants and animals). 9.4 Sustainable.	1. Natural hard landscaping adopted. Prominent sign. 2. Private land not available for recreation 3. Habitat opportunities for wildlife not adversely affected 4. Recycled plastic signage used.	Minor Not significant Not significant Minor
	SUMMARY			Minor

	DISCUSSION	Record of thinking
10		10.1 Numerous principal natural hazards have been recognised. This has made it a simple task to identify those hazards which are not natural. Where little or no additional risk is posed by the asset, no action is required. 10.2 The additional non natural hazards are the responsibility of the owner and the maintainer. Without control measures this site has a Medium risk rating. Control measures are needed therefore. (See risk Estimator) 10.3 From Operations point of view the control measures applied must not adversely affect their safe working practices. Easy access for working implies that it is unlikely that harm will occur. 10.4 The environmental balance is considered to be Minor with the use of recycled plastic signage. The signage however could be more sympathetic to the area due to its low visitor count.

		<p>10.5 The addition of the control measures listed reduce the risk rating for the public and have no detrimental effect on operational staff. The maintenance of the asset is not compromised by the introduction of the control measure(s).</p> <p>10.6. The positioning of the sign is important. Environmentally it is better to be as discreet as possible without becoming ineffective. The Photograph shows that the warning sign is not readily visible from the principal hazard itself (Diving off gabion {medium}). Discreet signage at the gabions may be more suitable.</p>	
	Review period	Overall therefore this site is considered to be adequate for the safety of the public (Very Low Risk), operational staff (Very Low Risk) and is broadly sympathetic to the immediate environment (Minor). Suggested review period (5 years) .	

Excessive	Enhanced	Good Practice	Adequate	Insufficient
	●			

7.4 Assessment examples

7.4.1 Example – Coastal assets – rock groyne

1. Scene setting

A man-made rock groyne is an important asset in mitigating long shore drift along the coastal front in this area. The surrounding beach is used regularly by the general public. The rocks are slippery when wet and they are deposited in a way that has created deep voids between them. Not all of the rocks are submerged at high tide.

2. Prior to control measures

There is an unexpected risk of being trapped within the voids on a rising tide. Wet rocks will become slippery when wet, but this is to be expected.

Likely x moderate harm = medium risk

3. Post control measures

Signs warning of the most significant risks are placed above the natural high water mark. Risk rating improved.

Unlikely x moderate harm = low risk

4. Environmental issues

Avoids any unsightly pole mounted signs in full view of all passers by not just those on or near the rocks.

Minor

5. Suggestions to get to “Good Practice”

Keep the sign simple. Concentrate on identifying the most significant risks (entrapment) rather than the obvious risks (falling).



Excessive	Enhanced	Good Practice	Adequate	Insufficient
			●	

7.4.2 Examples – Coastal assets – sand dunes and sea marsh

1. Scene setting

Wide open public space leading to an isolated area incorporating sand dunes and sea marsh. This is a prominent access and egress focal point into an area which is much less defined as a recreational space. The area in the background is not normally below Mean High Water and rarely gets flooded. Normally no maintenance is undertaken in this marshland. There is potential for entrapment by incoming tide in one isolated area but egress is still possible without undue risk (paddle to safety).

2. Prior to control measures

The potential for entrapment from an incoming tide beyond the footpath is a significant unexpected hazard. When flooded, unexpected deep water pools become more significant.

Unlikely x major harm = medium risk

3. Post control measures

Signage positioned at common access and egress points have been erected. Additional signage at the area of entrapment is provided. Increased risk to operations requires safe plan of action to mitigate risk.

Very unlikely x major harm = low risk

4. Environmental issues

Signage is present with minor impact on the environment.

5. Suggestions to get to “Good Practice”

Endeavour to provide effective signage that compliments existing signage. Combined signage with those of other Authorities may be possible.



Excessive	Enhanced	Good Practice	Adequate	Insufficient
			●	

7.4.3 Examples – Coastal assets – promenade

1. Scene setting

The asset (promenade) is man-made although due to its prevalence may be considered semi-natural. The asset is used for recreation by the public but may occasionally be flooded at spring tides.

2. Prior to control measures

The fall from the edge is the principal hazard but the drop is initially low onto sloped revetment. The public will be aware of the inherent risk of falling over the edge.

Unlikely x minor harm = very low risk

3. Post control measures

No control measures are present. The risk rating has neither improved or worsened.

Risk rating unchanged

4. Environmental issues

None. Control measures do not detract from the “unspoilt” environment.

Not significant

5. Suggestions to get to “Good Practice”

For new build edge marking or tactile paving could be considered.



Excessive	Enhanced	Good Practice	Adequate	Insufficient
			●	

7.4.4 Examples – Coastal assets – sea wall

1. Scene setting

The sea wall is well used by pedestrians particularly in the summer months. Vehicular access is generally prohibited. Vertical drops onto hard (right) and soft (left) surfaces are present and obvious to all.

2. Prior to control measures

The fall from the upstand walls is the principal hazard, particularly on the right hand side where the ground is permanently hard. The public will be aware of the inherent risk of falling over the edge.

Unlikely x moderate harm = low risk

3. Post control measures

Signage warning of the risk of falling at each principal access point. The risk rating has improved slightly.

Very unlikely x moderate harm = very low risk

4. Environmental issues

None. Control measures do not detract from the “unspoilt” environment.

Not significant

5. Suggestions to get to “Good Practice”

None.

(Future new assets may have a profiled top edge to discourage balancing).



Excessive	Enhanced	Good Practice	Adequate	Insufficient
		●		

7.4.5 Examples – Coastal assets – urban promenade

1. Scene setting

The foreground is a well used promenade fronted by beach huts with a local shop behind the camera. Children play with superficial supervision. Toddlers will ordinarily be supervised in this area. There is a hard landing area on the beach if a fall occurs.

2. Prior to control measures

Very likely x moderate harm = high risk

3. Post control measures

Handrailing without infill mesh and signage.

Very unlikely x moderate harm = very low risk

Maintenance of the asset can be achieved wholly from the promenade but does introduce a slight risk to maintenance staff as they will inevitably need to work near an edge when maintaining the asset.

4. Environmental issues

The barriers have been co-ordinated with railings elsewhere in the nearby town and do not look out of place in this semi-natural environment.

Not significant

5. Suggestions to get to “Good Practice”

None.



Excessive	Enhanced	Good Practice	Adequate	Insufficient
		●		

7.4.6 Examples – Coastal assets – rural promenade

1. Scene setting

Well trafficked access route used by walkers, skateboarders and cyclists. The area links nearby holiday resorts and caravan parks. The promenade is wide enough for groups to pass in comfort. The sloped revetment is occasionally submerged by the sea but more often exposed to reveal a sandy beach or water at its toe. The first step onto the sloped revetment is not a significant height.

2. Prior to control measures

Unlikely x minor harm = very low risk

3. Post control measures

Addition of signs to prohibit cyclists at natural access points, warn of the danger of falling and edge demarcation using yellow line marking.

Very unlikely x minor harm = very low risk

This example demonstrates that a minor change in the likelihood of harm need not necessarily change the risks when using risk matrices.

4. Environmental issues

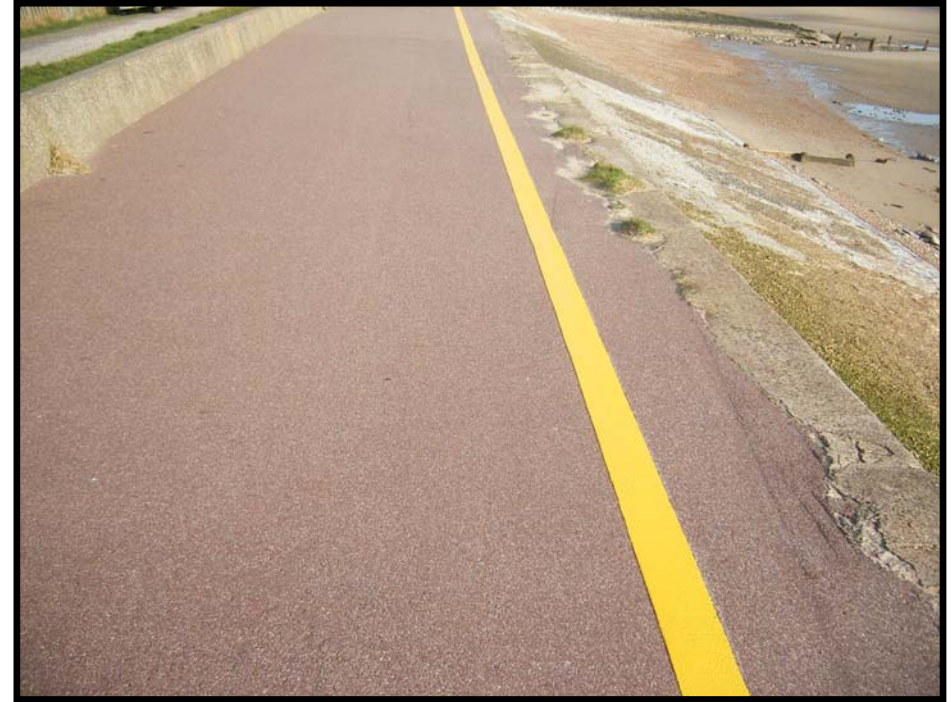
Control measures do not make a significant and adverse impact on the natural beauty of the area.

Minor

5. Suggestions to get to “Good Practice”

None.

(For a new build, consideration could be given to providing a tactile edging strip. The limitation of any matrix used for prioritising risks can be seen from this example when compared to “Worked Assessment example 2”).



Excessive	Enhanced	Good Practice	Adequate	Insufficient
		●		

7.4.7 Examples – Coastal assets – timber groynes

1. Scene setting

This is a public beach where summer swimming is a frequent occurrence. The timber groynes have steel fixings which can become exposed over the passage of time. The groyne (steel sheet piles with timber infill) may be considered as a semi natural and obvious feature. This is not the case for the steel fixings or corroded remnants of steel piles between the timber posts.

2. Prior to control measures

Partially submerged groynes tend to be a hazard to swimmers. Maintenance to reduce the risk of injury on steel fixings (or corroded piling) is particularly onerous and at times not reasonably practical.

Likely x minor harm = low risk

3. Post control measures

Signage on the asset.

Unlikely x minor harm = very low risk

4. Environmental issues

Slight visual impact.

Minor

5. Suggestions to get to “Good Practice”

None.



Excessive	Enhanced	Good Practice	Adequate	Insufficient
		●		

7.4.8 Examples – River assets – pumping station

1. Scene setting

Located within an urban environment, the asset shown is part of a much larger facility (Pumping Station). The Guillotine gates operate on demand although the facility is continuously manned when in use. A public highway runs adjacent to the lifting frame for the Guillotine gates. The depth to invert is significant. The flow of the water can be fast and treacherous during certain conditions. Operational access is required for periodic maintenance only. Egress gates/ ladders and safety chains are present.

2. Prior to control measures

Poor egress and injury from falling. Automatic operation of machinery may be unexpected by the public or trespassers.

Unlikely x fatal harm = very high risk

3. Post control measures

Railings to prevent access by public and trespassers. Signage to warn of significant hazards. Good easy access maintained for operational staff.

Very unlikely x fatal harm = high risk

4. Environmental issues

Urban environment with little environmental value in this location.
Minor

5. Suggestions to get to “Good Practice”

Razor wire or similar is to be avoided where possible by using bespoke security fencing.



Excessive	Enhanced	Good Practice	Adequate	Insufficient
			●	

7.4.9 Examples – River assets – channelled river

1. Scene setting

Fast flowing water with flash flows contained in a channel located in an urban environment. The area is frequented by the public and unsupervised children.

2. Prior to control measures

Very likely x moderate harm = high risk

3. Post control measures

Vertical non-climb infill rails are used to good effect.

Very unlikely x moderate harm = very low risk

4. Environmental issues

The location is not particularly sensitive to natural beauty and so, subject to local planning issues, a standard galvanised railing is appropriate.

Minor

5. Suggestions to get to “Good Practice”

None.

(Signing the obvious is not necessary and will increase the impact the asset has on the environment. A site id notice may be beneficial if located in a discreet position).



Excessive	Enhanced	Good Practice	Adequate	Insufficient
		●		

7.4.10 Examples – River assets – flood wall

1. Scene setting

Flood defence wall with falls to ground on both sides and over 2m on one side. Landing areas are of grass. The asset is on private land but it can be accessed by the public. The wall is at ground level in the foreground and can be walked (balanced) along by adventurous members of the public. The “unexpected” hazard is the differential heights of fall on either side of the wall.

2. Prior to control measures

The hazard of falling is an obvious one for those balancing on the wall but for anyone athletic enough to “vault” the wall the drop on the left side is not so obvious.

Unlikely x moderate harm = low risk

3. Post control measures

The railing is likely to be effective only to very young children who are usually accompanied. The sign and railing is the result of a compromise between the landowner and the asset owner given that the landowner objected to the installation of a full length rail.

Unlikely x moderate harm = low risk (Unchanged)

4. Environmental issues

The Galvanised railing does not blend into the local environment too well.

Major

5. Suggestions to get to “Good Practice”

Discreet surface mounted signs fixed to the right-hand side of the coping warning of falls from height would be more environmentally friendly. The risk control measure is ineffective for the risk of the unexpected differential ground levels and the measures are not sympathetic to the environment.



Excessive	Enhanced	Good Practice	Adequate	Insufficient
* ●				* ●

* The control measure is excessive for the environment and insufficient for the unexpected hazard.

7.4.11 Examples – River assets – flood embankment

1. Scene setting

A concrete access chamber located within open countryside accessed by the landowner and ramblers.

2. Prior to control measures

Unlikely x minor harm = very low risk

3. Post control measures

Easy access to the chamber is prevented by palisade fencing. Diversion route for public and operatives maintaining the fencing is perilously close to a slippery bank.

Likely x moderate harm* = medium risk

The category of harm rarely changes. However, in this instance the control measure (fencing) has introduced a more severe hazard; that of falling into the river due to the close proximity of the fencing to the slope.

4. Environmental issues

An eyesore in an otherwise natural environment.

Severe

5. Suggestions to get to “Good Practice”

Install lockable covers to the chamber. Provide safe pedestrian passage past the asset to maintain the original risk rating for both the public and maintenance staff. Remove the palisade fencing. The excessive use of fencing has resulted in a solution which may be insufficient if it does not permit a safe alternative route past the chamber.



Excessive	Enhanced	Good Practice	Adequate	Insufficient
* ●				** ●

* Excessive. Severe environmental issues

** Insufficient. Unsafe access past fencing

7.4.12 Examples – River assets – control structure

1. Scene setting

Semi rural area with good public access nearby. Well worn footpath used by workforce and public. Fast flowing water over a permanent slippery weir makes egress particularly difficult.

2. Prior to control measures

Likely x moderate harm = medium risk

3. Post control measures

Signage and steel handrailing with vertical bar infill and lockable access gates at ladder positions. Vertical infill bars selected to reduce the ease of climbing by youngsters.

Very unlikely x moderate harm = very low risk

4. Environmental issues

The area is not in any AONB although it is in a local recreational area. Timber railings may be less effective from the viewpoint of a small/young child using this recreation area.

Moderate

5. Suggestions to get to “Good Practice”

None.



Excessive	Enhanced	Good Practice	Adequate	Insufficient
		●		

7.4.13 Examples – River assets - weir

1. Scene setting

Open countryside accessed by the landowner, ramblers and adventurous children. Narrow access bridge above a weir within a deep water course. Persistent trespassing is evident at this site and it has become a local attraction for children of school age.

2. Prior to control measures

Likely x fatal harm = very high risk

3. Post control measures

Security palisade fencing. The principal risks of drowning and falling from the bridge are obvious risks. Trespassers need to be protected where possible but not necessarily at all costs; environmental or otherwise.

Very unlikely x fatal harm = high risk

4. Environmental issues

Security fencing is particularly noticeable in the rural environment. The hazard is obvious although egress from the water is difficult.

Major

5. Suggestions to get to “Good Practice”

A more environmentally sympathetic fence to be installed, with good clear signage of the hazards. Trespassers will enter after making their own informed assessment. Scope for education and training at local schools about the risk of poor buoyancy within aerated water.



Excessive	Enhanced	Good Practice	Adequate	Insufficient
	●			

7.4.14 Examples – General assets – flood storage

1. Scene setting

Located on third party private land. 300mm diameter culvert passes under access track. Occasional flooding of gabion baskets occurs. Maximum depth of water is 1.2m with approximately 150mm of soft silt on the invert. Flow rate through culvert is generally at a slow pace. Access by the public is not common but is not impossible due to footpaths nearby.

2. Prior to control measures

Steel tie wires protruding from gabions are an unexpected hazard. The shallow water can become obscured by weeds.

Likely x moderate harm = medium risk

3. Post control measures

Advise by the use of signs the principal significant hazards and what actions are required.

Very unlikely x moderate harm = very low risk

4. Environmental issues

The sign is on third party land with their permission.
Moderate

5. Suggestions to get to “Good Practice”

Consider advising of the hazard of sharp objects on the gabion baskets. Make the sign visible from the gabions as they may be used as a diving platform.



Excessive	Enhanced	Good Practice	Adequate	Insufficient
	●			

7.4.15 Examples – General assets – access route

1. Scene setting

Narrow and little used access route within housing area. Steep grassy slopes down to the watercourse are present. The edge is at times poorly defined. A small control structure is located in the river nearby.

2. Prior to control measures

Likely x minor harm = low risk

3. Post control measures

Simple sympathetic timber fencing to prevent accidental falls when the edge is undefined.

Very unlikely x minor harm = very low risk

4. Environmental issues

No signs warning of the obvious are present.

Not significant

5. Suggestions to get to “Good Practice”

None.



Excessive	Enhanced	Good Practice	Adequate	Insufficient
		●		

7.4.16 Examples – General assets – outfall structure

1. Scene setting

Major outfall in a rural environment which is operated locally on site. Area is frequently visited by the public. Egress from the water is not unusually difficult.

2. Prior to control measures

Likely x fatal harm = very high risk

3. Post control measures

Anti-climb railing and signage.

Very unlikely x fatal harm = high risk

The management plan for this site requires the gates to be operated manually on site to ensure the area is clear before operation. The high risk becomes tolerable.

4. Environmental issues

Steel railing is necessary particularly for its anti-climb properties. Timber fencing has been used elsewhere where the risk is reduced and the anti-climb features less important.

Moderate

5. Suggestions to get to “Good Practice”

None.



Excessive	Enhanced	Good Practice	Adequate	Insufficient
		●		

7.4.17 Examples – General assets – outfall chamber

1. Scene setting

Wide open rural setting with very few members of the public passing. Covers too heavy to be removed without tools. Sluice hand wheels locked in position. Deep and medium fast flowing water is present periodically.

2. Prior to control measures

The non-automated arrangement of this asset makes sudden and unexpected water flows unlikely.

Unlikely x moderate harm = medium risk

3. Post control measures

Simple 2 rail steel handrail.

Very unlikely x moderate harm = very low risk

4. Environmental issues

Little adverse effect upon the environment due to the railings despite its rural location.

Minor

5. Suggestions to get to “Good Practice”

None.



Excessive	Enhanced	Good Practice	Adequate	Insufficient
		●		

7.4.18 Examples – General assets – screened outlet

1. Scene setting

Large screened outlet with post and wire fencing in open countryside with few members of the public visiting. Extremely difficult egress from the watercourse without assistance.

2. Prior to control measures

The situation is covered without post and wire fencing.
Unlikely x fatal harm = very high risk

3. Post control measures

Existing post and wire fencing replaced with palisade security fencing.

Very unlikely x fatal harm = high risk*

* The addition of trash screens over and above the standard public safety control measures reduces the risk rating to a tolerable level.

4. Environmental issues

The original post and wire fencing or timber stock-proof fencing is also capable of reducing the likelihood of harm at this asset. The security fencing used is excessive from an environmental point of view.

Major

5. Suggestions to get to “Good Practice”

Exchange security fencing for stock-proof fencing.



Excessive	Enhanced	Good Practice	Adequate	Insufficient
●				

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List of abbreviations

ACoP	=	Approved Code of Practice
BSI	=	British Standards Institution
CDM	=	Construction (Design and Management) Regulations 2007
CDMC	=	CDM Co-ordinator
DTp	=	Department of Transport
ECI	=	Early Contractor Involvement
FCRM	=	Flood and Coastal Risk Management
HSE	=	Health and Safety Executive
HSWA	=	Health and Safety at Work etc. Act 1974
MHSWR	=	Management of Health and Safety at Work Regulations 1999
OLA57	=	Occupiers' Liability Act of 1957
OLA84	=	Occupiers' Liability Act of 1984
O&M	=	Operation and Maintenance
RoSPA	=	Royal Society for the Prevention of Accidents
RNLI	=	Royal National Lifeboat Institution
RSPB	=	Royal Society for the Protection of Birds
VSCG	=	Visitor Safety in the Countryside Group
SAM	=	Sustainable Asset Management

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