Royal Life Saving

THE ROYAL LIFE SAVING SOCIETY AUSTRALIA

Guidelines for Water Safety in Urban Water Developments

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INTRODUCTION

In recent years, residential developments have increased the use of water features as an integral part of their developments. Water features range from small ornamental ponds and wetlands to larger lakes of 4 hectares capable of handling boat and ferry traffic. These water bodies are used either to offer a calm, relaxing and aesthetically pleasing environment for passive recreation or to service storm water quality treatment needs.

The development of any water feature introduces a level of risk to the public. The Royal Life Saving Society Australia and Melbourne Water have developed these Guidelines for Water Safety in Urban Water Developments in response to that risk. The guidelines provide advice for Designers, Developers, Government Authorities, Sales Agents and residents on water safety considerations that should be integral to the design, development and the long-term operation of the asset.

The Royal Life Saving Society Australia – Victoria Branch would like to acknowledge the support of Melbourne Water in the development and production of this document.

BACKGROUND

It is a well known fact that Australians have an affinity with water. Australia's major cities have been developed around waterbodies whether they are a river, a bay, a harbour or the ocean, or any combination.

Unfortunately, associated with this affinity is a loss of life. In the 2001-2002 financial year, 251 people drowned in Australia. 34 drowned in rivers, 34 in harbours, bays or estuaries and another 41 drowned in lakes, dams or lagoons, showing that Australians are drowning in calm inland water, not just at the beach or in the swimming pool.

In children under 5 years old, there were 44 drownings in the 2001-2002 financial year. 75% of these drownings were due to the child falling in or wandering into the water. In other words, nobody expected these children to be in the water. 13 drowned in lakes, dams or lagoons and 8 drowned in rivers, oceans or harbours. Further information on drowning statistics can be obtained from the Royal Life Saving Society Australia Victoria Branch's website at www.vic.royallifesaving.com.au.

The development of residential subdivisions with water bodies have become popular modern developments. The inclusion of ornamental lakes, ponds or fountains in residential developments is not a new concept however, their popularity, size and accessibility has increased, leading to concerns on public safety.

The growth in popularity of residential developments featuring water has also seen an increase in commercial developments doing likewise. In light of this increase in development encouraging people to interact with water, Melbourne Water and the Royal Life Saving Society Australia Victoria Branch have developed these guidelines.

The Royal Life Saving Society Australia has over 100 years of history in water safety and actively promotes water safety at beaches, swimming pools and inland waterways throughout the country. The Royal Life Saving Society Australia also publishes the Guidelines for Safe Pool Operation, a best practice document for the aquatics industry and the Home Pool Safety booklet for the home pool owner.

SCOPE OF THE GUIDELINES

These Guidelines are relevant for purpose-built water environments, near or around areas which the general public may frequent, and would include:

- Residential developments in both urban and rural settings.
- Commercial developments such as shopping precincts and hospitality venues.
- A combination of residential and commercial developments.
- Public spaces, e.g. parkland and reserves.

The safety considerations listed here do not encompass residential swimming pools and spas that are covered by existing state regulations and safety programs. Please refer to the Building Commission for regulatory information and the Royal Life Saving Society for safety and educational resources.

RETROSPECTIVITY

It is recognised that some existing urban water developments may not meet the recommendations detailed in these guidelines. Where practicable, it is recommended that when these existing water bodies are redeveloped, renovated, or undergo major maintenance works, the new design and works should follow these guidelines.

DEFINITIONS

1. WATER ENVIRONMENTS

Water environments in residential or commercial developments include any one or combination of the following:

- Ornamental lakes and ponds.
- Large lakes.
- Constructed or natural wetlands.
- Complex tidal lake systems.
- Fountains.
- Natural (pre-development) or rehabilitated waterways.

Water environments can be salt or fresh water and left to a largely natural state or can be interspersed with human intervention such as jetties and bridges.

2. WATER CHARACTERISTICS

Characteristics that need to be considered for water environments located within residential or commercial developments include the water quality, depth, size, habitat, barriers, distance from dwellings, waters edge slope and vegetation, human activity on, in or near the water.

REFERENCE COMMITTEE

The following people are thanked for their contribution to the document.

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RISK MANAGEMENT

The purpose of this section of the Guidelines is to help you establish a framework for risk management in urban water developments.

Risk management is primarily focused in maximising potential opportunities and minimise losses by implementing a systematic process that provides greater insight into risks and their impact. In this context, risks can be defined as "the possibility of events or activities having an adverse effect on the achievement of organisational objectives".

Risk management is also driven by legislative requirements, common law precedents and coronial enquiries. The process is further supported by Australian Standards, industry best practice and benchmarking standards.

The Australian/New Zealand Standard AS/NZS 4630 - Risk Management provides a generic framework for the application of a risk management process and also contains definitions of terminology, flowcharts of the risk management process and example documentation.

The following describes the basic procedure of risk management.

Procedure

1. ESTABLISH THE CONTEXT

- Strategic Context – determine the elements which may either support or impair the ability to manage the risks.
- Organisational Context – understand the organisational capabilities, goals and objectives and the strategies in place to achieve them.
- Risk Management Context – balancing the costs, benefits and opportunities.
- Evaluation Criteria – determining against which criteria risks will be analysed and treated.
- Structure – separate the project or activity into elements to formalise framework for identification and analysis.

2. IDENTIFY POTENTIAL AND ACTUAL RISKS

- Establish a framework and/or tools to identify risks. The Australian/New Zealand Standard 4630 Risk Management outlines tools and techniques that organisations can adopt.
- Generate a list of incidents, possible causes and scenarios of identified risks.
- Establish risk assessment criteria. This may include physical, financial, ethical or moral risks and legal obligations.
- Identify the variables that affect the organisation or activity being conducted. These may include internal, external and random variables.

3. RISK ANALYSIS

- Risk analysis is the process of classifying the risks into minor and major risks. Risk analysis is conducted by combining estimates of consequence and likelihood given existing control measures.
- An example of a risk assessment matrix for consequence and likelihood is attached far right (table 3).

4. EVALUATION

- This stage involves comparing the level of risk found during the analysis process against the previously established risk assessment criteria. This will generate a list from which priorities of risk management can be determined.

5. RISK TREATMENT

- Risk Avoidance – avoiding the activity or providing education about the risk.
- Risk Control – identifying what can be done to limit the consequence and likelihood of the risk.
- Risk Financing – estimating and building financial reserves to cover liability.
- Risk Transfer – transferring risks to an insurer or by way of an exemption from liability clause.
- Risk Treatment can also include the organisations policies, goals and objectives, and the interest of shareholders.

6. COMMUNICATE AND CONSULT

- Communication with internal and external stakeholders is important to ensure those making the decision and those with a vested interest are aware of why or why not particular actions are required.
- This process should be considered at each stage of the risk management process.

7. MONITOR AND REVIEW

- Identified, analysed, evaluated and treated risks do not remain the same, therefore review and evaluation of the risk management process is required.
- The factors to consider include:
  - Changes in common law.
  - Environmental changes.
  - Legislative changes.
  - Technological changes.
  - Changes in activity.
  - New practices and techniques.
  - Venue changes.
  - Operational changes.
  - Staff turnover.

RISK ANALYSIS

Risk Management Matrix

A matrix can be used to give each individual risk a numerical rating, allowing the risks to be categorised according to severity. The first step is to determine the level of consequence (harm) should something happen. The second step is to determine how likely it is for something to happen.

Consequence

Classify the category of the consequence using the following table:

Table 1.

Category	Consequence (harm)	Description
1.	Catastrophic	Fatalities
2.	Major	Serious injury, such as permanent disability
3.	Moderate	Medical treatment or lost time injury
4.	Minor	Minor injury, such as first aid
5.	Insignificant	No injury

Likelihood

Estimate how likely the consequence is to happen as a result of exposure to the hazard using the following table:

Table 2.

Category	Probability	Description
A.	Almost certain, common	Is expected to occur in most circumstances;
B.	Likely, has happened	Will probably occur in most circumstances;
C.	Possible, could happen	Might occur at some time;
D.	Unlikely, not likely	Could occur at some time;
E.	Rare, practically impossible	May occur only in exceptional circumstances.

Risk Management Matrix

A risk score can be determined by cross referencing the potential consequence with the likelihood of the consequence being realised in the following table:

Table 3.

Consequence (harm)	A	B	C	D	E
	Likelihood				
1	1	2	4	7	11
2	3	5	8	12	16
3	6	9	13	17	20
4	10	14	18	21	23
5	15	19	22	24	25

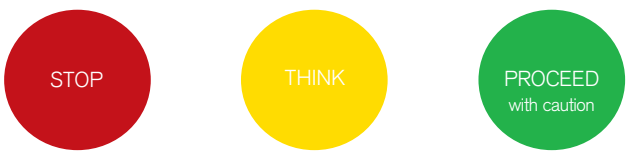
The risk score can provide a ranking that will give an indication of the priority and the qualitative level of risk and the need to take remedial action.

HIGH - immediate correction required. Consider discontinuing.

MEDIUM - attention needed, correction required.

LOW - perhaps acceptable as is.

The level of acceptable risk varies with all hazards, the ways and available means of reducing risk and the skills and competencies of persons managing the risks. As when approaching a controlled traffic intersection the level of risk should always be reviewed before proceeding.



Facility Visitation Rate

Defining the Facility Visitation Rate can be a very useful tool in helping with risk analysis and thus, risk management. The Facility Visitation Rate (FVR) is an equation that leads to a numerical number, which when used in conjunction with the Risk Management Matrix (table 3) can highlight areas where Risk Management is required.

STEP 1 - DEVELOPMENT

The first step in determining the FVR is to determine the level of development in a particular area. If there are varying levels of development, the area being assessed may need to be divided to match the areas of development/non-development with a separate analysis on the different areas. If an area with varying levels of development is to be assessed in its entirety rather than divided, it is recommended that the assessment is done according to the area of highest development, therefore it will be done according to the area of highest risk.

Different levels of development need to be decided upon according to what is being assessed. For instance, Table 4 shows suggestions for two areas, an area that has been developed and also for undeveloped areas with natural hazards (these are suggestions only). The table used in this process should accurately reflect the type of area that is being assessed.

Each level of development is given a numerical rating, with 1 reflecting an area with the least amount of risk and 5 reflecting the greatest amount of risk.

It is important that when assessing a particular area, that you assign the appropriate rating following a risk assessment. Do not automatically rate the area of least risk (development) as 1 (the lowest rating) and the area of most risk (development) as a 5 (highest rating). It is possible that the area of least risk in a given area may need to be rated as a 5 and the area of highest risk may be a 1 as each area may have unique and different factors associated with it.

If the area and development being assessed is pre-existing, it is vital that the area undergoes a physical survey for this process. If the area being assessed is on plan only, a desk top audit will need to be done.

It is strongly recommended that whenever an area is being assessed for risk management purposes, that a checklist be developed especially for this purpose and that this checklist is used by the people conducting the assessment. This will facilitate decision making and allow a written record of the process to be kept.

The following table is an example of the way in which typical developments and reserves can be rated.

Table 4.

	Area with Development	Area with Natural Hazards
1	Virginal bush, cleared land, no infrastructure.	No hazardous natural features.
2	Cleared land, static infrastructure, eg; grass area with tables and chairs, toilet block, lookout.	Sloping ground, no natural water, eg; walking track around reserve.
3	Cleared land with activity based infrastructure, eg; grassed area with play equipment, cycleway.	Reserves containing natural waterway that runs during wet weather, drops less than a metre.
4	Infrastructure with no artificial lighting, eg; golf course, football field, recreational ground.	Creeks, ponds and ledges between 1-3 metres high.
5	Extensively developed infrastructure with artificial lighting, eg; sports complex.	Contains river, dams and cliffs greater than 3 metres.

STEP 2 – POPULATION USAGE

The next stage in determining the FVR is to determine the population usage, which is the usage of the facility. "Population" is defined as - 'The average number of people using a facility over a selected period of time during an organised or impromptu function.'

The population usage helps to highlight areas and facilities which are used by more people, therefore identifying those areas more likely to have a higher risk associated with them. The table below is an example of rating population usage for a pool. The numbers used as cut offs for the different levels should be adjusted to the specific area/ development/facility that is being rated.

Table 5

Population Use - Swimming Pool	
1	Less than 5 people at a time.
2	5 to 50 people at a time.
3	50 to 100 people at a time.
4	100 to 500 people at a time.
5	Greater than 500 people at a time.

STEP 3 – FREQUENCY OF USE

The next step is to determine the frequency of use. This is defined as 'The number of times that the facility is used by patrons over a selected period of time'. In some cases, the facility may be used so infrequently that it is considered to be zero. At the other end of the scale, a facility may be used constantly. For example, a lake in a residential estate may be used occasionally throughout the year but in summer hosts two or three weddings plus increased recreational use. However, if it is anticipated that the facility is never going to be used, a score of 0 is possible.

If a facility is used for one event a year, the risk management process should be revisited for that event.

The following table is an example of a frequency of use rating system for a facility. It is important to note that when undertaking this process, that the tables being used actually reflect what is being audited.

Table 6.

Frequency of Use	
1	An annual activity or event is held at the facility.
2	An activity or event takes place at the facility on a monthly basis.
3	An activity or event takes place at the facility on a weekly basis.
4	An activity or event takes place at the facility on a daily basis.
5	The facility is in continuous use for the majority of the day.

STEP 4 – FACILITY VISITATION RATE

The next step is to calculate the Facility Visitation Rate (FVR).

The equation used to determine the FVR is:
FVR = (Development x Population) + Frequency

An example of the equation is:

[Development (3) x Population (4) = 12] + [Frequency (3)] = FVR of 15
The maximum score (and risk) is 30

The FVR scores assign a numerical value to the potential risk associated with development, population numbers and the frequency of use. Obviously, the higher level of development, the larger the population using the facility and the greater the frequency with which it is used, the higher the FVR will score and the higher the risk associated with it. The following table shows the level of risk associated with FVR scores.

Table 7.

FVR Scores	
0-7	LOW RISK – perhaps acceptable as is
8-14	MEDIUM RISK – attention needed, correction required
15-30	HIGH RISK – immediate correction required. Consider discontinuing

Used in conjunction with the Risk Management Matrix, this risk assessment procedure can be used to give a good indication of the levels of risk that a particular development is carrying. It is vital that once specific risks have been identified through the FVR process, they undergo assessment via the Risk Management Matrix (or similar), as the FVR will give only a general risk assessment. The risks highlighted by the entire process can then undergo risk treatment. Two examples of how the Risk Management Matrix and the FVR could be used in an Urban Waterways setting are included in Appendix A.

LINKS

Aquatic Risk Management Kit

Australian Standards

Aquatic and Recreational Signage Manual

section 2

GUIDELINE UW1.

1. TITLE PROXIMITY OF DEVELOPMENTS TO WATER

2. PURPOSE To establish the minimum safety considerations on the proximity of residential allotments/dwellings and commercial buildings to water developments.

3. GUIDELINES

3.1 Developments that separate the water from the home using roads should be considered as a preferred option.

3.2 Residential allotments that abut the water, in particular those with backyards extending to the waters edge should have a barrier such as a pool safety fence and gate between the backyard and the water.

3.3 Setbacks

3.3.1 In residential allotments that abut the water, dwellings should be at least 15 metres from an open water environment (not including a swimming pool or pond) where there are back fences without private access provided.

3.3.2 In residential allotments that abut the water, dwellings should be at least 25-30 metres from an open water environment (not including a swimming pool or pond) where there are back fences with private access provision.

3.4 Developments that include playgrounds and/or picnic facilities for residents and the public adjacent to water should be designed such that playground activities are not close to water nor would lead an activity participant into the water. If playgrounds are within 30 metres of the water, they should be isolated by fencing in accordance with **AS 1926.1 – Swimming Pool Safety – Fencing for Swimming Pools**.

3.5 Any developments that are within the 100 year flood level or fall under a flood plain overlay must comply with Melbourne Waters' **Guidelines for Development in Flood Prone Areas**.

3.6 Residential developments with lakes, where there is pedestrian access around the lake such as roads, paths, promenades, trails or raised timber boardwalks, should be constructed and located where users cannot trip or fall from the designated walkway into water. Similar considerations should be introduced for trails and tracks designed for bicycles or shared use.

Bicycle and shared bicycle/pedestrian paths should range from 2–4 metres wide depending on the volume of users and have a 1m setback from obstacles, fence etc. For further design information and bicycle path signage information, please refer to VicRoads Cycle Notes at **www.vicroads.vic.gov.au**, Austroads Guide to Traffic Engineering Practice Part 14 – Bicycles, Australian Standard 1742.9 Manual of Uniform Traffic Control Devices and Part 9 Bicycle Facilities.

3.7 Developments with water areas where fishing is promoted or not discouraged should be appropriate for the activity, safe for the fisher and be appropriately signposted. Refer to **Aquatic and Recreational Signage Manual**.

3.8 Developments with a mix of public access around a lake such as roads, paths, promenades, and trails or raised timber boardwalks should not lead the users into a dangerous or isolated area.

GUIDELINE UW2.

1. TITLE BUILDING GUIDELINES

2. PURPOSE To establish the minimum safety considerations on the building guidelines or covenants that may be necessary for the provision of child safety enclosures and/or perimeter fencing.

3. GUIDELINES

3.1 All playgrounds and bike paths must be above the 10 year Average Recurrence Interval (ARI).

3.2 All water body and wetland crossings shall have a 100 year ARI protection.

3.3 All crossings shall have a clear line of sight from the approaches to the water body, allowing pedestrians a clear view of the prevailing water conditions before they use the crossing.

3.4 Where residents wish to provide isolation either to or from their property, so as to restrict access to the water, developers and planners should not introduce covenants restricting the provision of isolation methods.

3.5 Developers should consider introducing covenants that request secure recreational areas if designing for children aged between 0-5, e.g; Playgrounds be fitted with isolation fencing to provide secure play areas.

GUIDELINE UW3.

1. TITLE RECREATION IN, ON OR NEAR THE WATER

2. PURPOSE To establish the minimum safety considerations for the provision or conduct of recreational structures, facilities or activities in, on or near water areas adjacent to residential developments.

3. GUIDELINES

3.1 Storm Water

Water bodies designed for storm water treatment should not be available for recreation on or in the water body.

3.2 Recreation Attractions – Beaches and Jetties

Water areas that have active recreation attractions such as jetties and beaches should have the following safety considerations.

3.2.1 Beaches should not be installed adjacent to or with water where swimming should not be permitted, eg; storm water treatment, boating areas, or where water does not meet the World Health Organisation Guidelines for Safe Recreational Water Environments Volume 1, Coastal and Fresh Waters.

3.2.2 Jetties or structures that protrude from the land out into the water should have the following:

(i) Appropriate handrails in accordance with relevant Australian Standards and Building Codes. Refer to Barriers Appendix B.

(ii) No Diving Prohibition Signs. Refer to Aquatic and Recreational Signage Manual.

(iii) Appropriate Warning Signs. Refer to Aquatic and Recreational Signage Manual.

3.3 General Recreation Areas

(i) Activities that could lead to the participant or the object of the activity (eg; Football) into the water should be kept well away from the water body or prohibited. Vegetation beds may be strategically placed near the water body to restrict the playing of such games within 30 metres of the water body.

(ii) Appropriate Warning Signs should be prominently displayed at the access points warning of potential water hazards. Refer to the Aquatic and Recreational Signage Manual.

3.4 Watercraft

3.4.1 **Powered**

(i) Waterway developments actively promoting the use of powered watercraft should not promote swimming nor encourage beach-based activity through the provision of a beach.

(ii) Powered and non-powered craft should not share the same uncontrolled residential waterway.

3.4.2 **Non-Powered (row boats, canoes, sailboards and the like)**

(i) Non-powered craft should only be permitted on waterways where special design considerations have been addressed, such as:

(a) Access and egress points for craft

(b) Loading and unloading areas

(c) Pedestrian access across roads

(ii) Non-powered craft and powered craft should not share the same residential water development.

3.4.3 **No Swimming**

Swimming and the use of watercraft should not be promoted at the same location.

3.5 Playgrounds

Playgrounds, picnic facilities and general recreation areas for residents and public should have appropriate separation to minimise any risk.

3.5.1 Playgrounds should be fenced to provide a secure sanctuary for the children.

3.5.2 **Picnic facilities**

(i) Picnic facilities such as barbeques and picnic tables should be sited a minimum of 30 metres from the waters edge.

(ii) Picnic facilities sited closer than 30 metres to water should have an appropriate barrier (eg; fence) placed between the picnic facilities and the water.

3.6 Fishing

Water areas in which fishing is approved should have appropriate signs installed.

3.7 Model Watercraft

Model boats and yachts should only be permitted in water zones built expressly for the purpose and where the waters edge has been established fit for purpose. Considerations should include:

(i) Access and egress

(ii) Launching and recovering areas

(iii) Pedestrian traffic flow

GUIDELINE UW4.

1. TITLE WATER CONDITIONS

2. PURPOSE To establish the minimum safety considerations on the water conditions.

3. GUIDELINES

3.1 Water Quality (General)

Should the water become polluted, either by natural causes such as blue green algae, by chemical contamination or by human intervention, to a level unfit for use by humans (swimming, fishing, boating), appropriate information should be disseminated and displayed as a warning to residents and visitors. Refer to the World Health Organisation Guidelines for Safe Recreational Water Environments Volume 1, Coastal and Fresh Waters.

3.2 Water Flow

3.2.1 Safety considerations should be given in moving water environments such as tidal waterways and flowing rivers and streams.

3.2.2 Residential developments should not be located in areas prone to large tidal variations, floods, storm surges and surf environments. Refer to Guidelines for Development in Flood Prone Areas.

3.3 Water Quality (Recreation)

3.3.1 Where aquatic recreation activity is promoted, water quality should be regularly monitored. Refer the World Health Organisation Guidelines for Safe Recreational Water Environments Volume 1, Coastal and Fresh Waters.

3.3.2 Water quality should be promoted to the local residents, in particular where conditions are unsatisfactory. A community education program should be established in relation to the causes, prevention, precautions to be taken and treatments for poor water quality. Refer the World Health Organisation Guidelines for Safe Recreational Water Environments Volume 1, Coastal and Fresh Waters.

GUIDELINE UW5.

1. TITLE IN-WATER STRUCTURES

2. PURPOSE To establish the minimum safety considerations on provision of in-water structures.

3. GUIDELINES

3.1 Structures

All boardwalks, bridges and/or structurally treated edges installed and maintained by others are to have heights and or railings in accordance with design codes and satisfy inundation and safety criteria.
Refer to Guidelines for Development in Flood Prone Areas.

3.2 In-Water Structures

In-water structures, such as piers, jetties, marinas and moorings should be designed to minimise injury to people walking on them, near them and swimming in the vicinity by having the following:

3.2.1 Appropriate handrails in accordance with relevant Australian Standards and Building Codes.
Refer to Barriers - Appendix B at rear of document.

3.2.2 Appropriate warning and prohibition signs, such as "no diving" from jetties into unknown water depth.
Refer to Aquatic and Recreational Signage Manual.

3.3 Rescue Equipment

Rescue floatation devices such as life ring (lifebuoy) may be necessary and would be considered as a result of a Safety Risk Audit.

3.4 Maintenance

Structures should be regularly inspected and listed on a maintenance register.

GUIDELINE UW6.

1. TITLE SAFETY SIGNS

2. PURPOSE To establish the minimum safety considerations on provision of safety signage.

3. GUIDELINES

3.1 A signage system alerting people to the warnings of potential dangers or hazards should be provided at appropriate locations by authority responsible for managing development.
Refer to **Aquatic and Recreational Signage Manual**.

3.2 The signs should be designed and displayed to accepted Australian Standards. The **Aquatic and Recreational Signage Manual** provides a design guide.

3.3 Signage must be maintained and be legible at all times.

3.4 Signage must be vandal proof. Refer to **Aquatic and Recreational Signage Manual**.

GUIDELINE UW7.

1. TITLE EMERGENCY CONSIDERATIONS

2. PURPOSE To establish recommendations on the appropriate considerations in preparing for and responding to emergencies.

3. GUIDELINES

3.1 Risk Assessment

All developments should have Risk Management assessments conducted at various stages during the design and development phases. Refer to the Risk Management section at the front of the document.

3.2 Emergency Action Plan

Each development should have a water based emergency action plan, which should be clearly displayed for all water body users to see.

3.3 Emergency Access

In the event of an emergency, each water environment that promotes access, should have access to the water for emergency/rescue craft. In an isolated area, eg; water body, that has fencing and/or barrier planting, access should be provided by means of a gate or a section of fencing that can be easily removed by authorised persons.

3.4 Regular Safety Inspections

3.4.1 Regular safety inspections should be conducted to a predetermined documented schedule. Application of a Risk Management Strategy will determine the frequency and scope of the inspection. Refer to Risk Management section.

3.4.2 A safety improvement plan should be created following each inspection.

3.5 Rescue Equipment

Rescue aid(s) should be available for use by members of the public going to the aid of someone having difficulty in the water. A life ring (lifebuoy) or similar floatation aid should be considered in public areas where in-water activities are promoted.

3.6 Emergency Services

Emergency services that are likely to be called to an emergency at the development, should be included or consulted in the preparation of the emergency action plan.

GUIDELINE UW8.

1. TITLE: WATER SAFETY AWARENESS AND EDUCATION

2. PURPOSE To establish recommendations on appropriate water safety awareness and education activities considered necessary for informing residents and their guests.

3. GUIDELINES

3.1 Developers should provide each prospective purchaser with an appropriate water safety document/brochure outlining the water safety considerations appropriate to the specific development.

3.2 Each residence should be provided with a water safety guide appropriate to the development.

3.3 It is recommended that each resident over the age of 14 years should be encouraged to undergo basic water safety and CPR instruction.

GUIDELINE UW9.

1. TITLE: ACCESS, EGRESS AND CROSSINGS

2. PURPOSE To establish safety considerations for access and egress to water areas and crossings over water areas.

3. GUIDELINES

3.1 Access

3.1.1 Where access to the water is available, signage should be provided indicating the type of activity(s) appropriate to the venue. Refer to the Aquatic and Recreation Signage Manual.

3.1.2 Where access is provided, it should be safe and free of obstructions, whether above or below water, visible or hidden.

3.1.3 Where swimming is allowed, there should be appropriate access and egress areas such as steps, ramp, beach or similar.

3.1.4 For a water's edge covered in soft mud, heavy reed beds, mangroves or introduced items such as tree logs, access should be denied, prohibited or restricted.

3.1.5 Dangerous locations such as deep water or quick sand/mud should be appropriately signed and isolated.

3.2 The edge of any deep open water should not be hidden or obscured by embankment or planting unless measures precluding access are incorporated.

3.3 Approach batter slopes should be no steeper than 1:5 Vertical to Horizontal (V:H) unless there is special landscape edge treatment that will provide appropriate safety measures. Refer to Waterbody and Wetland Safety Requirements.

3.4 Safety Benching

3.4.1 No formal access to water shall be invited unless there is appropriate safety benching.

3.4.2 All edges to water bodies and wetlands shall have safety benches of at least 1.5-3.0 metres wide from the edge of normal top water level (NTWL) position, except where transitions to culverts or waterways occur. Refer to Waterbody and Wetland Safety Requirements.

3.4.3 The safety benches shall have a maximum grade of 1:8 (V:H) for the first 1.5-3.0 metres before transitioning through 1:5 (V:H) grade over at least 0.5 metre, prior to any steeper grades with a maximum of 1:3 (V:H) grades. The safety bench shall be densely planted such that casual entry will be difficult and that depths gradually increase beyond 150-200 mm before deepening. Refer to Waterbody and Wetland Safety Requirements.

3.5 Secondary Safety Benches

In the case of open water bodies greater than 0.9 metre deep a secondary safety bench will be required at 0.9 metre. This is dependent on the batter slopes from the initial safety bench and depth of the deeper open water. Refer to Waterbody and Wetland Safety Requirements.

3.6 Fencing

3.6.1 Interim fencing may be required between the construction and vegetation establishment where any component of the water body is deeper than 350mm. Refer to Waterbody and Wetland Safety Requirements.

3.6.2 Permanent fencing and/or combined fencing and dense impenetrable plantings should be considered for use adjacent to zones of deep water (greater than 350mm at NTWL), areas where safety benches do not meet the width criteria, adjacent to potentially unsafe structures, areas where high velocities may be encountered or batters are steeper than 1:5 (V:H). Refer to the Risk Management section at the front of document, Appendix A – Risk Management Examples and Appendix B – Barriers.

3.7 Maintenance Access

Maintenance access areas shall be signed, fenced and gated to discourage access where the basic safety measures above are not met.

3.8 Non Maintenance Access

Non maintenance access to the top of weirs, orifice pits and outlet structures shall be restricted by appropriate safety fences and other barriers.

3.9 Crossings

3.9.1 Crossings over water bodies and waterways shall have 100 year flood level protection.

3.9.2 All crossings shall have a clear line of sight from the approaches to the water body, allowing pedestrians a clear view of the prevailing water conditions before they use the crossing.

3.10 Egress

Appropriate exit or extraction methods should be developed and practiced should someone unintentionally fall into or enter the water.

section 3

APPENDIX A

EXAMPLE 1

Scenario

A proposed residential development has a feature lake with a beach for access by the local residents and visitors to the site. The lake is clear of snags and the bottom of the lake is sand and stable. The development will have two hundred houses.

Risk Assessment

RISK MANAGEMENT MATRIX (SEE RISK MANAGEMENT SECTION FOR TABLE)

Consequence (What sort of harm could be caused?)
Drowning = Catastrophic or Category 1

Likelihood Possible = Category C

Risk Management Matrix gives this combination a score of 4. A score of 4 falls into the red zone or the high risk zone, requiring immediate action.

Facility Visitation Rate

STEP 1 – DEVELOPMENT

1) Virginal bush, cleared land, no infrastructure.

2) Cleared land, static infrastructure, eg; grass area with tables and chairs, toilet block, lookout.

3) Cleared land with activity based infrastructure, eg; grassed area with play equipment, cycleway etc.

4) Infrastructure with no artificial lighting, eg; golf course, football field, recreational ground.

5) Extensively developed infrastructure with artificial lighting, eg; sports complex.

As this is a purpose built beach and is designed to encourage people to use it, it rates a 4 for Development.

STEP 2 – POPULATION USAGE

As the population table in the Risk Management section was for a pool, it has been modified to reflect a lakeside beach on a residential estate.

1) Less than 5 people at a time.

2) 5 to 20 people at a time.

3) 20 to 50 people at a time.

4) 50 to 100 people at a time.

5) Greater than 100 people at a time.

With two hundred residences on the estate, the population usage would be **3**.

STEP 3 – FREQUENCY

1) An annual activity or event is held at the facility.

2) An activity or event takes place at the facility on a monthly basis.

3) An activity or event takes place at the facility on a weekly basis.

4) An activity or event takes place at the facility on a daily basis.

5) The facility is in continuous use for the majority of the day.

As the lake is in a residential estate and is unlikely to be used by the public at large, the frequency is **3**.

THE FVR for this example = (4 x 3) + 3

= 15

The FVR for this example falls into the high risk category.

Risk Treatment

As both indicators fall into the high risk category, immediate correction is required. Correction strategies may include:

a) Elimination of the beach from the lake.

b) Elimination of the lake from the development.

c) Signage placed at access points to the beach warning of hazards.

d) Provision of lifesaving service.

e) Provision of lifesaving equipment, such as a lifebuoy.

f) Development and publication of an emergency action plan.

g) Training of residents in swimming, rescue techniques, resuscitation, emergency action plan.

h) Restrictions (signposted and publicised to residents) on who can use the lake, eg; only those with demonstrated swimming ability or all children under the age of 10 must be supervised by a parent/ guardian when using this facility.

i) Elimination of the beach combined with access restrictions, making the lake a purely ornamental development. Access restrictions may include signs posted around the lake at potential access points, placing an access road around the perimeter of the lake between the houses and the water, impenetrable planting around the lake (depending on the type of vegetation used for this, there will be a period where this will not be effective as the plants grow), isolation fencing such as required by AS 1926.

j) A combination of the above points.

It is important to note that while elimination of the lake would be a successful risk management strategy given this scenario, it could also drastically affect the physical environment around the estate and possibly the financial value of the properties in the estate. There are consequences for all risk treatments and these should be looked at as part of the overall picture.

Risk management also needs to be looked at from a financial point of view as well as from a physical safety point of view. Information on the financial risks will not just come from asking "What will it cost if something goes wrong?" but also "What will it cost if we take these (risk treatment) steps?". It may be that elimination of the lake turns out to be the best physical solution but also one that in itself poses a substantial financial risk. It may be that a combination of the other strategies are able to achieve an acceptable reduction of physical risk without having the possible negative financial outcome of the lake being removed.

Each risk is individual and must be assessed and treated accordingly.

EXAMPLE 2

Scenario

A residential development has a series of 3 lakes. These lakes are all ornamental in intent and are part of a storm water treatment process. The development includes a picnic area next to the largest lake that includes barbeques and a children's playground. The development will have four hundred houses.

Risk Assessment

RISK MANAGEMENT MATRIX (SEE RISK MANAGEMENT SECTION FOR TABLE)

Consequence (What sort of harm could be caused?)
Drowning = Catastrophic or Category 1

Likelihood Unlikely = Category D

Risk Management Matrix gives this combination a score of 7. A score of 7 falls into the yellow zone or the medium risk zone, requiring attention.

Facility Visitation Rate (FVR)

STEP 1 – DEVELOPMENT

1) Virginal bush, cleared land, no infrastructure.

2) Cleared land, static infrastructure, eg; grass area with tables and chairs, toilet block, lookout.

3) Cleared land with activity based infrastructure, eg; grassed area with play equipment, cycleway.

4) Infrastructure with no artificial lighting, eg; golf course, football field, recreational ground.

5) Extensively developed infrastructure with artificial lighting, eg; sports complex.

As this is cleared land with activity based infrastructure, it rates a **3** for Development.

STEP 2 – POPULATION USAGE

The population table has been changed to reflect a picnic ground, next to a lake with 400 residences in the estate.

1) Less than 5 people at a time.

2) 5 to 50 people at a time.

3) 50 to 100 people at a time.

4) 100 to 200 people at a time.

5) Greater than 200 people at a time.

With four hundred residences on the estate, the population usage would be **2**.

STEP 3 – FREQUENCY

1) An annual activity or event is held at the facility.

2) An activity or event takes place at the facility on a monthly basis.

3) An activity or event takes place at the facility on a weekly basis.

4) An activity or event takes place at the facility on a daily basis.

5) The facility is in continuous use for the majority of the day.

As the lake is in a residential estate and is quite likely to be used daily in the summer holidays, the frequency is **4**.

THE FVR for this example = (3 x 2) + 4

= 10

The FVR for this example falls into the medium risk category.

RISK TREATMENT

As both indicators fall into the medium risk category, attention and correction are required. Correction strategies may include:

a) Elimination of the lake from the development.

b) Elimination of the picnic area.

c) Elimination of the children's playground.

d) Signage placed at access points to the picnic ground warning of hazards.

e) Children's playground isolated via fencing compliant with AS 1926.

f) The lake isolated via fencing compliant with AS 1926.

g) Education and training of residents in swimming, rescue techniques, resuscitation, emergency action plan etc.

h) Requirements (signposted and publicised to residents) on adult supervision of young children.

i) Locating children's playgrounds as far from the lakes edge as possible.

j) Minimising line of sight obstructions that may block line of sight supervision of young children.

It is important to note that while elimination of or fencing around the lake would be successful risk management strategies given this scenario, they could also drastically affect the physical environment around the estate and the possible financial value of the properties in the estate.

Risk management also needs to be looked at from a financial point of view as well as from a physical safety perspective. The financial issues need to be looked at not just from the point of view of "What will it cost if something goes wrong?" but also "What will it cost if we take these (risk treatment) steps?" It may be that elimination of the lake turns out to be the best solution in relation to the risk to physical safety, but it may also be that a combination of the other strategies are able to achieve an acceptable reduction of risk without having the possible negative financial outcome of the lake being removed from the development.

Each risk is individual and must be assessed and treated accordingly.

APPENDIX B

BARRIERS

As described in the introduction, people often get into trouble in water when they have entered the water unexpectedly. Barriers between people and water are a very effective way of remote supervision that reduces the likelihood of an unexpected entry into the water.

The barrier around the water body can be a combination of fencing and/or impenetrable planting. It should be noted that if impenetrable planting is used as part of a barrier, the effectiveness of this barrier may be reduced while the plants grow. If fencing is to be used as a barrier, either in the entirety or in part, it should comply with AS 1926.1 Swimming Pool Safety – Fencing for Swimming Pools, as it is designed with the specific intention of remote supervision of water bodies. A guide to the standard follows.

Fencing

Fencing is to be designed and constructed so that at any point, the outside of the fencing will present an effective barrier by restricting access of young children to a pool or spa or water body as described above.

Materials

Fencing may be constructed from any type of material, provided that the finished fencing complies with the requirements of the Standard.

Fencing Height

The effective fencing height shall be not less than 1.2 metres.

Perforated Material or Mesh Fencing

Perforated Material or Mesh Fencing using perforated materials or mesh requires an opening of 13mm or less.

If the opening used is greater than 13mm, effective fencing height should not be less than 2.4 metres.

NOTE: Fencing using mesh shall include a strainer wire or rail at the top and the bottom of the fencing.

Horizontal Climbable Members

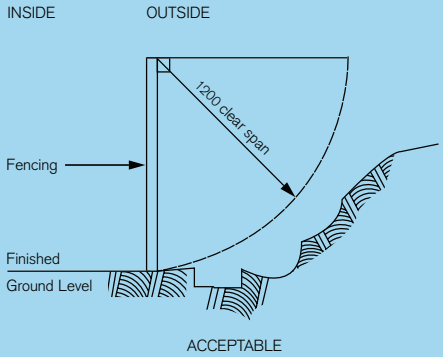
Where fencing components provide a significant horizontal surface, such as rails and rods, that could be used as holds for climbing, they must be situated on the inside of the fencing and at least 900mm apart. If situated less than 900mm apart, the vertical members must be spaced no more than 10mm apart.

Vertical Members

The space between vertical members shall not exceed 100mm at any point.

Outside of Fencing

Any substantial horizontal surfaces that are permanently located on the outside of the fence and could be used as holds for climbing must not be within a 1.2 metres arc measured from the top of the fence.



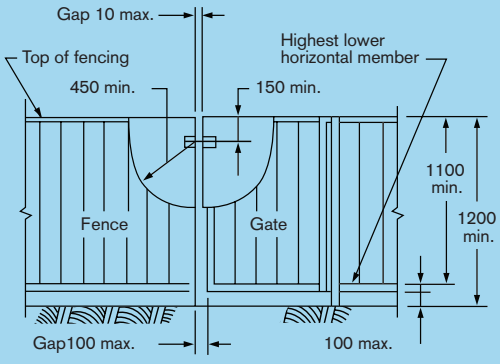
ACCEPTABLE

All dimensions in millimetres (mm)

Shielding of Latching Device

Where the gate is of an open construction and the latch release is below 1.5 metres, the latch must be shielded so that no opening greater than 10mm occurs within an area bound by:

- A circular area with a radius of 50mm from the operating parts of the latch.
- The top of the gate if this intersects the area described in the diagram below.



(a) Basic requirements

All dimensions in millimetres (mm)

Inside of Fencing

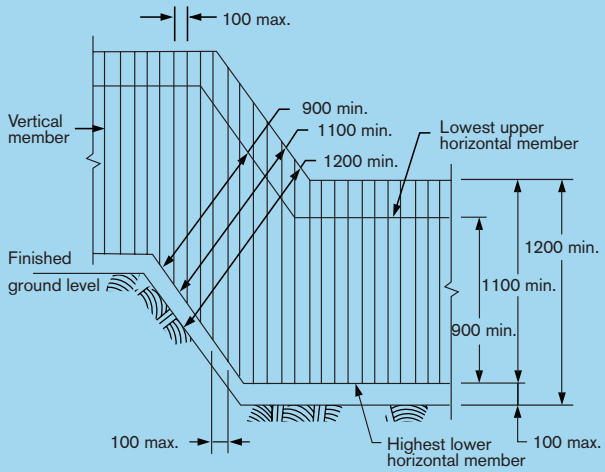
Any substantial horizontal surfaces that are permanently located on the inside of the fence and could be used as holds for climbing, must be at least 300mm clear of the fence.

Above Ground Pools

The walls of the pool or water body shall be an effective barrier if they are not less than 1.2 metres in height and provide no climbable projections.

Ground Clearance

The height of any opening between the bottom of the fencing and the finished ground level shall not exceed 100mm.



All dimensions in millimetres (mm)

GATES AND FITTINGS

Direction of Opening

Gates shall be hung so that they only swing outwards, eg; away from the pool area.

Self-Closing Device

All gates shall be fitted with a device that will return the gate to the closed position and operate the latching device from any position with a stationary start without the application of a manual force.

Note: The self-closing device shall be capable of complying with these requirements with the gate at any position from resting on the latching mechanism to fully open.

Latching Device

Gates shall be fitted with a latching device that will automatically operate on the closing of the gate and will prevent the gate from being re-opened without being manually released.

Location of Latching Devices

The latch or its release should be located at 1.5 metres above finished ground level. Where the latching device is located at a height less than 1.5 metres above the finished ground level, the location of the latching device and its' release shall:

1. Not be on the outside of the fence.
2. Be in such a position that to release the latching device from the outside it will be necessary to reach over or through the fencing at a height of not less than 1.2 metres.
3. Be at least 150mm below the top of the gate if a hand-hole is not provided, or at least 150mm way from the edge of any if a hand-hole opening is provided.

Child-Resistant Doorset

Both sliding and hinged swinging doors must be fitted with a self-latching device with the latch located no less than 1.5 metres above floor level. The self closing device should return the door to the closed position and trigger the latch from any position from a stationary start.

Opening Windows

The window sill must be higher that 1.2 metres, or fixed grill or bars must be provided or a device to prevent the window from opening more then 100mm must be fitted.

NOTE: Key locks are not suitable for this purpose.

FURTHER INFORMATION

Aquatic and Recreational Signage Manual, Life Saving Victoria

AS 1926.1 – Swimming Pool Safety - Fencing for Swimming Pools, Standards Australia

AS 2416 – Water Safety Signs, Standards Australia

AS 2899 – Public Information Symbol Signs, Standards Australia

AS/NZ 4360 – Risk Management, Standards Australia

Best Practice Guide – Signage for Reserves, Civic Mutual Plus

Cycle Notes – Design Standards for Bicycle Facilities, VicRoads

Guidelines for Development in Flood Prone Areas, Melbourne Water

Guidelines for Safe Pool Operations, Royal Life Saving Society Australia.

Guidelines for Safe Recreational Water Environments Volume 1, Coastal and Fresh Waters, The World Health Organisation

Home Pool Safety Booklet, Royal Life Saving Society Australia

Waterbody and Wetland Safety Requirements, Melbourne Water

Royal Life Saving

THE ROYAL LIFE SAVING SOCIETY AUSTRALIA