



**National Water
Safety Management
Programme**

Level 2: Beach Module



Safeguarding lives in, on and near water

This resource is the approved material for the RLSS UK's National Water Safety Management Programme and has been specifically designed to support your learning as you develop your water safety awareness competencies.

Level 2: Beach Module



National Water Safety Management Programme

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Level 2: Beach Module



National Water Safety Management Programme

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Introduction

The coastal environment, in particular the beach where the sea meets the land, is one of the most dynamic on the planet. It is also one of the most heavily utilised areas with competing interests including development, tourism, commercial industries and recreation. This module focuses particularly on the interaction of human recreation and the beach environment, and considers the variety of resulting hazards. Ultimately, the beach can be a hazardous play ground, especially for young or uninformed people who see the attraction but often do not appreciate the dangers associated with beaches.

Before we start perhaps we should define what we mean by 'Beach'. Beach types are wide ranging from long linear beaches to small pocket bays, some with close proximity to urban centres and others being remote in rural locations with limited vehicular access. In the context of this module, we will assume that 'Beach' will primarily be in the coastal zone but the definition can be extended to inland beaches. Although the coastal zone is too large an area to identify hazards, when we talk about the 'Beach' we are referring to those hazards most likely to be encountered by recreational users, including, for example, waves, currents and rock falls.

Recommended further reading: Safety at Beaches RLSS UK/ROSPA and The RLSS UK National Beach Lifeguard Manual.

Learning Outcomes

The learning outcomes for this module are:

- To provide a group leader with knowledge and appropriate skills to develop safety plans to manage groups effectively whilst in or near a beach environment (utilising simulated exercises)
- To improve individual awareness of personal safety when around the beach environment
- To understand the need to manage risk in beach environments
- To develop effective use of rescue equipment

Lifeguarded Beaches



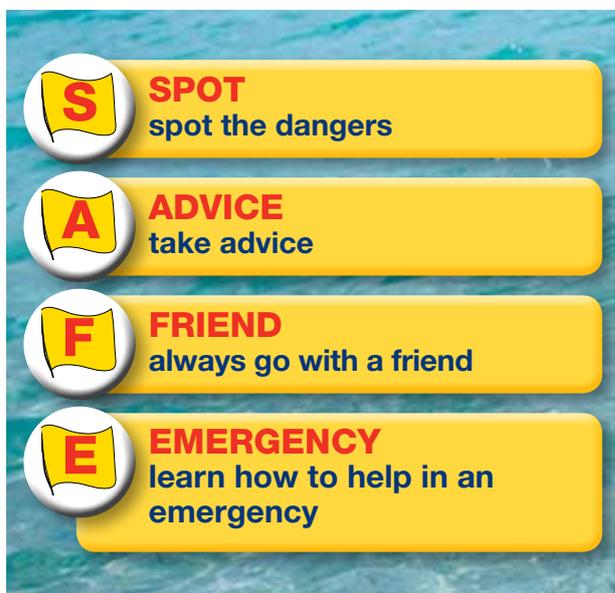
Beach visits should be planned where a lifeguard service is present. As part of the safety plan, it is always recommended that the lifeguards are approached and asked for advice about any local beach hazards and where best to deliver activities.

Flags and Safety Code

The Safe Code

The SAFE Code (also called the water safety code) is a simple way of remembering the most fundamental water safety tips.

- SPOT** **Spot the Dangers**
 - Learn about the hazards at swimming pools and open water sites.
- ADVICE** **Take safety advice**
 - Read the signs.
 - Listen to the Lifeguards.
- FRIEND** **Always go with a friend**
 - If one person gets into difficulty the other can get help.
 - Never swim alone.
- EMERGENCY** **Learn how to help in an emergency**
 - Learn personal survival.
 - Learn how to help others.

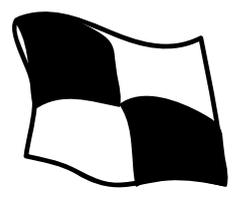


Beach Flags

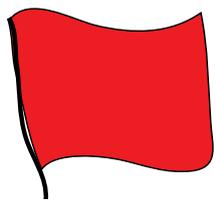
The beach flags are displayed by the Beach Lifeguards in patrolled areas to provide guidance on the water and wind conditions. The flags also inform beach users where the swimming and water sports zones are.



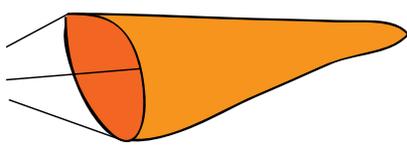
- Red and Yellow Flag – Swimming zone**
- Lifeguards patrol between these flags.
 - It is the safest area for swimming.



- Black and White Chequered Flag – Sports Zone**
- Lifeguards patrol between these flags.
 - It is the safest area for water sports.
 - All other beach users should stay out of this area.



- Red Flag – No Swimming**
- The area between these flags is unsafe for people to enter the water.



- Wind Sock – Offshore Winds**
- Shows the direction and force of the wind.
 - Offshore winds can be hazardous for swimmers and people using inflatables.

Interaction and Variability

What makes the beach particularly hazardous is the dynamic nature of the environment, in that it is often unpredictable and subject to changing conditions. What can appear to be a safe and inviting play area can quickly change to a potentially threatening dangerous environment. In addition to natural variability we have to consider the interaction of hazards that can have a more significant impact than the sum of their individual parts. A good example can be illustrated by hazards associated with rip currents and offshore winds which independently can create significant risks but when combined the effect is multiplied, presenting a potentially lethal combination for bathers on inflatables.

Beach Hazards

RLSS UK run a training qualification – the Level 3 Beach Risk Assessment Programme, in conjunction with the Chartered Institute of Environmental Health. The programme defines beach hazards into five generic categories:

- Nature of the Environment
- Manmade features
- Human
- Equipment
- Employee

Each hazard group has multiple sub categories which will be treated individually.



Environment

Waves

Breaking (spilling) waves

Occur on gently shelving beaches and can be identified by the crest tumbling down the face of the wave.

These are normally the safest type of wave for swimmers, surfers and bodyboarders.



Dumping (plunging) waves

Occur near to the shore on steep shelving beaches as the water motion is slowed down by the seabed.

These waves break with tremendous force. They can knock paddlers from their feet, and can push swimmers onto the seabed causing head and spinal injuries.



Surging waves

Occur when the waves have travelled through deep water close to the shore, and may never actually break.

These waves may cause an unexpected build up of water on the beach and can catch beach users unaware, knocking them off their feet and dragging them into the deep water.



Key Hazards and Risks

- Dumping and surging waves can knock you off your feet which is especially dangerous for young children. This type of wave typically causes impact injuries and can result in neck/spinal injury. Be careful when body surfing or bodyboarding in the near shore.
- Backwash occurs as a result of water from a broken wave running back down the beach face and under the oncoming wave. Again, this is particularly dangerous for young children.



Spilling Waves

Environment

Rip Currents

A rip current is a channel of water moving out to sea, generally through the surf zone. They are usually formed by a build up of water on the beach, caused primarily by large wave sets but also can result as an estuary runs into the sea. Permanent structures such as piers, groynes and geo-morphological features can provide channels of least resistance for water flow where rip currents can be evident.

Identifying a Rip Current:

- Debris on the surface floating away from the shoreline
- Discoloured water, with sand and other seabed materials churning in the water
- Lower wave energy in the rip current, sometimes leading to no visible waves in the rip current at all
- Waves breaking either sides of the rip current



Rip Currents (Source: SLSA Australia)



Environment

Rip Currents

Key Hazards and Risks

- Rip currents are believed to be the largest cause of coastal drowning, taking swimmers out to sea. Panic is usually a major contributory factor with swimmers attempting to swim against the rip current. Rip currents can travel at one metre per second, so within a minute swimmers can find themselves sixty metres further offshore.
- During wave sets, rip currents can pulse fluctuating between high and low flow rates, easily catching people off guard.
- Flash rip currents are caused by a sudden build up of water on the beach through wave action. They appear and subside rapidly and can occur in fairly flat conditions, taking people by surprise.

Escaping a Rip Current

If caught in a rip current, try not to panic. An attempt should be made to swim out of the current and then back to shore (as shown below). If very tired, raise your arm and wait for help.



Escaping a Rip Current

Environment

Tides

Tides are the rise and fall of the surface of the ocean, observed as the movement of water up and down the beach. They are caused by the gravitational pull of the moon, and to a lesser extent the gravitational pull of the sun and the effect of the earth's rotation.

The height of the tide is measured vertically, and the height of the each tide changes every day with the phases of the moon. Parts of the UK experience some of the largest rises and falls of the tide in the world, up to fifteen metres. The difference between the lowest and the highest tide is called the tidal range. The size of the tidal range varies at different locations around the UK and around the world.

Each tide takes around six hours to flood (rise) and six hours to ebb (fall), meaning that each full cycle takes a little over twelve hours. Over the six hours that it takes for the tide to change from low to high, the speed of its movement varies. Simply, the tide begins to rise slowly, then gains pace during the middle of the tide, and eventually slows down before reaching high tide. Similarly, when the tide begins to ebb, the fastest flow is at mid-tide. A more accurate description of the speed and tidal height change is provided by the Rule of Twelfths.





Environment

Tides

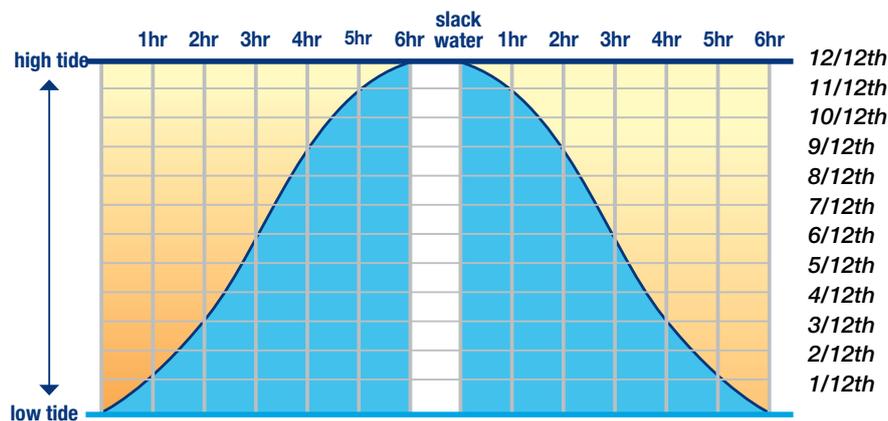
The Rule of 12ths

The Rule of 12ths is a guide to explain the tidal cycle and its changing speed, to assist in knowing when the tide will be moving at its fastest. This is useful to avoid being cut-off by the tide. The Rule of 12ths describes each half cycle, either from low to high water or from high to low water. Lets consider the former, low to high water.

The Rule divides the tidal height into 12ths:

- In the first hour of the tide, the water level rises by 1/12th of the tide's full range.
- In the second hour of the tide, the tide speed has increased and the water level rises an additional 2/12ths of the tide's full range.
- During the third hour and fourth hour, the tide is travelling at its quickest and the water level rises 3/12ths for each of these hours.
- In the fifth hour (similar to the second hour), the water level rises 2/12ths of the tide's full range.
- In the sixth hour (similar to the first hour), the height rises 1/12th of the tide's full range (completing the tide's half cycle).

The table below summarises the Rule of 12ths.



Rule of Twelfths

Key Hazards

- Flooding tides can cut off beach users from exits from the beach, which can be exacerbated by high cliffs and multiple coves
- Both flooding and ebbing tides form tidal currents that can transport swimmers out of safety zones.



Beach Showing Tidal Cut-Off

Environment

Longshore Currents, Sandbars and Hole



Longshore Currents – Lateral Drift Currents

Longshore currents are caused by the incoming waves being deflected at an angle by the shore. The currents usually run parallel to the shoreline and can carry people towards rip currents.

Groynes on the beach indicate the presence of longshore currents. Groynes are used by beach managers to reduce the movement of sand or other beach materials along the beach in the direction of the current. This is called Longshore Drift.

Hazards and Risks

- Swimmers can be carried along the shore and away from safety.
- Swimmers can be carried into rip currents.
- Sandbars, sandbanks, gullies and holes can be formed in the intertidal zone.

Sandbars, Sandbanks and Holes

Currents, such as longshore currents, can move sand and other sediment along the beach in the intertidal zone (called Longshore Drift), and can cause erosion and deposits on the seabed.

Environment

Longshore Currents, Sandbars and Hole



Sand Bars

Sandbars

Sandbars are ridges of sand along a beach created by the action of waves and tides which can be submerged or partially exposed and can form in the intertidal zone between low and high water.

Hazards and Risks

- Rip currents hazard – holes in sandbars are often the cause or result of rip currents.
- Misleading water conditions hazard – sandbars can have a calming effect on the incoming waves causing beach users to underestimate the hazards.
- Misleading water depth hazard – sandbars can cause beach users to underestimate the depth of the water.
- Incoming tides can cut people off, leaving them stranded on sandbars. The sandbars can become submerged with the rising tide leaving people out of their depth.

Sandbanks

Sandbanks are also formations of sand that usually form offshore and higher than the water surface at low tide.

Hazards and Risks

- Cut off hazard – sandbanks can submerge during high tide which can cause beach users to become cut off from safety, possibly out of their depth.

Holes

Holes, also called gullies and troughs, form where the current erodes the seabed material and in the intertidal zone.

Hazards and Risks

- Rip current hazard – holes in sandbars are often the cause or result of rip currents.
- Irregular seabed hazard – holes in the intertidal zone causes sudden drop offs in the seabed, with swimmers finding themselves out of their depth. This is particularly dangerous for non swimmers using the surf and wash zones.

Environment

Beach Composition



Jagged Rocks in Intertidal Zone

Beach Sediment

Beach sediments vary widely from sand through to boulders, influenced by coastal processes which can change the shape of a beach quite rapidly. Generally, the sediment and structure of the beach can be easily identified and managed. Sand and shingle beaches tend to be the safest type of beach, although changing sandbanks and holes can be hazardous, as mentioned above.

Key Hazards

- Shingle can be suddenly destabilised by wave action.
- Rock boulder beaches form fall and entrapment hazards and restrict access to emergency services.
- Underwater rocks or boulders, in the intertidal zone, can be dangerous to swimmers through collision from being thrown by waves.
- Silt and mud can present a very high hazard due to the suction effect of deep mud which can entrap people, especially in the intertidal zone where the casualty may be trapped and facing an incoming tide.



Environment

Beach Composition

Cliffs

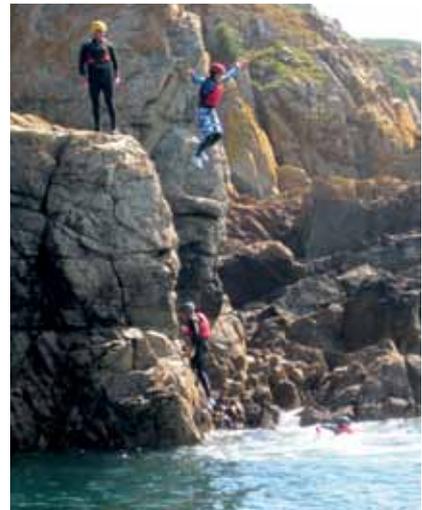
Cliffs form the back drop to many beaches and border approximately 4,000 km (2485 miles) of the UK coastline and are commonly formed from near vertical rock faces.

Cliffs are always continuously eroding, depending upon environmental conditions and rock material. Evidence of the ongoing process of erosion can often be seen where fences and paths previously in safe areas are now perilously close to the cliff edge. Recent rock falls can be evidenced from piles formed at the foot of cliffs.

Cliff jumping, often termed 'tombstoning', is an activity that can lead to serious injury, especially where there is a lack of appropriate safety systems or where the cliff height to water depth ratio is high and egress is limited.

Key Hazards

- Slip, trip and fall hazard – from cliff edge and pathways
- Falling rock hazard - from crumbling cliffs
- Cut-off hazard - by the flooding tide



High Cliffs Forming Coastline

Environment

The Effects of Wind and Weather

Weather conditions can turn an otherwise relatively safe beach into a highly dangerous one very quickly. For example, the onset of an onshore gale will produce rough sea conditions that can elevate risks significantly and also introduce new risks.

In reality, the waters around the UK never rise above the temperature required to prevent the onset of hypothermia. Cold water can induce a reduction in the unprotected swimmer's physical ability, often resulting in unexpected difficulties just metres away from safety.

Effects of Temperature

The welfare of the individual or group is paramount and proper preparation for a day out at the beach is essential due to the changing conditions of a beach which can swing quickly from sunny and warm to cold and wet, both of which carry their own hazards. Wind chill is another factor for consideration.

Key Hazards

- The sun and heat can lead to sunburn, heat exhaustion and more seriously heat stroke.
- Lower temperatures and inadequate clothing can lead to hypothermia.
- The sea temperatures in the UK rarely rises above 18C and lengthy immersion will always present a risk of hypothermia. Children are at particular risk as they can become so engaged in having fun that they can fail to notice feeling cold.

Environment

Winds

Winds can have dramatic effects on beaches, particularly in the case of large open expanses of space.



Key Hazards

- Offshore winds pose a particular danger to those using inflatables or boards that are easily blown seaward, taking people out of their depth. Offshore winds often present in calmer conditions can lull people into a false sense of security.
- Onshore winds can have a significant effect on wave patterns causing them to become bigger and more powerful.
- High winds can create poor visibility and make the sea choppy which can impair swimming

Forecasting

Whilst we don't expect you to be a weather forecaster, some of the folklore tales about weather have been shown to be surprisingly accurate. For example:

Fair weather signs

- *early mist clearing*
- *red sunset the night before*
- *steady barometer*
- *cirrus [high, light, fluffy] clouds*

Deteriorating weather

- *red sunrise*
- *thickening cloud cover*
- *clouds moving in different directions*
- *falling barometer*
- *hazy clouds around the sun*

Clearing weather

- *rising barometer*
- *change in the wind direction*
- *decrease in temperature*

Manmade and Human Hazards

Manmade

Manmade structures on the beach can present dangers to beach users, most of which are easily identifiable, although smaller structures, such as groynes, can become hidden beneath incoming tides. Manmade structures on the beach and coastline include piers, sea walls, flood defences and groynes.

Equipment hazards can also be present on beaches which can include lifeguard vehicles and general public vehicles parking on the shore.

Leaders and supervisors must be appropriately trained to manage a group in the beach environment and know their personal capabilities to ensure the safety of themselves and the group. Any incident involving intervention can put the supervisor at risk.

Key Hazards

- Slip, trip and fall hazards – often from significant heights
- Rip currents and irregular water flow – where structures extend into the water
- Irregular seabed composition – caused by erosion
- Collision with submerged objects/structures
- Collision with vehicles either travelling across the foreshore



Coastal Groynes

Manmade and Human Hazards

Manmade (continued)



Coastal pier with high tidal range

Human

Beaches can be heavily populated during the summer months and tempers can fray with hot temperatures. In addition, some beach users can become aggressive and anti-social due to alcohol intake or substance abuse. Other forms of conflict can arise from different types of users competing for resource space, e.g. powercraft and fishermen.

Key Hazards

- Anti-social behaviour and potential violence
- Collision between users, especially between swimmers, surfers and powered craft



Powered Beach Craft

Marine Life, Water Quality and Litter

Micro-organisms

Micro-organisms are a natural component of seawater and includes pathogenic bacteria and viruses. Water pollution can also occur through oil spills, agricultural and urban runoff and discharge of chemicals into the water course. Increasing sewage treatment, management of combined sewer outfalls and improved agricultural practices has resulted in dramatic improvements in water quality. Most beaches in the UK are sampled by the Environment Agency and in some cases by local authorities. Various beach awards are presented to beaches with water quality meeting European Guidelines, the most prominent being the Blue Flag.

Pollution and Debris

Pollution is caused by pollutants entering the water without pre-treatment to remove their harmful effects. Pollution can significantly decrease the cleanliness of water, making it poisonous to fish, animals and humans.

A significant amount of litter is seaborne although beaches can be heavily littered following busy days. Apart from being visually obtrusive and impairing the aesthetic of a seascape, litter can also be dangerous (such as broken glass and contaminated syringes hidden in the sand).

Sources of pollution include:

- Sewage and storm water discharge
- Chemicals and toxic waste
- Industrial waste
- Discarded rubbish (floating and submerged)
- Agricultural waste and animal run-off
- Oil spills and sea flotsam/jetsam

Discarded rubbish, trolleys, cars and domestic appliances also present physical hazards in the water that can harm water users.



Hazards and Risks

Contact with contaminated water may result in:

- Weil's disease
- Eye, ear and skin infections
- Chemical poisoning
- Respiratory infections
- Septicaemia
- Physical injury and entrapment
- Diarrhoea, fever and vomiting



Marine Life, Water Quality and Litter

Marine Life



There are many species of sea life that live in the waters around the UK. A small number of these species may sting bathers if they come into contact with them. Of particular note is the weever fish that can sting bathers in shallow waters through poisonous spines on their backs. Jelly fish and sea urchins are other common forms of natural hazard.

Hazards and Risks

The following species pose a sting injury hazard:

Weevers and Rays

- Weever and ray fish have spines on their back that can also contain venom. If bathers step onto the fish, the spines can pierce their foot causing considerable pain for approximately two hours and causing ongoing discomfort.

Sea Urchins

- Sea urchins are small, very slow moving animals that are covered in spines. If bathers step onto the urchin, the spines can pierce the skin and break off inside the foot.

Jellyfish

- Jellyfish have stinging cells on their jelly-like skin which sting upon contact. Stings caused by contact with jellyfish can range in severity from a slight tingle to very painful.

SAFETY NOTICE: In most cases these stings can be treated with basic first aid. However, if any of the following symptoms develop immediately after a sting, professional medical advice should be taken:

- Swelling.
- Itching anywhere else on the body.
- Wheezing.
- Feeling faint.
- A fast heart rate.
- Difficulty in swallowing.
- A swollen face or mouth.

Injuries

- Skin, ear, nose and throat infections and gastrointestinal symptoms from water
- Cuts arising from broken items and infection from contaminated syringes and sanitary items
- Marine stings and pierced skin

Suggested Controls for Beaches

General controls listed here are provided as a guide for planning activities on beaches (including lone working). These are only suggested controls and not an exhaustive list and other arrangements may be necessary.

General controls

- Where possible select beaches that are lifeguarded and, if swimming, stay between the lifeguard flags
- Observe all warning signs
- Where multiple activities are occurring on the same site, zoning must be considered
- If you are the designated safety cover, ensure you hold a current life saving qualification and can deal with life support and basic casualty care
- For those operating around the beach, keep a safe distance from the edge of steep drops to avoid inadvertently falling in (beware of sandbanks and holes)
- Ensure the leader(s) is equipped with a rescue aid (e.g. throw line, buoyant aid) and lone workers are also equipped with appropriate rescue provision
- Plan activities away from identified hazards
- Ensure there are a number of suitable access and egress points, especially on a flooding tide
- Be aware of the weather forecast and be vigilant of changing weather conditions
- Make sure all those operating around the beach wear appropriate clothing to cope with hot and cold conditions and, where appropriate, wear personal protective equipment and personal floatation devices
- Put time limits in place for water activities to avoid hypothermia
- Ensure plenty of fluid is available to avoid dehydration
- Follow the slip, slop, slap rule applying clothing, hat and sun cream to avoid sun burn
- Create behavioural framework for beach water activity

Specific controls for group management

- Clear instructions to be communicated to groups
- Groups should be allowed in coastal water where there is ease of access and egress, the environment is calm and where the activity is programmed
- Select a site that is within the capability of the group
- Leaders to maintain contact and observation of the group at all times.
- ALWAYS have a plan B to switch activities



Additional safety note for operating on beaches

Waves, Rip Currents, Tides and Offshore wind

- Do not enter the water if the waves are beyond the capability of the group and, be wary of shore dumping waves. Ensure young children are not exposed to big waves.
- Create an activity zone away from obvious rip currents
- Provide group with advice on how to escape a rip current and/or signal for help
- Have knowledge of the tidal range and tide times
- Ensure there is ease of egress so group is not cut off from incoming tide
- Inflatables must not be used when the windsock indicates an offshore wind and they must be tethered
- With wind chop and high waves, swimming should be avoided

Beach configurations

- Keep group away from sand holes & sandbars which could become cut-off points
- Provide advice
- Stay clear of soft sediment, in particular mud
- Stay clear of the foot of cliffs
- Avoid walking close to cliff edges and stay on designated paths
- Do not engage in cliff jumping activities unless supervised by an experienced leader who knows the area well

Human, Manmade, Marine life

- Survey beach for litter and harmful items. If injured, apply appropriate first aid
- Keep clear of any manmade structures and beware of hidden obstacles
- Make provision to ensure the group does not come into contact with vehicles
- Be respectful of other users and refrain from engaging in confrontation
- If stung by a weever fish, place foot in water as hot as the casualty can bear
- Watch out for anaphylactic shock, take emergency action and refer to beach lifeguard if present

Sea, Coast and Beaches Summary

FEATURES	HAZARDS AND INFORMATION
Tides	<ul style="list-style-type: none"> • Two incoming and outgoing tides per day • Varying tidal range
Cliffs	<ul style="list-style-type: none"> • Slip, trip and fall hazards • Falling rock hazard • Cut-off hazard
Offshore Winds	<ul style="list-style-type: none"> • Blow out to sea • Can carry swimmers and inflatable's away from the shore
Manmade Structures	<ul style="list-style-type: none"> • Piers and Supports • Groynes • Sea walls, flood and erosion defences
Waves	<ul style="list-style-type: none"> • Breaking (spilling) waves • Dumping (plunging) waves • Surging waves
Longshore currents	<ul style="list-style-type: none"> • Flow parallel with the shore • Can carry swimmers away from their point of entry/exit
Sandbars, Sandbanks and Holes	<ul style="list-style-type: none"> • Variable water depths • Rip Currents • Cut-off hazard
Rip Currents	<ul style="list-style-type: none"> • Flow away from the shore • Can carry casualties away from the shore
Sea Life	<ul style="list-style-type: none"> • Weevers • Rays • Jellyfish • Sea urchins
Beach Composition	<ul style="list-style-type: none"> • Sand – Low hazard • Shingle/pebble – Low hazard • Rock/boulder – Moderate hazard • Silt/mud – High hazard
Water Bed Composition	<ul style="list-style-type: none"> • Gently shelving – Low hazard • Steeply shelving – Moderate hazard • Sudden drop offs – High hazard • Irregular surface – High hazard
Silt, Mudflats and Quicksand	<ul style="list-style-type: none"> • Soft sediment layer • Entrapment hazard • Drowning hazard (from incoming water)
Water Quality	<ul style="list-style-type: none"> • Micro-organisms • Pollution • Blue Flag
Deep/Cold Water	<ul style="list-style-type: none"> • Sea temperatures 4°C to 21°C • Cold Shock Response • Hypothermia
Water Speed and Force	<ul style="list-style-type: none"> • Tides/currents and wave action can result in water moving at speed with extreme force and with sudden changes in direction • Casualties can be knocked off their feet, and swept onto other hazards and rocks • Casualties can be pulled away from an activity zone/out to sea.