

# Managing safety at lock sites: Guidance for navigation authorities on minimising falling risks

## Foreword

Locks are an integral part of navigation infrastructure. The issue of safety around locks is common to all navigation authorities who allow boaters to operate their structures themselves and permit access to other visitors, for example for viewing the boats or where footpaths cross lock gates.

Each navigation authority is expected to consider the risks to visitors and provide a reasonably practicable means of managing identified hazards and a number of authorities have developed internal guidance on managing such risks. In 2013 AINA updated its guidance document, *Managing Inland Waterway Safety Risks* which provided a starting point and context for developing specific safety plans and risk assessments in relation to waterway operators, users and visitors.

This document will help navigation authorities understand the needs of visitors and users and identify falling risks associated with access around locks. It will also assist them in developing guidance on how to manage the risks identified in the context of the term 'reasonably practicable'.



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**June 2015**



Association of  
Inland  
Navigation  
Authorities

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## About AINA

AINA is the industry body in Great Britain for those authorities with statutory or other legal responsibility for the management, maintenance and operation of navigable inland waterways for navigation and the delivery of wider public benefits. AINA was set up in 1996 with strong encouragement from government to provide, for the first time ever, a single voice on waterway management issues. The broad purpose of AINA is to facilitate the management, maintenance and development of inland waterways as an economic, social and environmental resource.

There are 18 AINA members drawn from the public, private and third sectors. They include the Canal & River Trust, the Environment Agency and the Broads Authority in addition to other national park authorities, local government authorities, private canal companies, internal drainage boards and a variety of public and charitable trusts. Most AINA members are defined as navigation authorities by their own Acts of Parliament (some of them more than 250 years old) which regulate the operation of their waterways. Others, such as some local government authorities, have inherited the status of navigation authority through various statutes. Between them, AINA members have responsibility for over 5,500km of navigable, inland waterways which include canals, river navigations and lakes. Since its inception AINA has demonstrated with a high degree of success that by bringing navigation authorities together to share good practice, expertise and professionalism and to speak with one voice when required to do so, it can deliver significant benefits to all navigation authorities, large and small, and also to their partners across the waterways sector. AINA has:

- delivered a valuable resource of more than 25 reports giving good practice guidance across a wide range of waterway management and operational issues
- determined common, industry-wide standards
- delivered, in partnership with regulators and stakeholders, industry codes of practice to facilitate pragmatic and effective industry self-regulation with the effect of achieving significant cost savings for Members or staving off mandatory regulation which would have incurred considerably greater costs for the industry

AINA has become established in the psyche of all parties with interest in the waterways. It has enjoyed regular contact with senior government officials and Ministers in Whitehall and has hosted well-attended national conferences on key issues affecting the waterways. The foundation for all AINA's achievements is its unique ability to represent all navigable inland waterways across Great Britain.

### 1. Introduction

- 1.1. This document is designed to be used as an aid when considering the risk of falls from lock operating areas such as lock quadrants onto a towpath or into water, cross- lock walkways and lock frontages into the lock. It also contains guidance for managing risk of falls into disused locks.
- 1.2. When controlling risk of falls at operational lock frontages the aim is to provide clear demarcation and to minimise obstructions which could lead to a slip/fall. At disused locks the consideration should be to ensure **all** chambers are fenced to stop access.
- 1.3. There will be sites where 'standard' risk controls cannot be implemented. Local circumstances such as heritage and environmental listings may dictate the level and style of any risk control measure which is provided. In such circumstances early discussions with relevant authorities should ensure that an agreement of appropriate controls is implemented in a timely manner.
- 1.4. Appendix 1 presents a number of points for consideration by navigation authorities in their design and management of lock sites with respect to user and public safety. Taken together, these considerations have the potential to become established as an industry-wide standard.
- 1.5. Through Appendix 2 the document addresses general risks associated with lock operations which go beyond falling at lock sites by web links to relevant boating safety information.

### 2. Use of fencing

- 2.1. It may be considered appropriate to arrest falls from height adjacent to lock operating areas. When considering the need for action other controls such as shortening/cranking beams, demarcation of edges, removal of tripping hazards etc. should be considered as preferred control measures before considering fencing.
- 2.2. Where fencing is considered the most appropriate control, it must be remembered that its use can create additional hazards that must be taken into account when assessing its design and installation.

These include:

- crushing hazards
- impeding entry and exit to operate structures or equipment
- hazards to cyclists or walkers especially where a pathway narrows
- creation of climbing aids and access 'challenges' for youngsters
- encouraging unwanted use. e.g. loitering
- tripping hazards (e.g. from low level fencing).

- 2.3. A decision tree to aid managing falls from lock sites and further guidance on managing falls from lock chambers is shown on the next page. **Please note:** the decision tree is not exhaustive. When assessing locks every location must be judged on its own merits, and issues such as location, operational/public access and maintenance should be considered and risks assessed accordingly.
- 2.4. Certain cases may fall outside the scope of the decision tree and require an alternative combination of control measures.

Circumstances – Arresting falls from Lock Sites	Provide / maintain or highlight definition to lock edges	Ensure lock side area has no unnecessary tripping hazards	Consider anti-slip on lock walkways	Consider hand rails on walkways over lock	Extend operating area of lock quadrant	Highlight edge also consider notices on balance beams	Signing to educate visitors	Consider provision of formal viewing areas to encourage crowds elsewhere
<p><b>Start</b> → Drops around lock &gt;1m at low water level</p> <p><b>Key</b> ● Control measures to consider</p> <p>Yes → Do visitors need to cross the lock from one side to the other?</p> <p>No → Is crowd pressure possible?</p> <p>Yes → Can crowds be encouraged?</p> <p>No → Would fencing create a tripping hazard (Is there a gap of &gt;300mm between possible fence line and balance beam end)?</p> <p>Yes → Can balance beam be shortened or cranked to remove trapping hazard?</p> <p>No → Can operating area be extended?</p> <p>Flowchart logic: 'Drops around lock &gt;1m at low water level' leads to 'Do visitors need to cross the lock from one side to the other?'. If 'Yes', it leads to 'Would fencing create a tripping hazard...'. If 'No', it leads to 'Is crowd pressure possible?'. From 'Is crowd pressure possible?', 'Yes' leads to 'Can crowds be encouraged?', which then leads to 'Would fencing create a tripping hazard...'. From 'Would fencing create a tripping hazard...', 'Yes' leads to 'Can balance beam be shortened or cranked to remove trapping hazard?'. From 'Can balance beam be shortened...', 'Yes' leads to 'Can operating area be extended?'. From 'Can operating area be extended?', 'Yes' leads to 'Can balance beam be shortened...', and 'No' leads to 'Would fencing create a tripping hazard...'. 'No' answers from 'Do visitors need to cross...', 'Is crowd pressure possible?', and 'Would fencing create a tripping hazard...' lead to the 'Provide / maintain or highlight definition to lock edges' column.</p>	<p>●</p> <p>●</p> <p>●</p> <p>●</p> <p>●</p> <p>●</p> <p>●</p> <p>●</p>	<p>●</p> <p>●</p> <p>●</p> <p>●</p> <p>●</p> <p>●</p> <p>●</p> <p>●</p>	<p>●</p> <p>●</p> <p>●</p> <p>●</p> <p>●</p> <p>●</p> <p>●</p> <p>●</p>	<p>●</p> <p>●</p> <p>●</p> <p>●</p> <p>●</p> <p>●</p> <p>●</p> <p>●</p>	<p>●</p> <p>●</p> <p>●</p> <p>●</p> <p>●</p> <p>●</p> <p>●</p> <p>●</p>	<p>●</p> <p>●</p> <p>●</p> <p>●</p> <p>●</p> <p>●</p> <p>●</p>	<p>●</p> <p>●</p> <p>●</p> <p>●</p> <p>●</p> <p>●</p> <p>●</p>	<p>●</p> <p>●</p> <p>●</p> <p>●</p> <p>●</p> <p>●</p> <p>●</p>

### 3. Cross-lock walkways (Including lock gates and access bridges)

- 3.1 A balance beam is the long arm projecting from the landward side of the gate over the towpath. As well as providing leverage to open and close the heavy gate, the beam also balances the (non-floating) weight of the gate in its socket, and so allows the gate to swing more freely. Access bridges allow a user or a member of the public to traverse from one side of the lock to another without having to use a balance beam.
- 3.2. The following must be considered:
- lock walkways and balance beams used as walkways - consider having non slip surfaces
  - lock walkways and balance beams used as walkways - consider having securely fitted handrails
  - if there is an access bridge from one side of a lock to another consider not having anti-slip on the nearest balance beams to the bridge.

#### Surface materials

The exact type of surface material used at a particular location will vary depending on the location and use of the site.



**GRP with anti-slip surface**



**Epoxy base/grit surface**



#### 4. Handrails

- 4.1. The requirement for handrails on lock walkways includes cross-lock bridges used by boaters and other visitors. The exact requirement for handrails will vary by location. The consideration should be to have a handrail on the downstream side of any walkway that is used to cross the lock because otherwise the potential is to fall onto a hard surface (lock cill) if the lock is at low water level.
- 4.2. Where lock walkways are used by visitors other than boaters (for example high use sites and/or where public footpaths cross the lock, consideration should be given to providing twin handrails with sufficient width walkways to allow use by the type of groups who visit the site.
- 4.3. When assessing cross-lock foot bridges which are used extensively by non-boaters, consideration should also be given to protecting falls on all open sides.





## 5. Risk controls for lock frontages

	Risk Control Measures			
	<b>Disused Locks</b>	<b>Fencing erected on all waterside frontages to stop access where the lock chamber is empty<sup>1</sup></b>	Surrounding surfaces maintained to minimise tripping hazards	Signs in place to warn of any hazards which are not obvious
<b>Operational Lock chambers</b>	<b>Lock edges have clear demarcation</b>	Copings and other surfaces maintained to minimise tripping hazards	Signs in place to warn of hazards which are not obvious (e.g. automated lock gates, sluices etc)	<b>Where possible</b> locks should be left full, particularly overnight

### **Application Note:**

<sup>1</sup> Where disused locks still retain water at the upper canal level the requirement for fencing can be relaxed although ladders should be installed to assist escape where the freeboard is in excess of 300mm.

### Appendix 1

#### Consideration of standards

The following guidance is for the consideration of all navigation authorities to establish a standard that can be used throughout the inland waterway network to enable a consistency of approach for all users.

#### Landings and moorings

- Operational structures such as locks or flights of locks should have landings or waiting points on both upstream and downstream sides and are suitable for a least one vessel.
- The landings at any operational structures should have a means of tying a vessel.
- The landings and moorings should have even surfaces and defined edges.
- All vegetation around the mooring or landings should be kept trimmed.
- Water depth at the mooring or landings should be maintained within the published dimensions.

#### Locks

Lock Ladders should be functional, safe and robust.

*The following points should also be considered when assessing the ladder:*

- Locks should be fitted with ladders ideally a minimum of two in wide locks at opposite third points, and one in narrow locks ideally at the centre point.
- The hoops should be high enough to ensure the user is safe above the coping.
- Rungs should be reasonably spaced and allow good foot depth.
- Landing area should have minimal tripping hazards.
- The ladder is primarily required to allow a person to escape after falling into the water. However, it must be recognised that ladders are used in normal lock operation, particularly by single handed boaters, so they need to be safe to use on an everyday basis.



## Good practice guide

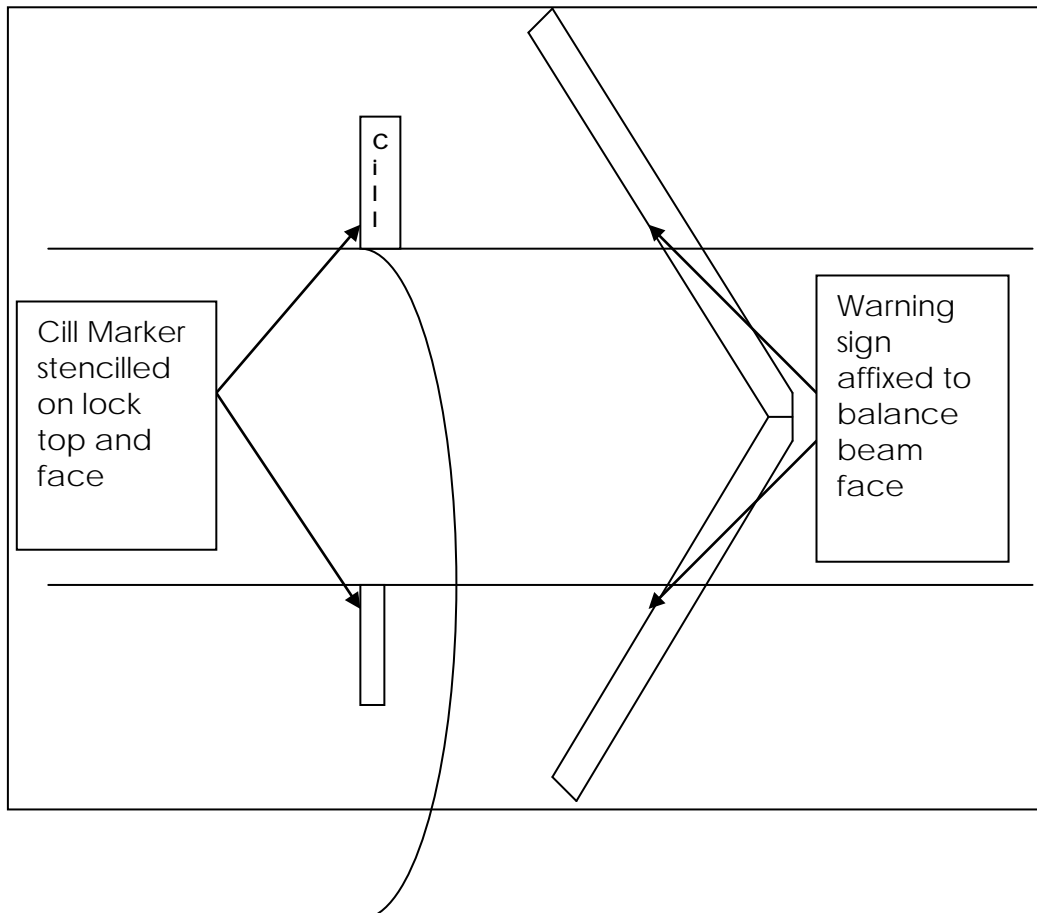
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- Mountings should be secure.
- The potential for boat damage should be minimised.
- The bottom rung should be adequately below the lowest water level, so that someone in the water can gain a foot hold to assist their escape.
- Narrow locks should holding points on the same side as the ladders.
- Wide locks should have holding points on both sides.



- The bollards at the upstream end of a lock should be positioned to assist in keeping craft away from the cill.
- The locations of the bollards should be carefully selected to avoid any risk of ropes becoming snagged on lock ladders or other items.
- Bollards should be near the edge of the lock chamber to ease ropes sliding over the wall and minimise potential for the rope to become a tripping hazard.
- Lock chambers and gates should free of obstructions and protrusions that could cause a vessel to snag.
- Cills should be marked clearly on lock tops and sides, to mark the position of all lock cills that presents a hazard to navigation. Erect and maintain warning signs advising of the action to take with regard to the hazard from cill.

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- Staircase, guillotine and customer operated powered locks display clear and simple instructions for the use.
- Locks are clearly signed with identifying numbers and traditional names where appropriate.
- Steps and sloping pathways near to lock sides should have no loose treads, risers or paving and any leading edges should clearly defined.

## Appendix 2

### General risks associated with lock operations

A lock is simply a chamber with gates at either end. By emptying or filling that chamber with water, a boat can move up or down onto a new section of the waterway.

Although there are many different kinds of locks, they all work on a similar principle. With the lock gates closed, you open sluices (the paddles) to let the water in or out. When the water level under the boat is the same as the level the boat is moving to, the boat can simply move in or out of the lock.

Some locks are self-operating and others are operated by lock-keepers. Check the particular waterway for details. Always obey specific lock instructions and local information.

#### *Links to useful information*

<http://canalrivertrust.org.uk/media/library/141.pdf>

<http://canalrivertrust.org.uk/boating/navigating-the-waterways/boaters-handbook>