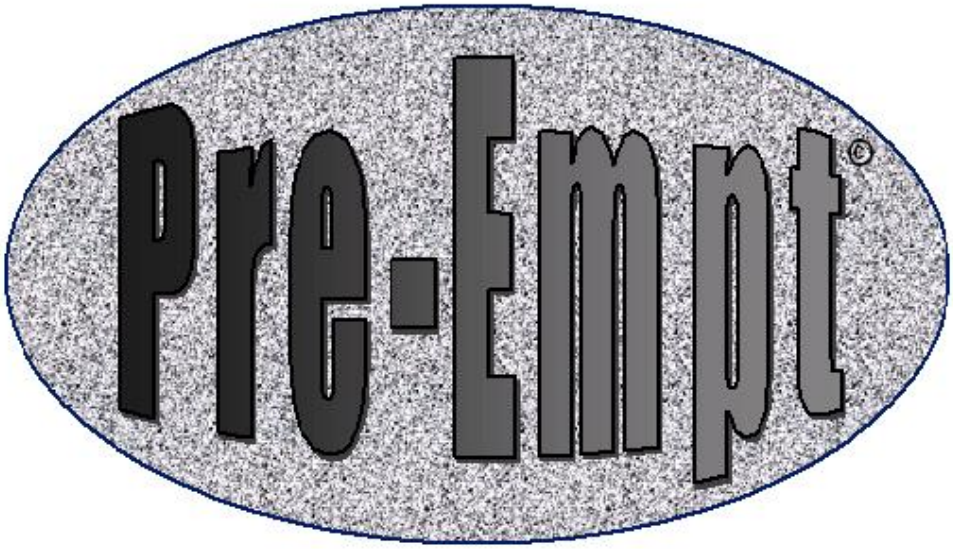

PRE-EMPT for Projects

Proactive Resilient Engineering and Emergency Mitigation Planning Tool

USER GUIDE

Version 2009/1.4

www.pre-empt.org.uk

loughborough innovative manufacturing and construction research centre

Loughborough University

EPSRC

Research Team

Andrew Dainty (a.r.j.dainty@lboro.ac.uk)

Patricia Carrillo (p.m.carrillo@lboro.ac.uk)

Jacqui Glass (j.glass@lboro.ac.uk)

Andrew Price (a.d.f.price@lboro.ac.uk)

Lee Bosher (l.bosher@lboro.ac.uk)

Tel: +44 (0)1509 223640

http://www.pre-empt.org.uk/

IT support

Cath O'Connell (C.E.OConnell@lboro.ac.uk)

Department of Civil and Building Engineering

Loughborough University

Loughborough, LE11 3TU

United Kingdom

Acknowledgements

The research and this tool were possible due to contributions from the following funding and collaborating organisations. Many more organisations, other than those listed below, also contributed with their time and personnel. We wish to extend our thanks to all of them.

Research Team

Department of Civil & Building Engineering, Loughborough University

Funding and Coordinating Bodies

Engineering and Physical Sciences Research Council (EPSRC)

Innovative Manufacturing and Construction Research Centre (IMCRC)

Industrial and Institutional Collaborators

Camden Borough Council

Coventry University

John Laing plc

Scott Wilson

University of Colorado

Contents

Key to symbols:

ⓘ Idea or tip

! Please take note

PLEASE NOTE

All advice or information from the PRE-EMPT Project is intended for use in the UK only by those who will evaluate the significance and limitations of its contents and take responsibility for its use and application. No liability (including that for negligence) for any loss resulting from such advice or information is accepted. Links and referrals to other web sites, publications or information resources are provided for guidance purposes only. Whilst great efforts have been made to signpost the user to the most relevant external sources, we acknowledge that the range of information provided is not a comprehensive list. The PRE-EMPT Project makes no representations or claims as to the quality, content and accuracy of the information and services which may be provided by external sources.

Please note that the documents provided via this website are subject to revision from time to time so please ensure that you use the latest versions of the documentation. The individual documents provided on this web site are copyrighted by the PRE-EMPT Project and may be downloaded for personal use only; permission to otherwise reprint, copy, electronically reproduce, or utilise any document on this web site, in part or in whole is expressly prohibited unless prior written consent is obtained from the PRE-EMPT Project.

Introduction

The Hazard Mitigation and Resilience checklist for projects

The PRE-EMPT toolkit is a project focused tool that will help key decision makers in the UK to systematically embed hazard mitigation and resilience considerations into new and existing developments.

This free web-based tool, developed by Loughborough University, will direct you towards an appropriate approach for any project that is at risk of a range of hazards (please note that for terrorism related threats please use the RE-Design tool that can be found at http://www.resilientdesign.co.uk/). By considering processes such as risk assessment and raising awareness of the implications of hazards, this web-based tool helps decision makers take the first step towards choosing a design and construction strategy.

This open access tool produces recommendations within a short period of time and delivers a project-specific report for clients or other interested parties, to demonstrate that hazard mitigation and risk management considerations have been integrated into your project.

Background

Buildings and developments in any geographic location can be subject to a wide variety of natural phenomena such as windstorms, floods, earthquakes, and other hazards. While the occurrence of some of these cannot be precisely predicted, their impacts are well understood and can be managed through hazard mitigation planning. Mitigation means measures that can reduce or eliminate the vulnerability of the built environment to hazards, whether natural or generated by human activity. The goal is to minimise loss of life, property, and the function of services/systems due to disasters. Designing to resist any hazard(s) should always begin with comprehensive hazard/threat and risk assessments. This includes identification of the hazards present in the location and an assessment of potential impacts and effects on the built environment, based on existing or anticipated vulnerabilities and potential losses.

Regardless of who is conducting the risk assessment, the process of identifying what can happen at a given location, how it can affect the built environment, and what potential losses could arise, remains essentially the same. Only after the overall risk is fully understood should mitigation measures be identified, prioritised, and implemented. The basic principles underlying this process include:

a) The impacts of natural hazards and the costs of the disasters they cause will be reduced whether mitigation measures are implemented pre-disaster (preventively) or post-disaster (correctively). However, proactively integrating mitigation measures into new construction is always more economically feasible than retrofitting.

b) Risk reduction techniques should address as many applicable hazards as possible. This approach, known as multi-hazard mitigation, is the most cost-effective approach, maximises the protective effect of the mitigation measures and optimises multi-hazard design techniques with other building technologies. This process can also highlight if there are any potential clashes between the mitigative strategies required (i.e. making a building resilient to floods may not necessarily be congruent with the measures required to make a building resilient to terrorist attacks).

c) All mitigation is local. Most mitigation measures, whether structural or regulatory, fall under the jurisdiction of local government. Additionally, mitigation initiatives are most effective when they involve the full participation of local stakeholders.

Overview

If you wish to proceed directly to an overview of the toolkit that explains how to use the tool please turn to page 10 of this document.

Structure and logic of the process

The tool is based upon a well established, but simple process of risk assessment that includes the following three components (see Figure 1), namely:

1) Hazard and threat identification
2) Highlighting the implications of the hazards, and
3) The generation of a 'To do list' that will be produced as a bespoke (project specific) 'Action Plan'.

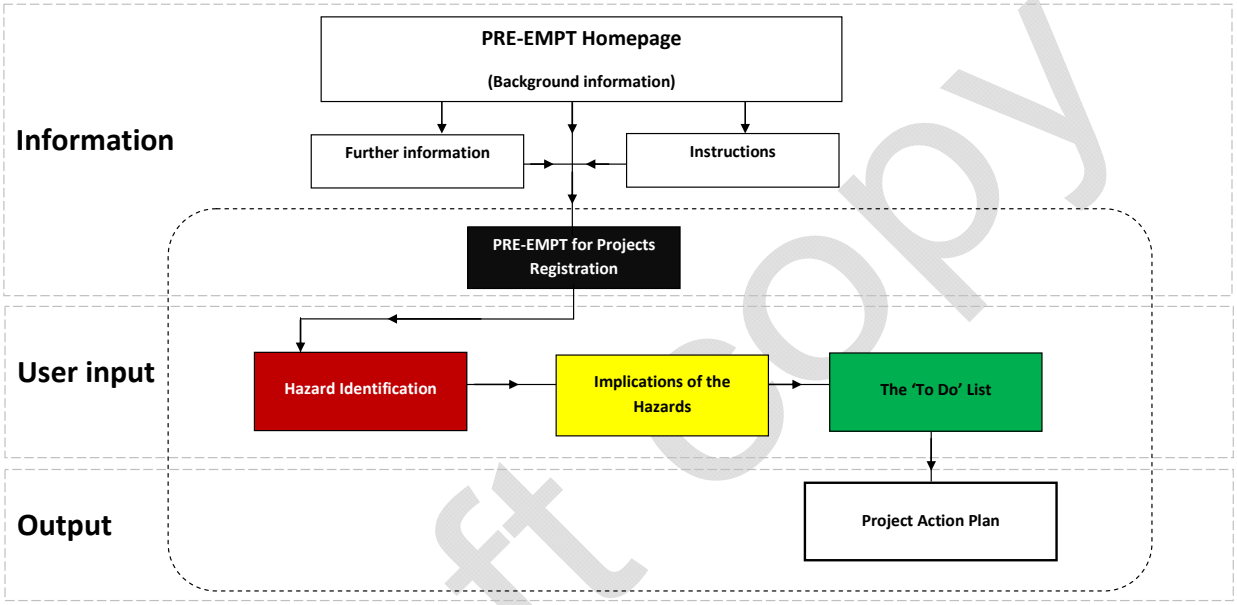

Figure 1: How the 'PRE-EMPT for Projects' tool works

Hazard and threat identification

The first step in risk management is hazard and threat identification. A hazard and threat assessment considers the full spectrum of threats for a given facility/location. The types of threats that a user may wish to consider are listed in Table 1 overleaf, which also shows (a selected list) of whether mitigating for certain hazards is a key consideration in the professional practice of engineers, architects and construction managers in the UK.[1] These hazards need to be considered more effectively during the professional practice of construction managers in particular, but also by architects and engineers.

A hazard/threat assessment should be undertaken that examines supporting information to evaluate the likelihood and potential scale of each threat. Of course, if no hazards are identified then there is no requirement to proceed with the rest of the assessment. Nonetheless, even by simply undertaking the 'hazard and threat identification' process the user has addressed an important component of risk management that is all too often neglected.

[1] Bosher L.S., Dainty A.R.J., Carrillo P.M., Glass J. and Price A.D.F., (2009) 'Decision support for integrating Disaster Risk Management strategies into construction practice', *Association of Researchers in Construction Management (ARCOM) Conference*, 7th – 9th September, Nottingham, UK

Table 1: Disciplinary perspectives of key UK specific hazards[2]

Perspectives of whether the hazard is a key consideration in professional practice			
Hazard/Threat	Engineers	Architects	Construction Managers
Riverine flooding	Yes	Yes	Yes
Pluvial flooding (localised heavy rain)	No	No	No
Coastal erosion and flooding	No	No	No
Windstorms	Yes	Yes	No
Terrorist attacks	No	No	No
Extreme temperatures	Yes	Yes	No

Use existing information from Government sources

The Civil Contingencies Act (CCA) 2004 places a legal duty on local authorities and other key agencies to carry out risk assessments and maintain them in a Community Risk Register. Risks in this context are those that could result in a major emergency. The local Community Risk Register (CRR) is an assessment of the risks within a Local Resilience area agreed by the Local Resilience Forum (LRF) as a basis for supporting the preparation of emergency plans. These CRRs should be accessed when undertaking your hazard and threat identification.

ⓘ Details of CRRs are provided at http://preempt.lboro.ac.uk/downloads/identifying_hazards_and_threats.doc

ⓘ Details of Lead Government Agencies are provided at http://preempt.lboro.ac.uk/downloads/government_agencies.doc

Implications of the hazards (vulnerabilities)

Once the credible hazards are identified, a vulnerability assessment should be performed. This can be a relatively simple process that considers the potential impact of specific hazards as well as the vulnerability of the facility/location. Impact of loss is the degree to which the operation of the business/facility is impaired by the impact of a given threat. A key component of the vulnerability assessment is properly defining the ratings for impact of loss and vulnerability. These definitions may vary from facility to facility. For example, the amount of time for which capability is impaired is an important part of impact of loss. If the facility being assessed is a major component of critical infrastructure, a downtime of a few minutes may be a serious impact of loss, while for an office of a local charity, a downtime of a few minutes would be quite minor. A sample set of generic definitions have been listed below.

- ***Devastating:*** The facility is damaged/contaminated beyond habitable use. Most items/assets are lost, destroyed, or damaged beyond repair/restoration.
- ***Severe:*** The facility is partially damaged/contaminated. Examples include partial structure breach or some items/assets in the facility are damaged beyond repair, but the facility remains mostly intact. The entire facility may be closed for a period of up to two weeks and a portion of the facility may be closed for an extended period of time (more than one month). Some assets (such as IT equipment) may need to be moved to remote locations to protect them from further damage.
- ***Noticeable:*** The facility is temporarily closed or unable to operate, but can continue without an interruption of more than one day. A limited number of assets may be damaged, but the majority of the facility is not affected.
- ***Minor:*** The facility experiences no significant impact on operations (downtime is less than four hours) and there is no loss of major assets.

[2] Bosher L.S., Dainty A.R.J., Carrillo P.M., Glass J. and Price A.D.F., (2009) 'Decision support for integrating Disaster Risk Management strategies into construction practice', *Association of Researchers in Construction Management (ARCOM) Conference*, 7th – 9th September, Nottingham, UK

Vulnerability is defined to be a combination of the exposure of the facility to hazards and the level of deterrence and/or defence provided by the existing countermeasures. In the context of flooding, the exposure of the asset or facility to flooding events is determined by a number of factors, such as the likelihood of flooding and the extent to which the asset of facility is protected. Sample definitions for vulnerability ratings in the context of flood hazards are as follows:[3]

- ***High:*** This is a facility that has high exposure to floods and/or the level of deterrence and/or defence provided by the existing countermeasures are only adequate. The chance of flooding each year is greater than 1.3% (1:75 years).
- ***Moderate***: This is a facility that has moderate exposure to floods and/or the level of deterrence and/or defence provided by the existing countermeasures are marginally adequate. The chance of flooding is 1.3% (1:75 years) or less, but greater than 0.5% (1 in 200 years).
- ***Low:*** This is a facility that has low exposure to floods and/or the level of deterrence and/or defence provided by the existing countermeasures are more than adequate. The chance of flooding is 0.5% (1:200 years) or less.

Risk Analysis

Once an assessment has been made, a combination of the impact of loss rating and the vulnerability rating (in consultation with leading agencies and stakeholders) can be used to evaluate the potential risk to the facility from a given threat. An example of a risk matrix is shown in Table 2.

Table 2: Identifying levels of vulnerability

	Level of vulnerability		
Impact of loss	High	Moderate	Low
Devastating	H	H	M
Severe	H	M	L
Noticeable	M	M	L
Minor	M	L	L

The risk ratings illustrated in Table 2 can be interpreted as follows.

H - These risks are high. Countermeasures recommended to mitigate these risks are essential to the long term sustainability of the development and should be implemented as soon as possible.

M - These risks are moderate. Countermeasure implementation is important to the long-term sustainability of the development and should be undertaken.

L - These risks are low. Countermeasure implementation may enhance security and contribute towards 'future proofing'.

If a 'high' or 'moderate' risk has been identified it is advisable to consult with the lead Government agencies that would be responsible for dealing with the specific hazard. Users would need to consider the implications of the hazards in a number of ways (see Table 3) because hazards can have far reaching impacts upon the operations of construction companies, the structural and materials requirements, associated infrastructure and the project's neighbours and the local community.

[3] After; Environment Agency, (2009) 'Understanding Flood Risk', Environment Agency, Available: http://www.environment-agency.gov.uk/homeandleisure/floods/31658.aspx

Table 3: Implications of the hazards: Key issues to consider

Key issues	For instance?
Operational	How might the hazards impinge upon your ability to deliver the project? What can you do to address any associated problems in the delivery of the project?
Structural	What structural changes will be required to mitigate the hazard?
Materials	What types of resilient materials will you need to use? At what cost?
Infrastructure	Will the critical services (water, sewerage, power, transport etc.) to your development be affected? Can you protect them?
Neighbours	Do the neighbouring developments have a detrimental impact upon the safety and security of your development/project?
Local community	To what extent does your project impact upon local resilience? How does the local socio-economic context influence the resilience of your project?
The business case	How might the hazards affect the rental/sale value of the development? If required, could your adaptations increase the value of the development?

The 'To Do' list

Upgrade Options/Recommendations

Based on the findings from the risk analysis, the next step is to identify countermeasures that can lower the various levels of risk. If minimum standard countermeasures for a given facility level are not currently present, these countermeasures should automatically be included in the upgrade recommendations. Additional countermeasure upgrades above the minimum standards should be recommended as necessary to address the specific threats identified for the facility (see Table 4 for examples of countermeasures related to flood risk). The estimated installation and operating costs for the recommended countermeasures will need to be considered but also the possible long-term benefits of using such measures.

Table 4: Some key considerations when addressing flood risk in England and Wales

Key considerations	Options (indicative)
Who can you turn to for specialist advice?	Contact the Environment Agency, Local Authorities, plus a range of engineering and flood risk management consultants.
What measures can eliminate the hazard?	Consider the locational planning (away from sources of flood risk) and landscape design (such as bunds and embankments) of the development
What measures can reduce or resist the impact of the hazard?	Consider the use of Sustainable Urban Drainage Systems, non-return valves on sewerage outlets, use of water resistant construction materials, location of essential services and use of removable flood barriers.
What might the costs be to mitigate for the hazard?	Consider whether any additional costs will be required because early measures during the concept and design may not incur any extra costs.
Could extra costs be recouped in the short-term?	If extra costs are required these could be minimal and possibly recouped in the short-term through increased resale prices or in the long-term through increased rental revenues associated with a 'resilient' development.
Could extra costs be recouped in the long-term?	If you will be operating/managing the development, benefits could include reduced insurance premiums, reduced maintenance costs and reduced service disruptions during localised flooding events.

Studies of the cost effectiveness and return ratios of investments related to mitigating crime and natural hazards have been carried out and can offer an insight into the long-term benefits of proactively mitigating for hazards. For example, it has been demonstrated that in regard to mitigating crime in residential properties, designing in and retrofitting measures cost 26% and 36% respectively of the average cost of a burglary in the UK.[4] With regard to the study of natural hazards, research into Federal Emergency Management Agency grants showed that for every dollar that was spent on mitigation, society saved $4 in the event of a disaster or a hazard causing damage.[5]

Re-Evaluation of Risks

Implementation of the recommended security, design and/or structural upgrades should have a positive effect on the impact of loss and/or the vulnerability ratings for each threat. The final step is to re-evaluate these for each threat in light of the recommended upgrades. Using a riverine flood as an example, the installation of flood protection/resilience measures (i.e. lime plaster on walls and raised electrical points) will not prevent the flood from occurring, but would reduce the damage caused by the flood waters. Therefore, the impact of loss rating for a flooding event would improve, but the vulnerability rating would stay the same.

The action plan

The final component of the toolkit is the 'PRE-EMPT Action plan', which is a project-specific report that can be used clients or other interested parties to demonstrate that all the options have been considered (even if it is merely demonstrating that a range of hazards have been assessed but did not pose a threat). This is a brief, printed outline of the key actions and issues that should be considered prior to, and during, the construction project. It should ideally be reviewed at each stage of the design, construction and operation process and upon completion, can be included in the project's legacy archive.

Linkages with other relevant Standards

This tool has been developed to encourage more joined-up thinking in relation to how the built environment is delivered and will therefore complement broader frameworks such as ISO14001 (International Environmental Management Standard), ISO2600 (Social Responsibility), BS8900:2006 (Guide for managing sustainable development) and BS 25999-1:2006 (Business continuity management: Code of practice).

[4] Armitage R., (2000) 'An evaluation of secured by design housing within West Yorkshire.' *Policing and Reducing Crime Unit Briefing Note 7/00*. London: Home Office

[5] Multihazard Mitigation Council (2005) *Natural Hazard Mitigation Saves: An Independent Study to Assess the Future Savings from Mitigation Activities*, Washington: National Institute of Building Sciences

Navigating through the tool

Home page

The tool can be accessed via this website http://preempt.lboro.ac.uk/index.php. On launching the tool, the home page will be displayed providing some brief information and an opportunity for you to download a copy of the ***User Guide***. Initially you will need to register to use the toolkit, see Figure 2.

Figure 2: Home page indicating the 'Register/Log in' tab.

Registration

Once you have provided some basic information such as your email address (which will become your log-in) and your name you will be registered. An automatically generated email will then be sent to you providing you with your unique case sensitive password; please keep this password safe. Once you have logged into the website you will be able to use the PRE-EMPT for Projects tool.

Privacy Policy and Data Protection

! Loughborough University is committed to ensuring that your privacy is protected. Should we ask you to provide certain information by which you can be identified when using this website, then you can be assured that it will only be used in accordance with this privacy statement.

In accordance with the Data Protection Act (1998) any personal information you provide will not be disclosed to third parties in any form. If you do not wish to disclose personal details you are not required to do so.

Log in

Enter your 'username' (the email address that you have provided) and your case sensitive password (that should have sent to your email address upon registration) before clicking the 'Log in' button.

! If you have forgotten your password please enter your details in the appropriate box and click 'Send password'. Once you have done this a new password will be sent to your email account.

Background information

This is an optional webpage providing you with additional information about the project, the principles that underpin the process and an opportunity to download the ***User Guide*** and a copy of the ***'Flow chart illustrating the PRE-EMPT for Projects process'***.

Step 1: Identify the project

You can now access your dashboard (see Figure 3 for illustration of key components). This dashboard will provide you with access to a list of you completed assessments, assessments in progress and the option to generate a new assessment.

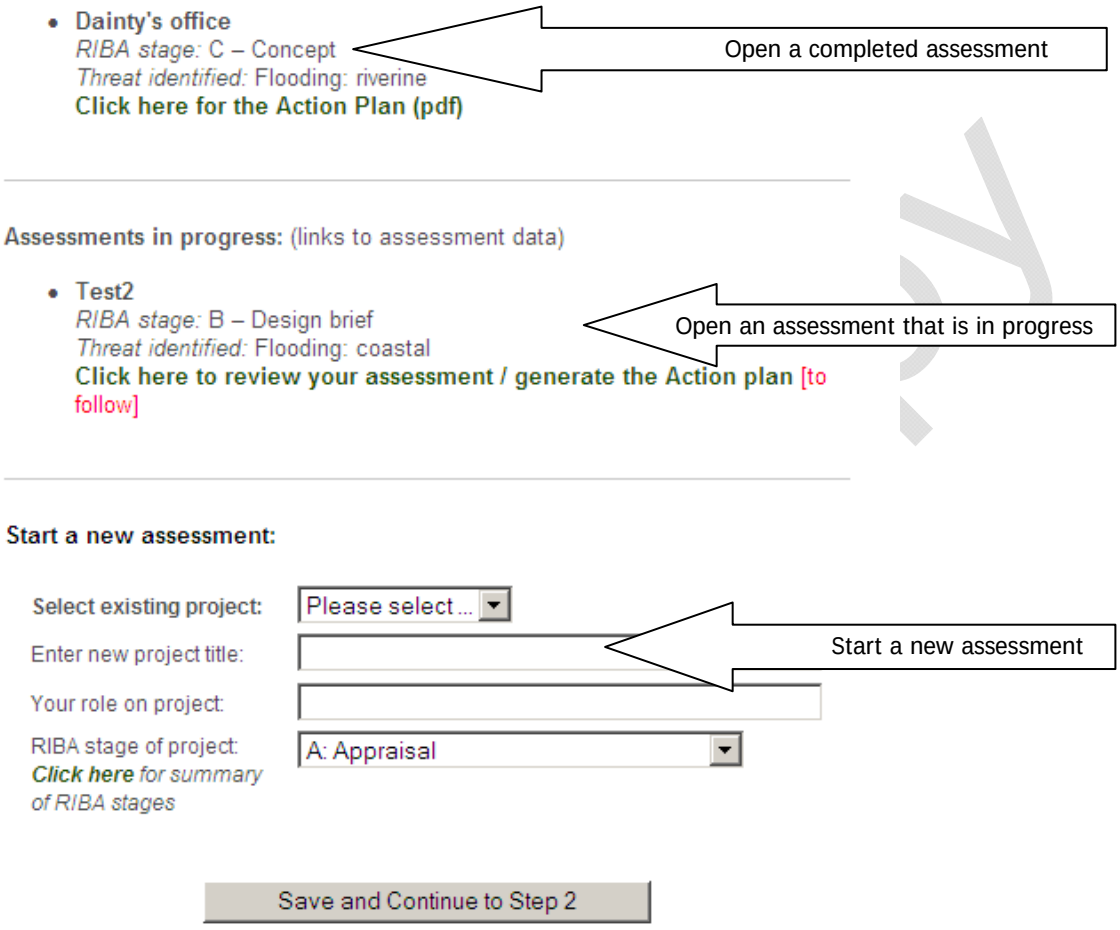

Figure 3: Key components of the project identification process

Starting a new assessment: Enter a new project title in the appropriate box, enter information about your role on the project and then choose from the drop down list at which stage of the project you are undertaking the assessment.

ⓘ For an overview of the project stages as defined by the Royal Institute of British Architects (RIBA) please see Appendix A of this document.

Step 2: Hazard and Threat Identification

The next step provides you with information about how to identify any possible hazards or threats to your development or project. Existing information can be obtained from Government sources through localised Community Risk Registers. Once you have checked the registers, Lead government agencies should also be able to advise you on the extent to which certain hazards/threats might affect your project.

ⓘ It is very important at this stage for you to either conduct your own hazard/threat assessment or to obtain information from existing assessments that have been undertaken by the Government. The quality of the assessment that you undertake or use is a critical component of how successful your PRE-EMPT assessment will be.

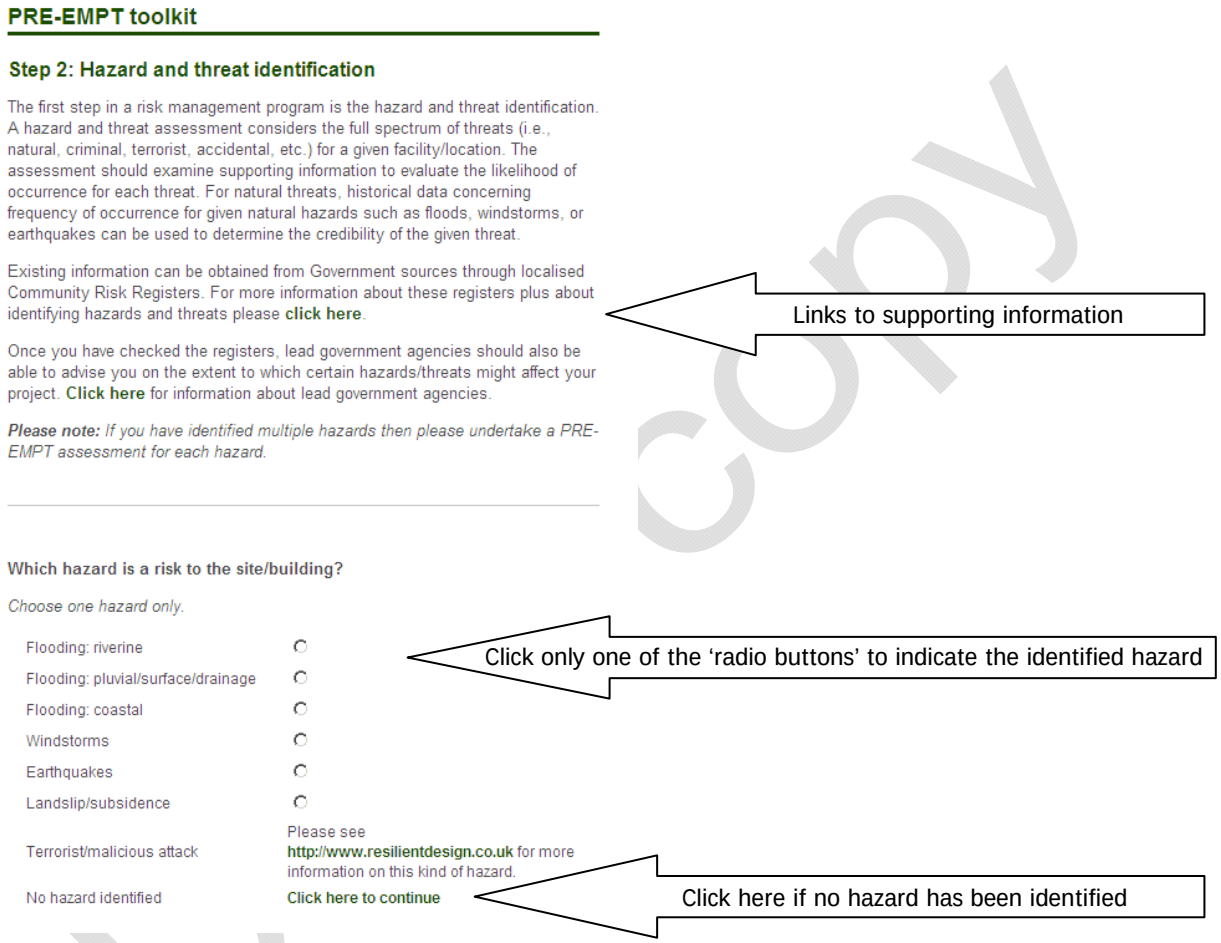

Figure 4: Selecting the identified hazard

Please click one of the 'radio buttons' for the hazard/treat that you have identified (see figure 4); note that you will only be able to 'check' one of these radio buttons. If you have identified multiple hazards then please undertake a separate PRE-EMPT assessment for each hazard. If no hazard has been identified please click the appropriate button so that you can be directed to the end of the assessment.

ⓘ Please note that if you have identified terrorism or malicious attacks as a possible threat to your project/development then please undertake your assessment on the RE-Design website that is located at www.resilientdesign.co.uk

When you have selected the identified hazard from the list, answer three questions related to your/the clients requirements for the project. When you answer these three questions you will also be given an opportunity to add some explanatory text (maximum of 20 words; this will be included in the final project Action Plan). Save the page and proceed to the next stage.

Step 3: Implications of the hazards

The level of impact table on the web-based tool (see Figure 5) will now give you an opportunity to select your judgement upon the level of impact (i.e. devastating, severe, noticeable or minor). Descriptive details are provided for each option to help you make your judgement (please select one option only).

PRE-EMPT toolkit

Step 3: Implications of the hazard (vulnerability) identified: Flooding: coastal

How could the hazard affect your project and the wider built and social environments?

Based on your assessments, to what extent could the impact of loss be:

Level of impact	*Choose 1 only*
Devastating: • The facility is damaged/contaminated beyond habitable use. • Most items/assets are lost, destroyed, or damaged beyond repair/restoration.	○
Severe: • The facility is partially damaged/contaminated. • Some items/assets in the facility are damaged beyond repair, but the facility remains mostly intact. • The facility may be closed for a period of up to 2 weeks or a portion of the facility may be closed for an extended period of time (more than one month). • Some assets may need to be moved to remote locations to protect them from environmental damage.	○
Noticeable: • The facility is temporarily closed or unable to operate, but can continue without an interruption of more than one day. • A limited number of assets may be damaged, but the majority of the facility is not affected.	○
Minor: • The facility experiences no significant impact on operations (downtime is less than four hours) and there is no loss of major assets.	○

Figure 5: Selecting the 'level of impact'

Next you will be asked to select the possible level of exposure of the project/development to the hazard. The table used for this is illustrated in Figure 6; please only select one option.

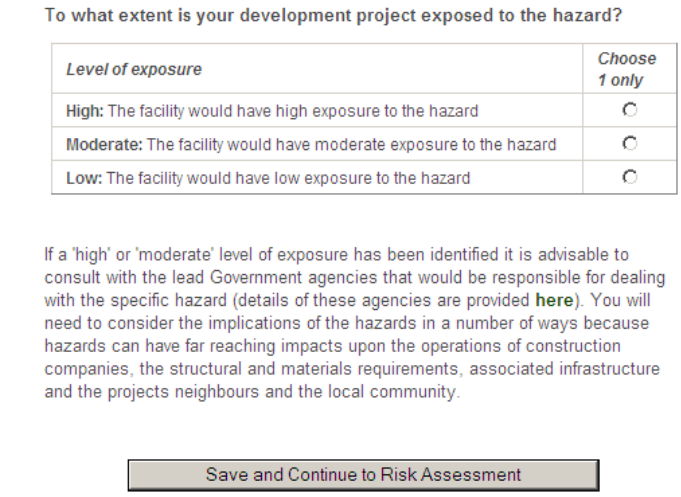

Figure 6: Selecting the 'level of exposure'

Risk analysis

A risk analysis matrix will now be generated automatically; the specific risk analysis for your project will be indicated with an 'x' (see Figure 7).

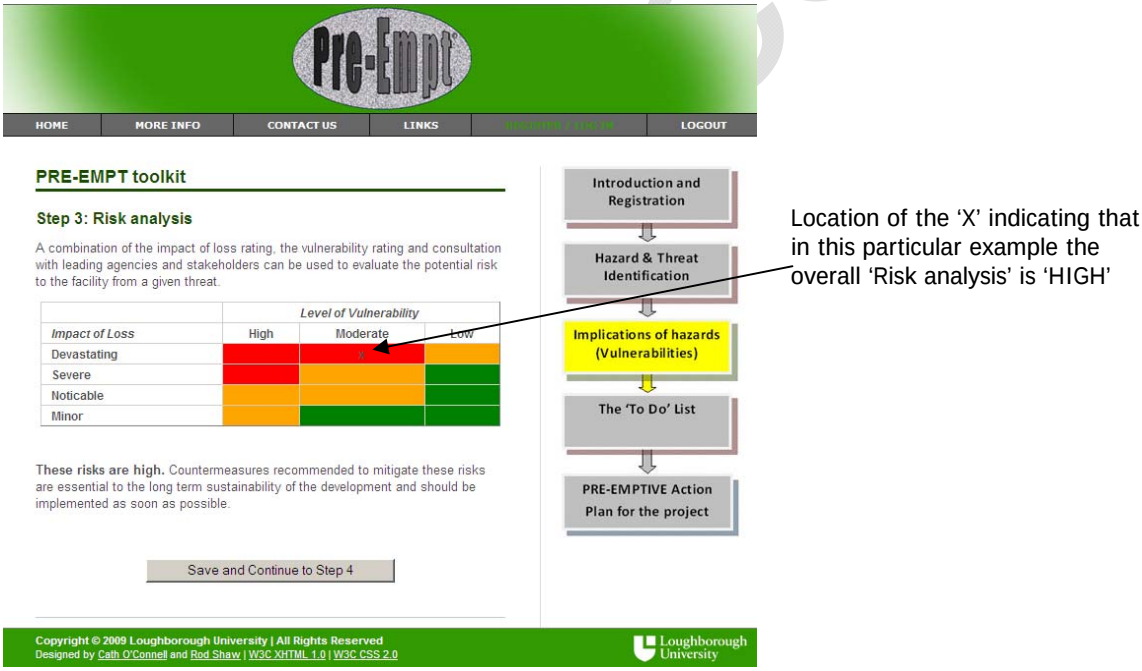

Figure 7: Example of the risk analysis matrix

The risk ratings provided in the automatically generated table (see Figure 7) can be interpreted as follows.

Red - These risks are high. Countermeasures recommended to mitigate these risks are essential to the long term sustainability of the development and should be implemented as soon as possible.

Amber - These risks are moderate. Countermeasure implementation is important to the long-term sustainability of the development and should be undertaken.

Green - These risks are low. Countermeasure implementation may enhance security and contribute towards 'future proofing'.

If a 'high' or 'moderate' risk has been identified it is advisable to consult with the lead Government agencies that would be responsible for dealing with the specific hazard. Users would need to consider the implications of the hazards in a number of ways because hazards can have far reaching impacts upon the operations of construction companies, the structural and materials requirements, associated infrastructure and the project's neighbours and the local community.

Step 4: Generation of the 'Action Plan'

After 'Step 3' a project specific 'Action Plan' will be automatically generated as a PDF file. This file will be emailed to your email address and can also be downloaded from the Action Plan webpage.

ⓘ You will need Adobe Acrobat Reader to open a PDF file, if you do not have this software it can be downloaded free of charge at http://get.adobe.com/uk/reader/

The 'PRE-EMPT Action Plan' is a project-specific report that can be used for clients or other interested parties to demonstrate that all the options have been considered (even if it is merely demonstrating that a range of hazards have been assessed but did not pose a threat). This is a brief, printed outline of the key actions and issues that should be considered prior to, and during, the construction project. The Action Plan document contains further guidance and information that is structured as follows:

- Who can you turn to for specialist advice?
- What measures can eliminate the hazard?
- What measures can reduce or resist the impact of the hazard?
- What might the costs be to mitigate for the hazard?
- Could extra costs be recouped in the short-term?
- Could extra costs be recouped in the long-term?
- Links to other related international and British standards

This action plan should ideally be reviewed at each stage of the design, construction and operation process (such as detailed in the Royal Institute of British Architects 'Plan of Work' 2007) and upon completion of the project the 'Action Plan' can be included in the project's legacy archive. The value and usability of the Action Plan is contingent upon the information provided by the user. The information provided in the Action Plan is not prescriptive; it is merely provided as a guide, to assist the user. For instance, the 'Additional situational considerations' section of the Action Plan is provided to raise a number of considerations that the user may need to address on the project; space is provided for the user to add extra written notes if required.

Thank you

We hope PRE-EMPT for Projects proves useful to you and your organisation. Improvements to the toolkit will be incorporated in forthcoming versions. Please see our website for news on the latest developments with the tool. Any comments on the content of the toolkit can be sent to the research team using the details provided on the inside cover page of this manual.

This User Guide was last revised on **21st August 2009**. Please ensure that you are using the most up to date version. In the event of queries or problems please contact Lee Bosher at L.Bosher@Lboro.ac.uk

Glossary

CCA	The Civil Contingencies Act 2004. Central to the Act is multi-disciplinary and multi-hazard planning; engaging a broad range of structural and non-structural measures to mitigate potential hazards. The Act places a legal duty on local authorities and other key agencies to carry out risk assessments and maintain them in a Community Risk Register.
CCR	The local Community Risk Register (CRR) is an assessment of the risks within a local area agreed by a Local Resilience Forum (LRF) as a basis for supporting the preparation of emergency plans.
Countermeasures	xxxx
Hazards	xxxx
Hazard identification	xxxx
Hazard mitigation	xxxx
'Plan of work' (RIBA)	A commonly used framework that provides various stages in the life of a building project: See, Royal Institute of British Architects, (2007), *Outline Plan of Work 2007*, London: RIBA
Resilience	xxxx
RIBA	Royal Institute of British Architects, London
Risk analysis	xxxx
Threats	xxxx
Vulnerability	xxxx

Appendix A: RIBA Plan of Work 2007

The Royal Institute of British Architects (RIBA)

The RIBA 'Plan of Work' identifies various stages in the life of a building project, as shown below.

STAGE			SUMMARY OF ACTIVITIES
Preparation	A	Appraisal	Identification of client's needs and objectives, business case and ***possible constraints on development***. Preparation of feasibility studies and assessment of options to enable the client to decide whether to proceed
	B	Design brief	Development of initial statement of requirements into the Design Brief by or on behalf of the client ***confirming key requirements and constraints***. Identification of procurement method, procedures, organisational structure and range of consultants and others to be engaged for the project.
Design	C	Concept	Implementation of Design Brief and preparation of additional data. Preparation of Concept Design including outline proposals for structural and building services systems, ***outline specifications*** and preliminary cost plan. Review of procurement route.
	D	Design development	***Development of concept design*** to include structural and building services systems, updated outline specifications and cost plan. Completion of Project Brief. ***Application for detailed planning permission***.
	E	Technical design	***Preparation of technical design(s) and specifications***, sufficient to co-ordinate components and elements of the project and information for statutory standards and construction safety.
Pre-Construction	F	Production information	***Preparation of detailed information for construction***. Application for statutory approvals. Preparation of information for construction required under the building contract. Review of information provided by specialists.
	G	Tender documentation	***Preparation and/or collation of tender documentation*** in sufficient detail to enable a tender or tenders to be obtained for the project.
	H	Tender action	***Identification and evaluation of potential contractors and/or specialists for the project***. Obtaining and appraising tenders; submission of recommendations to the client.
Construction	J	Mobilisation	Letting the building contract, appointing the contractor. ***Issuing of information to the contractor***. Arranging site hand over to the contractor.
	K	Construction to practical completion	Administration of the building contract to Practical Completion. Provision to the contractor of further Information as and when reasonably required. Review of information provided by contractors and specialists.
Use	L	Post practical completion	Administration of the building contract after Practical Completion and making final inspections. Assisting building user during initial occupation period. Review of project performance in use.

Source: Royal Institute of British Architects, (2007), *Outline Plan of Work 2007*, London: RIBA

The stages when PRE-EMPT should be optimally used are shaded in **GREEN**

Appendix B: Framework for 'PRE-EMPT for Projects'