

A SAFER RIVERSIDE

GUIDANCE FOR DEVELOPMENT ALONGSIDE AND ON THE TIDAL RIVER THAMES



SEPTEMBER 2020

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(FRONT COVER PHOTOGRAPHS COURTESY OF BURO HAPPOLD)



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FOREWORD

The Thames is one of the greatest attractions in London and the south-east of England.

One of the major elements of the work of the Port of London Authority (PLA) is to ensure the safety of those who use the river, for work or pleasure.

To that end, we teamed up with other organisations who share that aim to create the Tidal Thames Water Safety Forum (TTWSF) in 2019. Our partners include the RNLI, HM Coastguard, London Ambulance Service, London Fire Brigade and the Metropolitan Police. In 2020, Transport for London and the City of London joined the forum.

In May 2019, HRH The Duke of Cambridge launched the forum's *Drowning Prevention Strategy*, which set out practical steps to be taken to improve waterside safety for all who use the river and its banks.

The strategy appealed to people from all walks of life to play their part in saving lives, by following safety advice and having the confidence to intervene when they spot someone in crisis, or on the verge of self-harm along the river.

In 2019, emergency services went to the aid of 108 people in the river and 31 of those died. In 2018, the figure was 105 people aided, with 30 dying.

We decided that by collaborating and embarking on a series of measures, we can reduce these figures each year.

Local councils and riparian landowners are important partners in this endeavour and this handbook aims to provide a guide to improve safety infrastructure on riverbanks, including the architecture and maintenance of

riverside areas and the provision of safety equipment. It illustrates the problems and sets out solutions. It highlights the importance of features such as grab chains and offers examples of good design from around the world.

The correct design of river walls, jetties, bridges and riverside environment can prevent accidental entry into the water, deter deliberate attempts and aid rescue efforts.

Building the right safety infrastructure can reduce the pressure on the emergency services and ultimately save lives.



Robin Mortimer
Chief Executive
Port of London Authority

The PLA would like to thank the TTWSF for their help and support in the production of this guidance, along with the following marine engineers and maritime risk and safety consultants:



BURO HAPPOLD



1. INTRODUCTION

The tidal River Thames flows through the heart of London and people are naturally drawn to it and its banks. It is a challenging environment, with strong tides and currents that mean water levels rise and fall by up to seven metres twice a day. It flows at up to 5mph, the speed of an Olympic swimmer.

In 2019, emergency services went to the aid of 108 people in the river and 31 of those died. The TTWSF's Drowning Prevention Strategy, published in May 2019 (www.pla.co.uk/watersafety) aims to reduce the number of deaths in and on the tidal River Thames by targeting a strategy of zero harm.

Key to meeting the Drowning Prevention Strategy's aim is ensuring that safety is an intrinsic part of all future development alongside and on the tidal Thames. We need to:

- *"Promote and, where appropriate, regulate the placement of public rescue equipment (PRE) at high risk locations and at new riverside developments and crossings; and*
- *"Engage with developers and riparian boroughs and owners to improve the provision of public life saving equipment along the banks of the Thames and fill in any gaps."*

Since 1994, the main guidance for developers and local authorities has been contained in the 'Review of Lifesaving Provision Along the River Thames' (known as the Hayes Report) and the Marico Marine report 'River Thames Emergency Arrangements Study Riverside Facilities Summary Report (2000)'.

This document seeks to update and replace this previous guidance and provides information on modern best practice in PRE. Given the types of developments that are now regularly built alongside and on the tidal River Thames, the scope of this document has been widened and specific consideration given to PRE for bridges, riverside edges and privately-owned, but publicly accessible, piers and jetties. The principles set out in this document are relevant to new and existing developments, where in the past PRE may not have been provided. Although this document can be read as stand-alone guidance, it is intended that documents referenced within it are also considered.

Guidance is not provided on private operational sites, such

as aggregate and waste sites and their associated river works including wharves and jetties where specific task-based risk assessments will have been carried out and health and safety requirements are already in existence.

This document has been produced with support of the TTWSF, tidal Thames marine engineers and maritime risk and safety consultants.

2. DUTIES

Riparian landowners are subject to at least four acts of Parliament and statutory instruments to ensure the safety of persons, which include:

- The **Health & Safety at Work Act (1974)**. This sets out general duties to employees and members of the public.
- The **Management of Health and Safety at Work Regulations (1999)**. This requires a suitable and sufficient assessment of the risks and appropriate control measures.
- The **Occupiers Liability Act (1957)**. This identifies the duty of care of persons and the importance of risk assessment in ensuring duties have been adequately assessed.
- The **Occupiers Liability Act (1984)**. This places a common duty of humanity to persons who may trespass or be uninvited.

The UK Drowning Prevention Strategy (2016-2026) calls for every community with water risks to have a community level risk assessment and water safety plan. Community is defined as including local authorities, community safety and/or public health boards, and organisations who are landowners and/or navigational authorities.

As a general approach, riparian landowners need to:

- Assess areas under their jurisdiction adjacent to the tidal River Thames and consider the hazards and those who are likely to be exposed to them, particularly "at risk" groups, such as the elderly, young children, joggers and walkers.
- Consider what reasonable protection and/or prevention measures would be adequate to prevent an unintentional entry into the water. This can reflect the hazard potential, which can be dependent on the location, accessibility, who is exposed to the hazard (for example via a business, a public house or a children's playground) and matters such as fencing, signage and education. Supervision should be reviewed accordingly.
- Determine what PRE should be provided, where there remains a likelihood that person or persons could be in the water and who (if anyone) should be trained in the use of the equipment.
- Conduct an appropriate risk assessment, incorporating a review of the hazard, who could be harmed, an evaluation of the risks, consideration of

current precautions and a decision on whether this is sufficient, a recording of those findings and a review at an appropriate time. ebuoy not located in housing.

Recommendation 1: It is recommended that a competent designer with experience in the marine environment and/or marine risk and safety consultant is engaged to assist landowners in carrying out this assessment.

3. THE REGULATIONS

When developing a riverside site, permissions may be required from a number of different consenting authorities. The consenting authorities with specific interest in PRE include the PLA, from whom a river works licence (RWL) is required, and the local planning authority (LPA) from whom planning permission is required.

The PLA's approach and the commonly seen LPA's approach to the provision of PRE is set out below:

River Works Licensing

A RWL is required from the PLA for all structures in, on or over the Mean High Water mark of the river. When considering any RWL application, the PLA requires specific consideration to be given to the provision of PRE (often referred to as Riparian Life Saving Equipment) within the application scheme. There is also a general obligation under the Construction (Design and Management) Regulations 2015 (CDM 2015). The following approach is taken by the PLA, depending on the circumstances of the application:

- If no specific details have been submitted with the RWL application and the PRE design is not finalised during the processing of the application, then the following condition will be placed on the RWL:
 - Written details and drawings of riparian PRE must be submitted to the PLA for approval at least two months prior to the commencement of work. To thereafter carry out and maintain the riparian PRE in accordance with the approved details.
- If specific details have been submitted with the RWL application, then the PRE will be listed in the schedule of works within the Licence for example, "Riparian life-saving equipment including six grab chains and two safety ladders" and it must be provided and maintained in accordance with the licence requirements.

To enable the PLA to accurately map the location of PRE and to identify gaps in provision, RWLs will also contain a requirement to provide the PLA with digital 'as built' drawings of the PRE as an AutoCAD .dwg or .dxf file with the equipment spatially located within the real world to a minimum of two identifiable fixed landmarks referenced to the Ordnance Survey of Great Britain 1936 National Grid. Alternatively, if the built structure can be referenced within a Geographic Information System (GIS), to the OSGB 1936 National Grid, then a file to an agreed Open Geospatial Consortium format

including Esri shapefile or Cadcorp bds is acceptable. Photographs of the PRE should also be provided showing the new equipment in the context of its location.

The information provided to the PLA will be uploaded into GIS and made publicly available via the PLA's web site. Riparian landowners and developers are encouraged to update the data held by the PLA when PRE provision at their site changes.

Planning

The requirement to provide life-saving equipment along the river edge is becoming more common in local councils' plans. For example, the Newham Local Plan (2018) contains the following policy (Policy INF7):

"Developments located adjacent to the Blue Ribbon Network should integrate with and enhance the waterside environment, providing improved amenity space and access to the waterfront while facilitating safe and active use of the waterspace. This will include provision of riparian lifesaving equipment where necessary"

Local planning authorities are also increasingly requiring the provision of life saving equipment in riverside developments. This is generally secured through a planning condition on a grant of planning permission and might take the following form, which is from a planning consent issued by the London Borough of Newham:

"No building in any plot or phase shall be occupied until full details of the provision of riparian life saving equipment (such as grab chains, access ladders and life buoys) along the river edge within the relevant phase to a standard recommended in the 1991 Hayes Report on the Inquiry into River Safety."

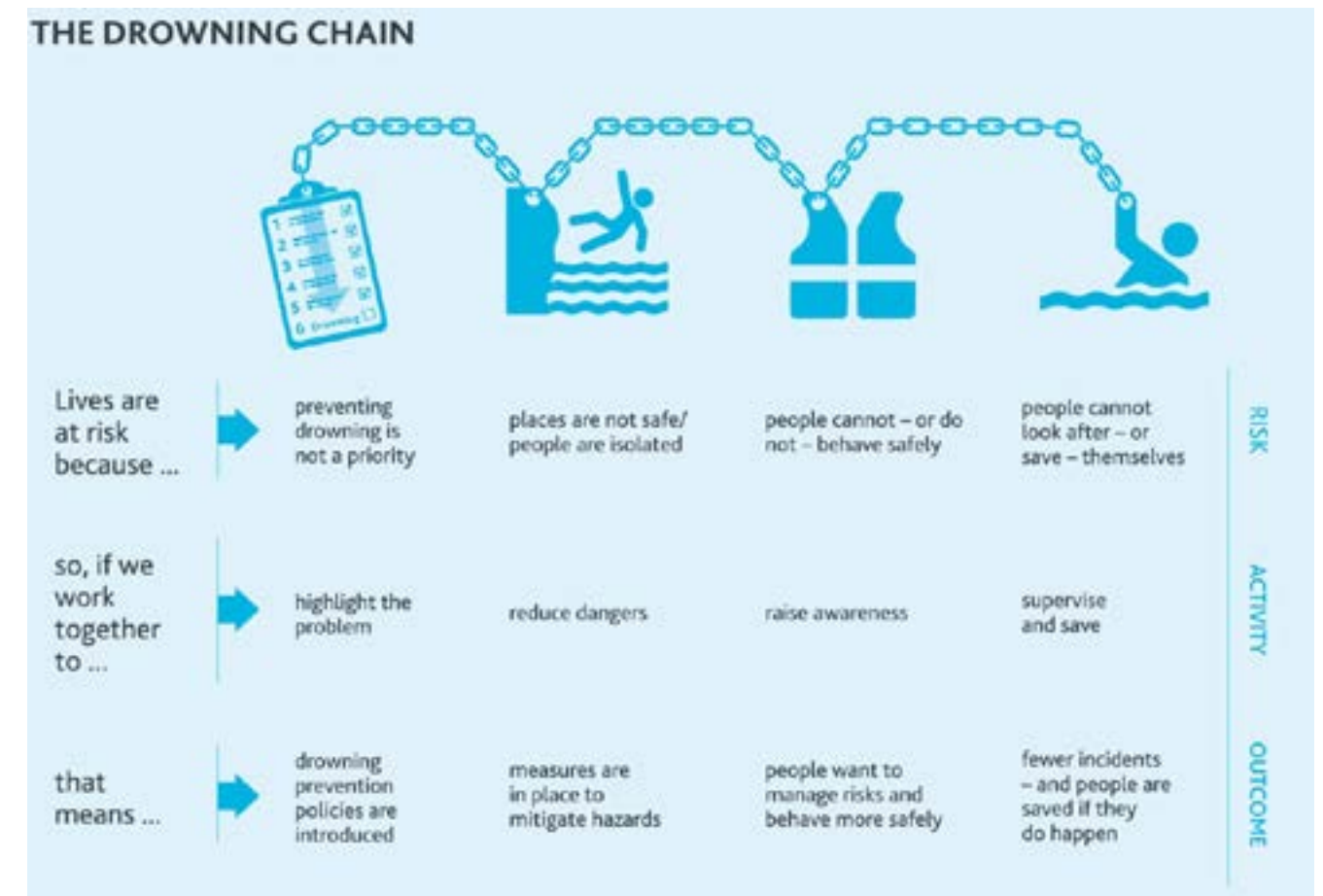
Recommendation 2: Early engagement should be undertaken with the PLA, the relevant local planning authority and other relevant organisations, as appropriate, regarding new developments and the provision and subsequent maintenance of PRE.

4. THE PLA'S APPROACH TO PUBLIC RESCUE EQUIPMENT

Given the RWL and planning requirements outlined above, the PLA receives frequent requests for guidance on the location and types of PRE that should be provided to support developments along the tidal Thames.

This document has been produced to assist those responsible for areas alongside or on the tidal River Thames in preventing an unplanned entry into the water and assisting the safe rescue of individuals who are at risk of drowning. It will be used by the PLA to assess proposals for PRE that are submitted in support of a RWL or a planning application.

The regulators, emergency services and voluntary groups that make up the TTWSF consider PRE to be a fundamental part of the Drowning Prevention Strategy and to the breaking of the drowning chain:



5. PREVENTING UNPLANNED ENTRY INTO THE WATER

The UK Drowning Prevention Strategy (2016-2026) highlights that each year in the UK an average of 400 people drown, many as a result of an accidental or unplanned entry into the water, such as a slip, or fall or as the result of attempting to rescue another person or pet. More people are moving to properties next to bodies of water and may not be aware of the associated dangers.

When designing a riverside site, the relevant legislation and standards should be followed. Generally developers should seek to manage risks to an established control hierarchy, such as:

- Elimination
- Substitution
- Engineering controls
- Administrative controls
- Personal protective controls and equipment

Not all these controls will be appropriate for public access, where the highest level of risk elimination will be required. In such situations collective safety measures will likely be preferred. The following measures can help to prevent unplanned entries into the water:

- Edge protection
- Signage
- Lighting
- Education and information

5.1 Edge protection

A number of different edge types can be found along the tidal River Thames. These vary from solid vertical flood defence walls to planted terracing to sloping riverbanks. The edge protection for a riverside site will therefore vary depending on the site-specific circumstances.

The design solution for edge protection should be informed by risk assessment. As a general principle, the edge protection should prevent people from climbing over, through or ducking under but should allow safe egress from the tidal River Thames or the foreshore. Parapets should be designed to act as a barrier that prevents anyone from sitting or climbing on them, which introduces additional hazards.

The following examples show what “good” looks like at a number of different development sites on the tidal River Thames. A one-size fits-all approach is not required, instead the edge protection can be designed with architectural variety to suit the wider site’s design principles. It may also be possible to combine hard edge protection (for example parapets and fencing) with softer edge protection (for example planting) to deter access to the water. If planting is proposed, consideration needs to be given to how the planting will be safely maintained.



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LEAMOUTH PENINSULA – PHOTO COURTESY OF BURO HAPPOLD



GREENWICH PENINSULA – PHOTO COURTESY OF BURO HAPPOLD



LEAMOUTH PENINSULA – PHOTO COURTESY OF HOP CONSULTING

- ✓ Fencing designed to make it more difficult to climb over for example through the use of curved fencing or vertical fencing elements that do not provide foot holds.
- ✓ Ladders aligned with exit point and lifebuoy.
- ✓ Established planting deters access to the water’s edge and enhances biodiversity.

It is also possible to provide temporary edge protection to protect construction workers during construction:



LEAMOUTH PENINSULA – PHOTO COURTESY OF HOP CONSULTING

There are also examples at existing sites on the tidal River Thames, where improvements could be made to the hard edge protection:

- Low parapet that facilitates easy accidental and uncontrolled access to the river.
- Parapet design that provides a seating area on the top of the wall putting people at significant risk of entering the water by accident.
- Railings only provided on highest part of a wall.
- Parapet design that provides a step making it easy to lean over and enter the water by accident.

Where the public have access to private structures, such as a jetty, suitable edge protection should be provided on the structure:



BATTERSEA POWER STATION JETTY - PHOTOGRAPHS COURTESY OF BECKETT RANKINE

PHOTO TAKEN FROM THE RIVERSIDE

- ✓ Ladder aligns with egress point.
- ✓ Gaps between panels are small preventing unintended entry into the water (gaps should generally not be capable of having a 100mm sphere pass through them).
- ✓ Gates designed to allow egress from the river through a break to exit mechanism and to prevent access to the river through a padlock.
- ✓ Life-saving equipment evenly spaced along the structure.

There are also many examples of sloping walls along the tidal River Thames. In many cases the sloping wall had steps designed into it, providing an unrestricted access point to the river. Vegetation may have also established itself within the sloping wall, providing a natural barrier between the land and the river.



- ✓ Steps extend to low water point to aid self-rescue.
- ✓ Well maintained steps which are generally clear from vegetation.
- ✓ Vegetation or wall along remainder of revetment discouraging unrestricted access to the river.
- ✓ Lifebuoy located with steps.

There are also examples at existing sites on the tidal River Thames, where improvements could be made to the sloping wall:

- Steps and revetment in a poor condition, which could cause difficulties for self rescue.
- Vegetation growth uncontrolled causing damage to the revetment and preventing self rescue.
- Angle of revetment is too steep thereby making self rescue difficult.

There are 30 bridges that cross the tidal River Thames between Teddington and the estuary. It was announced in 2015 that there were plans for an additional 13 crossings (bridges and tunnels) to 'unlock areas for development.' The existing and proposed bridges vary greatly in their design. Twenty of the bridges are listed and many, such as Tower Bridge, are historic locations that draw significant numbers of tourists each year. Sadly, several bridges are also locations for self-harm.

A careful balance needs to be struck to limit the opportunities for accidental or self-harm entry to the tidal River Thames from a bridge, whilst preserving and where possible enhancing the design of the bridge. Any design solution should be informed by a risk assessment and should follow the general principles set out above for riparian edge protection. If it is not possible to reduce the risk of people entering the river from a bridge through edge protection, consideration could be given to the provision of early warning systems on the bridge to alert the emergency services to a river entry and/or the provision of netting on the bridge to prevent entry to the river from the bridge and deter potential self-harm. For listed bridges, early discussions should be had with the LPA's heritage officer and Historic England.

New bridges should be designed from the outset with appropriate edge protection.



CLIFTON SUSPENSION BRIDGE, BRISTOL

PRINCE EDWARD VIADUCT, TORONTO, CANADA

GRAFTON BRIDGE, AUCKLAND, NEW ZEALAND

- ✓ Inward curving fencing makes it difficult to climb.
- ✓ Inward curved clear barrier helps maintain aesthetics, allows for tourists to see the views, whilst maintaining safety.
- ✓ Netting gives the opportunity for rescue and deters self-harm.
- ✓ Well-lit footpaths and edges ensure quiet and secluded spaces are eliminated.

There are also examples of existing bridges on the tidal River Thames, where improvements could be made to the edge protection:

- Low parapet that facilitates easy accidental and uncontrolled access to the river.
- Parapet design that provides a seating area putting people at significant risk of entering the water by accident.
- Poorly lit spaces on bridges providing quiet and secluded areas.

There are currently no examples on the tidal River Thames, where either an early warning system or nets have been installed on a bridge. However, netting has been installed in many locations across the world either on or under bridges, including:

- Muenster Terrace, Bern, Switzerland
- Sydney Harbour Bridge, Australia
- Golden Gate Bridge, California (due to be completed in 2021)

Recommendation 3: Riparian owners must review existing riverside developments and retrofit edge protection where required. New developments must design in and provide suitable edge protection, before a site is opened to the public or residents.

Recommendation 4: Bridge owners must review available data on self-harm and accidental entry from their existing bridges and retrofit edge protection, where required, and where planning and listed building consent is achievable. Where planning and listed building consent is not achievable for edge protection, consideration must be given to early warning systems and/or netting (subject to planning and where required listed building consent). New bridges must have edge protection designed in and provided, before the bridge is opened to the public.

5.2 Signage

Signs can be a useful way of providing information quickly to members of the public. Advertisement consent may be required for any signage and all signage should follow national guidelines on design and content. There are many different types of signs that can be seen along the tidal River Thames and on bridges, for example:

Instructional



Directional



Warning



Prohibition



Supportive



- The general approach to signage is the same for both riparian developments and bridges. If relevant, advice should be obtained from the relevant local authority regarding the approach to signage.
- Careful consideration needs to be given to the types and locations of signs required to ensure adequate but not excessive coverage over the development or area. If relevant, a signage strategy should be developed.
- Signs should be pictorial, clear, concise and consistent so that they can be easily understood by all, including people who may not speak English.
- Information on signage should be specific and may include:
 1. Hazard identification (for example, fast flowing water, sudden drop).
 2. Direction/distance to nearest PRE and telephone.
 3. Location details in a format that is widely recognised by the emergency services (grid reference).
 4. Emergency contact details (call 999 and ask for Coastguard).
 5. Contact telephone number for reporting defective and missing PRE.
- Signage should be integrated with PRE.
- Consideration should also be given on bridges or other riverside locations, which are known to be potential self-harm locations to the placement of Samaritans signs.

- ✓ Help sign co-located with life saving equipment.
- ✓ Lifebuoy signage provides clear instructions for use and both emergency contact number and locational details.
- ✓ Risk clearly identified.



There are also examples of signage along the River Thames, where improvements could be made to signage:

- A lack of a coherent signage strategy results in signs being placed at different times at different heights.
- Low-level signage which may not be seen.
- No information provided on use of the lifebuoy.
- Out-of-date information on signs and a lack of up-to-date locational information.

Recommendation 5: Riparian owners must review existing riverside signage and update and consolidate the signage, where required, to ensure consistency and clarity in approach. If necessary, a signage strategy should be produced. New developments must design in and provide suitable signage before a site is open to the public or residents.

Further Information:

ISO: 7010:2019 Graphical Symbols – Safety Colours and Safety Signs – Registered Safety Signs which prescribes safety signs for the purposes of accident prevention, fire protection, health hazard information and emergency evacuation

TFL has produced a set of design standards to promote high quality consistent communications

www.tfl.gov.uk/info-for/suppliers-and-contractors/design-standards

The RNLI has produced "A Guide to beach safety, signs, flags and symbols"

www.rnli.org/-/media/rnli/downloads/rnli-beach-safety-signage-symbols.pdf

5.3 Lighting

Lighting performs an important safety function, allowing people to see riverside hazards, such as steps or changes in surface or level of the path and prevent trips, slips and falls. Appropriate lighting encourages people to stay on a designated path, rather than straying towards the river. Well-lit footpaths and edges eliminate quiet and secluded spaces.

A careful balance needs to be struck between providing sufficient levels of illumination of a riverside path or bridge with even distribution of light across the area being illuminated, to provide a safe riverside environment but avoiding high levels of illuminance and glare that could negatively impact on ecology and vessel navigation.

Lighting should be directional to minimise both upward sky glow and glare. Consideration should also be given to the use of baffles, shields and louvres, where required.

Orange, red and green lighting should be avoided, and lighting should be fixed, not moving, unless it can be demonstrated that the lighting will not detrimentally impact on navigation or the effectiveness of existing aids to navigation, including lighting. When designing riverside lighting schemes, modern environmental technologies must be used, including the use of low energy LED lighting, alongside renewable sources, where practicable for example solar power.



- ✓ Evenly spaced lighting.
- ✓ Use of directional lighting to reduce light overspill to the river.
- ✓ Well lit internal space, with limited light overspill of the river.
- ✓ Use of coloured lighting that does not impact navigational lighting.

There are also examples of lighting along the tidal River Thames, where improvements could be made to the lighting:

- High levels of illuminance being a hazard to navigation, dazzling masters of vessels.
- High levels of illuminance having a detrimental impact on ecology, including migrating fish.
- The bridges navigational lighting no longer being clear and easy to see.



ROYAL WHARF PIER

Recommendation 6: Riparian and bridge owners must review existing lighting schemes and update them, where required. New developments and bridges must design in and provide suitable lighting before it is open to the public or residents.

Further Information:

British Standard BS5489/EN13201-1:2013 currently provides guidance for the design of lighting of highways, public thoroughfares, pedestrian and cyclists subways as well as bridges.

The Institute of Lighting Professionals' *Guidance Notes for the Reduction of Obtrusive Light* (GN01:2011) also provides useful guidance on designing lighting schemes.

5.4 Education and information

As the population around the river increases, more people will come to enjoy the river and its banks. Education will be an important factor in managing this growth safely, by helping to prevent unintended entry into the water.

There are already excellent education and training programmes that are being run by the emergency services in a range of languages. These target a range of people including schools, cultural and community groups, riverside pubs and restaurants, event organisers, summer drinkers, Christmas party goers and students during freshers' week.

However, there is still much more that can be done. When new developments or infrastructure are being built, workers on the sites may be unaware of the risks of working near or over water. Additionally, the residents who move into the new development may not have lived near to water before and be unaware of the hazards associated with the tidal River Thames. There is the potential to integrate water safety education programmes and information into new and existing developments by the river, to work with the emergency services to deliver education programmes for construction workers and residents, and to provide people with practical skills, such as throw line training.



ABOVE: WATER SAFETY EDUCATION PROVIDED TO PLA STAFF AS PART OF HEALTH, SAFETY AND WELLBEING WEEK



ABOVE: THROW LINE TRAINING PROVIDED TO PLA STAFF

Recommendation 7: It is recommended that all risk assessments give specific consideration to water safety education and appropriate levels of training for all construction workers on riparian sites and that water safety posters are displayed on site.

Recommendation 8: It is recommended that a Safer Thames river safety package is developed. This could include: leaflets (for communal area noticeboards and residents' welcome packs); what to do if someone has entered the water; locational information (e.g. postcode and grid reference details, along with optional use of What3Words), for the emergency services; and links to an online lifebuoy and throw line training module. It is also suggested that water safety training is made available to all residents all workers in new developments. Funding of this should be investigated and secured, where possible through the use of S106 obligations.

6. ASSISTING THE SAFE RESCUE OF INDIVIDUALS

The provision of PRE along the banks of the tidal River Thames and on bridges is vital in assisting the safe rescue of individuals. As highlighted throughout this document, a risk assessment should be undertaken by a competent person to determine the exact scope of the PRE that is required. The PLA would expect the following equipment to be provided and maintained (unless the risk assessment determines alternative provision is required):

- Lifebuoys / life rings;
- Throw bags / lines;
- Ladders and steps and means of egress;
- Grab chains / hand holds;

When designing the PRE for a site the use, misuse and maintenance of the PRE should all be considered. Regular inspections must be undertaken to ensure that the PRE is fit and available for use, if it is required, and replaced, where necessary, to ensure appropriate provision is maintained at all times. Updated information should be sent to the PLA and/or included in the PLA's GIS RLSE map.

Funding provision for the installation and maintenance of PRE should also be considered. For new developments this could, for example, be through a service charge on the properties. Alternatively, sponsorship from private sources could be considered.

6.1 Lifebuoys / life rings

Lifebuoys (also known as life rings) are particularly effective for water rescue, where the casualty is relatively close to the shore or rescue craft. The following design principles should be considered and informed by risk assessment:

- Line for the device must be able to float (RNLI recommends BS EN 699:1995, which is Maritime and Coastguard Agency approved).
- The length of line should be approximately 25m.
- Lifebuoys should be housed fully or partially, to protect from the weather and vandalism in accordance with BS EN 14145 holders for lifebuoys.
- Lifebuoys should confirm to BS EN 14144 Lifebuoys – Requirements, Tests.
- A standard design for the lifebuoy housing signage has been developed, providing consistent information for the user and the emergency services (see appendix 1).
- The lifebuoy should be marked with the owner's details, so that it can be returned.
- Electronic monitoring systems are available and should be considered.
- Spacing of lifebuoys: every 30m in higher risk areas (e.g. where members of the public gather, or where facilities for the mooring of vessels exist) up to 100m spacings in lower risk areas (e.g. where there are no local factors elevating the risks to the general public of those engaged in river-related activities).
- Reflective patches should be included to allow the lifebuoy to be visible at night.
- In poor reception areas consideration should be given to providing a call button which links through to a concierge or similar who can obtain help.
- Consider use of What3Words.
- Consider wording on lifebuoy housing that encourages use in an emergency, but discourages misuse.
- Positioning on the riverfront where the distance to the river's edge can vary on the changing tides.



- ✓ Clear instructions on how to get help and to use the lifebuoy.
- ✓ Postcode to easily identify the location.
- ✓ Fully housed lifebuoy.
- ✓ Co-located with Samaritans 'Talk to Us' sign.

Examples where improvements could be made:

- No post code or grid reference to identify the location.
- Lifebuoy not located in housing.
- Lifebuoy not marked with contact information.
- No line attached to lifebuoy.
- No information on housing regarding what is in the housing, how to use the lifebuoy or how to obtain help.

6.2 Throw bags / lines

Throw bags are amongst the lightest rescue devices to throw with greater potential for accuracy and distance to be achieved, however the person in the water only has a small head of the device and/or the floating line to hold onto. The following design principles should be considered and informed by risk assessment:

- The length of line should be approximately 25m.
- Generally held on craft/vessels and by emergency responders.
- Should have a positive flotation/buoyancy of at least 40N to assist in supporting a person in the water.
- Line for the device must be able to float (RNLI recommends BS EN 699:1995 which is MCA approved).
- Rope thickness should be between 6-13.5mm, made of polypropylene staple and coiled in a bag, which will deploy freely.
- Consider co-locating with lifebuoy.
- Consider placing in defibrillator style box with the user phoning for an access code.
- Positioning on the riverfront where the distance to the rivers edge can vary on the changing tides.

In some areas of the UK, riparian owners have sourced sponsorship from local businesses to fund the provision of throw bags.



PHOTO COURTESY OF RNLI

6.3 Ladders, steps and means of egress

Escape ladders support grab chains and allow persons who enter the Thames to track along the grab chains until reaching a point from which they can exit the river to a point of safety. The following design principles should be considered and informed by risk assessment:

- Spacing of ladders: every 30m in higher risk areas (e.g. where members of the public gather, or where facilities for the mooring of vessels exist) up to 100m spacings in lower risk areas (e.g. where there are no local factors elevating the risks to the general public of those engaged in river related activities).
- Designed with fencing so as to not encourage people to access the river, but allow people to egress the river.
- Aligned with gates to allow egress in fenced areas.
- If lockable gates are fitted, a refuge space should be provided at the top of the ladder and the gate should be fitted with an emergency services approved padlock and signage should provide information on who to call.
- Designed to comply with BS 6349-2-2019 with stiles finished flush with the parapet with an additional hand hold at the top level.
- Extending from the foreshore to the top of the wall, to make it available for use at all times.
- Typically ladders are galvanised steel, but consideration should be given to their colour to allow easy identification, including at night.
- Designed with lighting schemes to allow easy identification of a ladder and its use, but ensuring that aids to navigation are still clearly visible.
- Used in combination with grab chains.



RECENT LONDON WATERSIDE DEVELOPMENT – PHOTOGRAPH COURTESY OF HOP CONSULTING.

- ✓ Ladder is protected and inset from structure to minimise vessel/debris impact.
- ✓ Extends down to foreshore.
- ✓ Grab chains guide someone in the water to a ladder.

Examples where improvements could be made:

- Ladder does not extend above level of the topsides.
- Ladder doesn't tie up with egress points in the hand railing.
- Ladder provided in isolation from other PRE.
- Ladder in a poor condition.

6.4 Grab chains / hand holds

Grab chains can allow a person who has entered the river to have a hand hold, whilst awaiting rescue, and may in combination with ladders allow for self-rescue. Continuous catenary sagging (horizontal) grab chains should ideally be provided on linear vertical river walls, piers and abutments to potentially allow an individual to track along the chains to the nearest point of egress, for example a ladder, but on open jetties and tubular structures vertical grab chains with ring hoops may be a more appropriate solution.

In some scenarios, it may not be practical to provide continuous grab chains and an alternative method might be utilised instead, but it needs to provide the same level of mitigation. Grab chains may not be required on sloping revetments or tidal terracing depending on the individual design of the revetment or terracing, which may allow the individual to egress without assistance of chains. Grab chains should also be considered for temporary structures, including at riverside construction sites. The following design principles should be considered and informed by risk assessment:

Horizontal grab chains

- Typically, three levels of grab chain, equi-distant apart
- Fixed at a maximum horizontal spacing of 12.5m with a catenary sag of 1.0m.
- Top fixings placed at a level of 0.5m above Mean High Water Springs (MHWS).
- Additional chains provided at a maximum vertical spacing of 1.5m down to the foreshore or Mean Low Water Springs (MLWS), whichever is the higher.
- Galvanised steel with welded links.

- ✓ Chains provided at different heights.
- ✓ Chains provided in combination with ladders.



Vertical grab chains

- A potential alternative on river walls, piers and abutments, where for planning or listed building reasons it may not be possible to obtain consent for horizontal grab chains, or on open jetties and tubular structures.
- Vertical grab chains should be fitted with a handhold ring to give a 100mm handhold at a maximum spacing of 1 metre apart.

- ✓ Chains provided across entirety of structure.
- ✓ Handholds provided at different heights.



Bridge piers

The water around bridge piers can be extremely fast flowing and unpredictable. The approach to grab chains on bridge piers is the same as the approach to horizontal grab chains set out above.

- ✓ Different levels of chain provided on the bridge pier.



Sloping revetment walls / tidal terracing

- Estuary Edges recommends tidal terracing is designed with a slope of between 1:7 and 1:10, which allows for self rescue
- Terracing provides different height ledges to aid self rescue and provide a safe refuge.
- Grab chains can be designed into the terracing to aid self rescue.
- Design with egress points (ladders).



- ✓ Multiple ladder egress points are provided at both levels (tidal terrace level and topsides).
- ✓ Sagging horizontal grab chains are provided at both levels.



- ✓ Slope angle allows for self rescue and grab chain also provided on revetment.

7. CONCLUSIONS AND RECOMMENDATIONS

Recommendation 1: It is recommended that a competent designer with experience in the marine environment and/or marine risk and safety consultant is engaged to assist landowners in carrying out this assessment. Contact details for some consultants are available in the Port Handbook on the PLA's website www.pla.co.uk/Port-Trade/Latest-Port-Handbook

Recommendation 2: Early engagement should be undertaken with the PLA, the relevant local planning authority and other relevant organisations, as appropriate, regarding new developments and the provision and subsequent maintenance of PRE.

Recommendation 3: Riparian owners must review existing riverside developments and retrofit edge protection where required. New developments must design in and provide suitable edge protection, before a site is opened to the public or residents.

Recommendation 4: Bridge owners must review available data on self-harm and accidental entry from their existing bridges and retrofit edge protection, where required, and where planning and listed building consent is achievable. Where planning and listed building consent is not achievable for edge protection, consideration must be given to early warning systems and/or netting (subject to planning and where required listed building consent). New bridges must have edge protection designed in and provided, before the bridge is opened to the public.

Recommendation 5: Riparian owners must review existing riverside signage and update and consolidate the signage, where required, to ensure consistency and clarity in approach. If necessary, a signage strategy should be produced. New developments must design in and provide suitable signage, before a site is open to the public or residents.

Recommendation 6: Riparian and bridge owners must review existing lighting schemes and update them, where required. New developments and bridges must design in and provide suitable lighting, before it is open to the public or residents.

Recommendation 7: It is recommended that all risk assessments give specific consideration to water safety education and appropriate levels of training for all construction workers on riparian sites and that water safety posters are displayed on site.

Recommendation 8: It is recommended that a Safer Thames river safety package is developed. This could include: leaflets (for communal area noticeboards and residents' welcome packs); what to do if someone has entered the water; locational information (e.g. postcode and grid reference details, along with optional use of What3Words), for the emergency services; and links to an online lifebuoy and throw line training module. It is also suggested that water safety training is made available to all residents all workers in new developments. Funding of this should be investigated and secured, where possible through the use of S106 obligations.

APPENDIX 1 – LIFE BUOY DESIGN



A high-res version of this image is available by [clicking here](#)



APPENDIX 2 – GRAB CHAIN DRAWING



A high-res version of this drawing is available [by clicking here](#)

TYPICAL GRAB CHAIN LAYOUT DETAIL

RIVERWALL GRAB CHAINS AND EMERGENCY LADDERS: 2018 GUIDANCE

GRAB CHAINS
 CHAINS SHOULD BE METALLED ON ALL RIVER WALLS TO PROVIDE CUES/TIES IN THE WATER WITH A HAND-HOLD WELDED MOUNTING RESISTOR CHAIN SHALL BE APPROPRIATELY SIZED. GENERAL PURPOSE, GALVANISED STEEL WITH HELDED LINKS.
 THE CHAINS SHOULD BE MADE IN A MINIMUM SPACING OF 1.2 METRES WITH A 1.0 METRE OR GAP. TOP FRINGES ARE TO BE PLACED AT A LEVEL OF SPRING PLUS 0.3 METRES. TO GIVE PROTECTION AT ALL SIDES OF THE TIE, FURTHER CHAINS SHOULD BE PROVIDED AT A MINIMUM VERTICAL SPACING OF 1.2 METRES DOWN TO THE OPPOSITE OVERSIDE OF WATER SPECIFIED IN THE NOTES.

EMERGENCY LADDERS
 EMERGENCY LADDERS SHOULD BE PROVIDED TO ALLOW ESCAPE FROM THE RIVER. FLOODING LADDERS ARE TO COMPLY WITH BS 6462:2000 WITH STEEL PROVIDED FUSED WITH THE PERMITS BUT WITH AN ADDITIONAL WELD HELD IN ORDER TO HAVE THE PRESENCE OF LADDERS CORRECT UP AND OVER HOOPS IN ACCORDANCE WITH BS 4371 SHOULD ONLY BE PROVIDED IF NECESSARY FOR REGULAR MAINTENANCE ACCESS ETC. OR WHERE SAFETY HAND RAILING IS PROVIDED TO THE BANK'S EDGE.
 WHERE LOCKABLE GATES ARE FITTED TO PREVENT UNAUTHORIZED ACCESS A RELEASE MECHANISM SHALL BE PROVIDED AT THE TOP OF THE LADDERS. THE GATE SHOULD BE FITTED WITH A FIRE BREAKAGE PADLOCK TO ALLOW UNLOCKING BY THE EMERGENCY SERVICES.
 EMERGENCY LADDERS SHOULD BE PROVIDED AT 30 METRE CENTRES IN HIGHER RISK AREAS (I.E. WHERE WORKING FACILITIES ARE PROVIDED) OR IN SITUATIONS WHERE A LOWER RISK SITUATION. LADDERS LOCATIONS SHOULD TAKE INTO ACCOUNT LOCAL FLOODING TOPOGRAPHY AND EXISTING ACCESS POINTS.

ⓐ STRANGERS MAY EXTEND ABOVE PERMITS LEVEL WHERE SAFETY HAND RAILING IS FITTED TO FORM A BS 4371 WALK THROUGH*

DETAILS OF RIVER WALL ESCAPE LADDERS (1:10)

EYE BOLT & GRAB CHAIN DETAIL (1:1)

REV	CHAIN DIMENSION CORRECTED	NO	1/1/18
01	REVISED		1/1/18

PORT OF LONDON
 AUTHORITY

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 E-Mail: CEng@pola.co.uk
 Web site: www.pola.co.uk

Location: **RIVERBANKS GENERAL**

Drawing Title: **RIVERWALL GRAB CHAINS AND EMERGENCY LADDERS**

Name	Scale	Drawn	Engineer
Location	As Shown	MC	EM/MS/MS/MS
Drawing Number			
RVB/C/0900			A