



Coastal Aquatic Risk Assessment

Amberton Development



SURF LIFE SAVING
WESTERN AUSTRALIA

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**Prepared For:
Stockland: Amberton**

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1. Summary

Assessed Locations:

- 1 Alkimos-Pipidinnny-Yanchep (S) [Amberton beach]

1.1 BACKGROUND

Amberton is a residential site currently under development by Stockland. The site is situated within the City of Wanneroo, some 8km from the Yanchep SLSC in the north and 7.5 km from Quinns Mindarie SLSC in the south. The Amberton development has approximately 700 metres of ocean frontage.

This stretch of coastline beyond the fore dune is being developed by Stockland for residential purposes and sale of lots. The beach access and use is considered a centre piece to the recreational and leisure opportunities the Amberton development will provide residents and the surrounding community.

Amberton beach fronting the Amberton development is approximately 700m in length. For most of its length it is backed by a 10m to 20m high foredune with a few blowouts, then vegetated, undeveloped transgressive dunes extending 2km to 3km inland. There is development on the western side of Marmion Avenue which is moving towards the beach area. The beach is relatively wide however the northern half of the shoreline and further north for approximately 1.3 kilometres is littered with rock platforms and reef along the swash and surf zone.

The beach is not patrolled and is not yet a beach that has a high frequency of visitation for swimming activities; although the outer reefs and Amberton wreck provide some attraction to surf board riders for surfing and fishing related activities.

Stockland has engaged Surf Life Saving Western Australia to conduct an assessment of the Amberton foreshore to provide advice on:

- i. The most suitable location to be designated as a recreational and leisure beach primarily for swimming and wading activities; and within the Amberton Beach development boundaries.**
- ii. The best location for a surf lifesaving club and additional outpost facilities based on the risk profile and proposed use by the community across the Alkimos-Eglinton region.**
- iii. An assessment of coastal aquatic risk present at Amberton Beach and development of risk management plan and treatments including beach accessibility, proposed access signage, prevention and lifesaving services and awareness and education.**

This report contains findings and recommendations specific to current standards, guidelines and best practice regarding risk management pertinent to the characteristics and designed applicative use of the assessed location. The report contains information specific to Amberton Beach only.

A set of risk treatment options is proposed for the Amberton beach. The following risk treatments are offered for consideration and are representative of the key recommendations tabled:

1. Beach Access and Ongoing Maintenance (Section 4.2.4)
2. System of Safety Signage (4.2.5)
3. System of Supervision - Lifesaving Service Level Analysis (Section 4.2.6)
4. Existence of Coastal/Beach Emergency Action Plans (Section 4.2.7)
5. Education and Awareness Programs (Section 4.2.8)
6. Public Rescue Equipment (Section 4.2.9)
7. Dune Vegetation Maintenance, Beach Scarping/Tunneling (Section 4.2.10)
8. Emergency Response Beacons, Alarms and Phones (Section 4.2.11)
9. Monitor and Review (Section 4.2.12)

As a consequence of the continuing growth and changing usage patterns it is the view of SLSWA that Stockland should periodically review this coastal public safety risk assessment and treatment plan, in particular when a milestone development occurs or is imminent.



1.2 SUMMARY OF PROPOSED KEY RISK TREATMENTS

1.2.1 Beach Access Ongoing Maintenance

There are currently no defined access paths to Amberton Beach although the dunes are littered with informal pedestrian and four wheel drive tracks. As development continues, these tracks will be closed off to the public with the introduction of formal roads and pathways into the area.

SLSWA has assessed the southern area of Amberton Beach to be the most 'friendly' to a range of beach users. For this reason SLSWA have recommended the southern boundary of Amberton as the best location for major access points and associated infrastructure. Formal access paths must be developed for pedestrian use and a wider, gated beach access for emergency vehicles and other approved users.

Please refer to Section 4.2.4 for more information on access infrastructure and ongoing maintenance.

1.2.2 System of Safety Signage

As the site is under development, much of the formalised roadways, car parks, recreational pathways or beach access are not yet under construction. Reasonably, little or no formalised signage was in place at the time of the site visits. Once formalised access ways are developed the appropriate signage needs to be put in place.

Suitable future signage includes:

- Beach and aquatic safety signage
- Location signage
- Marine zoning signage
- Signage relating to location of toilets/disabled access
- Signage relating to location of nearest lifesaving service
- Local government regulation signage
- Environmental and conservation signage
- Dune management signage
- Community information signage including safety, security and crime prevention.

Please refer to section 4.2.5 for more information on systems of safety signage.

1.2.3 Lifesaving and Surveillance Outpost

SLSWA recommend that a community lifesaving storage facility and surveillance outpost is located on or near the southern boundary of the Amberton development. This facility could be designed to operate alongside or as part of any development of other beach infrastructure such as cafés, public changing facility in the Amberton area. This type of building is considered by SLSWA to be an outpost to a larger regional type surf life saving facility and clubhouse which is planned for future location in the neighbouring Alkimos beach development.

The advantages of locating a lifesaving and surveillance outpost near or on the southern boundary of the Amberton beach development includes:

- The elevations at this part of the beach provide for improved outcomes of emergency and

lifesaving activity beach access requirements. Entry and exit of plant and equipment on and off the beach and an appropriately sealed access way is likely to be safely provided for with lower elevations.

- The facility and services that can be provided will be more proximally located to where beach users are being channelled, requiring less transportation of equipment and people to activate and manage the beach.
- Transportation of injured persons along the undulating and often bumpy shoreline is less if the lifesaving facility is more proximal to the main beach user area.
- The lifesaving facility and benefit to the community is likely to be enhanced if it is proximal to the public open space and formalised recreational and/or commercial areas.
- Public are more likely to enter at and remain positioned near this section of the beach if the lifesaving facility is also located proximal to the recreational space.
- Despite the developer having limited or no responsibility for the beach area south of the Amberton Beach development boundary, any lifesaving service will by default have to take responsibility for beach users along this stretch of coastline. The placement of a facility nearer the southern boundary of the Amberton development will enable lifesaving services to better manage beach users that seek to use this stretch.
- The natural bluff provides excellent observation and surveillance to the north and south.

An outpost facility will allow remote surveillance and lifesaving service to be planned and implemented well before the development of a community regional lifesaving facility at Alkimos beach. As access to the beach is provided via through roads, parking and beach access paths, the outpost will also allow lifesaving and response services to be implemented at Amberton Beach. These may initially commence as a surveillance and response service only which could readily escalate to an on beach prevention and rescue service.

Typically, a lifesaving and surveillance outpost facility should have in summary the following form and function:

1. Have sufficient elevation that provides vision of the shoreline and ocean when streamed from an automated camera or when a trained lifesaver is insitu.
2. Provide for the secure storage of lifesaving, rescue and emergency care equipment:
 - i. Jet Ski and trailer.
 - ii. ATV (All-Terrain Vehicle).
 - iii. 2 x Rescue Boards.
 - iv. 2 x Rescue Tubes.
 - v. First aid kit.
 - vi. Stretcher and spinal board.
 - vii. Oxygen Resuscitation equipment.
 - viii. Semi-automated defibrillator.
 - ix. Communications equipment (handheld RF radios, tablets).
 - x. Beach hazard and warning signs.
 - xi. Emergency Response Point.
3. Provide for an area to enable first aid and prolonged pre-hospital care treatments.
4. Have sufficient GPO and electrical access to:
 - i. Re-charge equipment.
 - ii. Operate tablets and telecommunication devices.
 - iii. Operate temperature control equipment.
 - iv. Provide adequate illumination of spaces, with illumination relevant to the space required, including external to the facility.
5. Have appropriate telecommunication and data access within the building and to the highest point of the facility.
6. Have appropriate storage cabinets for:
 - i. Emergency care equipment and medical supplies.
 - ii. Storage of up to 100L of unleaded fuel.
7. Have appropriate access to water for maintenance of equipment, including drainage space and wash down area.



8. Allow a one direction entry/exit into the storage space for plant and equipment.

Should Stockland accept this recommendation SLSWA can provide a more detailed outcome statement on the form and function of a facility of this type.



Note: 700m foreshore area of Amberton with Southern Boundary identifier



= Indicator of Southern Boundary of Amberton

1.2.4 Education and Awareness Programs

Education and awareness programs for residents, especially school aged children, and tourists alike have been shown to be effective in mitigating risks at aquatic coastal locations.

This Section highlights and tables the SLSWA BeachSAFE initiative in addressing education and awareness pertaining to improved coastal aquatic recreation. When consistently implemented it will assist to build the capacity of the community to mitigate these risks.

Education and awareness programs currently delivered within the City of Wanneroo have been identified so they can be mapped and built upon. Stockland should cooperate with The City of Wanneroo and give strong consideration to actively investing in coastal aquatic safety education and awareness programs to improve coastal aquatic risk mitigation at Amberton beach. This strategy should seek to provide opportunities to undertake safe aquatic activity at any beach location within the City of Wanneroo.

For more information on education and awareness programs please refer to Section 4.2.8.

1.2.5 Monitoring and review

Monitoring and review provides information on the extent to which risk treatment options are meeting their objectives, new hazards and risks being identified in a timely manner and evolving strategies being developed in line with community expectations.

Monitoring and review activity should not be limited to maintenance programs and should actively seek to record and analyse objective data relating to the how, why, what and when Amberton beach is being used, so that objective decisions and medium to long term planned strategies can be developed by Stockland to assist in managing coastal aquatic and recreational risk at Amberton beach.

Please refer to Section 4.2.12 for more information on monitoring and review.

1.3 SUMMARY OF KEY RECOMMENDATIONS

Recommendations made in this report look at the broader context of coastal aquatic safety and make assumptions that the risk need to be mitigated no matter where the line of responsibility exists for management of the foreshore reserves. If the owner of the report is not the responsibly body for the considerations, implementation and management of risk treatments then the recommendations should be shared with the likely owner of the risks and associated treatment options (i.e. City of Wanneroo).

The following recommendations are also made noting that there is currently no formal public beach access to the Amberton coastline and that the recommendations can be investigated closer to public access being provided.

1.3.1 RECOMMENDATION 1

Engage broader input into beach safety issues along the coast through periodic inclusion of other representative groups such as City of Wanneroo Ranger Services, Residential Representative Groups, Volunteer Marine Rescue, Local Surf Life Saving Clubs and Local Police.

1.3.2 RECOMMENDATION 2

When developed and constructed, identified hazards specific to access tracks should be removed where appropriate. Access tracks that are no longer in use, unnecessary or that lead people to any high-risk location/s should be considered for closure. If closure cannot be achieved then barriers should be installed to restrict or discourage access.

1.3.3 RECOMMENDATION 3

The party responsible for implementing and maintaining beach accesses and therefore communication of risk (i.e. aquatic safety signage) must implement an inspection regime to assess the installation, adequacy and visibility of in-situ aquatic and recreational safety signage. Records of the inspections and actions should be maintained.

1.3.4 RECOMMENDATION 4

The number of individual signs at any one location should be maintained to a minimum, wherever possible. A single point of information for warning, regulation and information signage reduces confusion and visual pollution.

1.3.5 RECOMMENDATION 5

The party responsible for implementing and maintaining beach safety signs adopts and maintains Emergency location signage identifiers, as shown in the National Aquatic and Recreational Signage and Style Manual (NARSSM).



These should be incorporated into any new safety signage at Amberton beach. This should be done in consultation with relevant emergency services agencies.

A numbering system will need to be developed and adopted by the City of Wanneroo. Future municipal/residential developments need to be taken into account (to avoid out of sync codes/location identifiers associated with future developments).

1.3.6 RECOMMENDATION 6

The party responsible for implementing and maintaining coastal aquatic beach safety should carefully consider the implementation of electronic surveillance/monitoring solutions, including, but not limited to, recorded closed circuit television (CCTV). This system should form part of a lifesaving surveillance and outpost facility.

1.3.7 RECOMMENDATION 7

The party responsible for implementing and maintaining coastal aquatic beach safety should develop, implement and review Emergency Action Plans (EAPs) for Amberton beach. This activity is to assure a coordinated response to localised coastal emergencies at Amberton beach.

The EAPs should take into account the difficulties in accessing locations, delay of response and the inherent risks of the locations.

1.3.8 RECOMMENDATION 8

The party responsible for implementing and maintaining coastal aquatic beach safety should, in association with other water safety and emergency response organisations develop a planned and adequately resourced approach to improving long term education and awareness opportunities as they relate to safe aquatic recreation at Amberton beach.

1.3.9 RECOMMENDATION 9

Stockland to fund and develop a resident beach safety booklet or flyer to be distributed to new home owners in the Amberton development. This booklet will contain beach safety information specific to Amberton beach.

1.3.10 RECOMMENDATION 10

The party responsible for implementing and maintaining coastal aquatic beach safety should implement the use of Quick Reader (QR) codes on aquatic and recreational safety signage at Amberton beach. Users of this technology are taken to coastal aquatic safety information and in languages and translations that are relevant to their culture and language. The use of QR codes should form part of any aquatic education and awareness programs.

1.3.11 RECOMMENDATION 11

The party responsible for implementing and maintaining coastal aquatic beach safety should consider, and where practicable, implement engineered options to minimise the risks associated with dune and beach scarping presenting a risk of tunnelling, sand collapse and falls, or access to rock overhang areas.

1.3.12 RECOMMENDATION 12

The party responsible for implementing and maintaining coastal aquatic beach safety should consider that vegetation species planted in dune revegetation programs should be regularly monitored to ensure that they are not negatively impacting on the provision of safety and emergency services at a location. In particular the monitoring should ensure that plant foliage does not obscure vision of signs and reduce the effectiveness of the messaging.

1.3.13 RECOMMENDATION 13

The party responsible for implementing and maintaining coastal aquatic beach safety should review and continue to enhance aquatic recreation public safety injury data and information collection. This should include the collation and analyses deemed necessary to underpin accurate risk assessment and effective risk treatment plans and actions.

1.3.14 RECOMMENDATION 14

The party responsible for implementing and maintaining coastal aquatic beach safety should investigate and where practical implement activity zoning measures at Amberton beach. Zoning of incompatible activity will assist to reduce conflict and the incidence of injury by users of this location. This action can assist in directing swimmers into a safer swimming area south of Amberton beach.



2. Introduction, Scope & Context

Assessed Locations:

- 1 Alkimos-Pipidinnny-Yanchep (S) [Amberton beach]

2.1 Introduction

In 2012/2013 summer season Western Australia (WA) accounted for 10% of the national coastal rescue statistics drowning toll annually¹. In 2013 Western Australia had the second highest number of reported drowning's accounting for 20% of the national figure².

The vast majority of these fatal drowning's can be attributed to swimming/rip-currents and rock-fishing, with almost all occurring at unpatrolled locations/times, where no expert assistance is immediately available.

Accidental drowning deaths in the coastal aquatic environment can be accounted for through a number of causal factors known as the *drowning chain*.

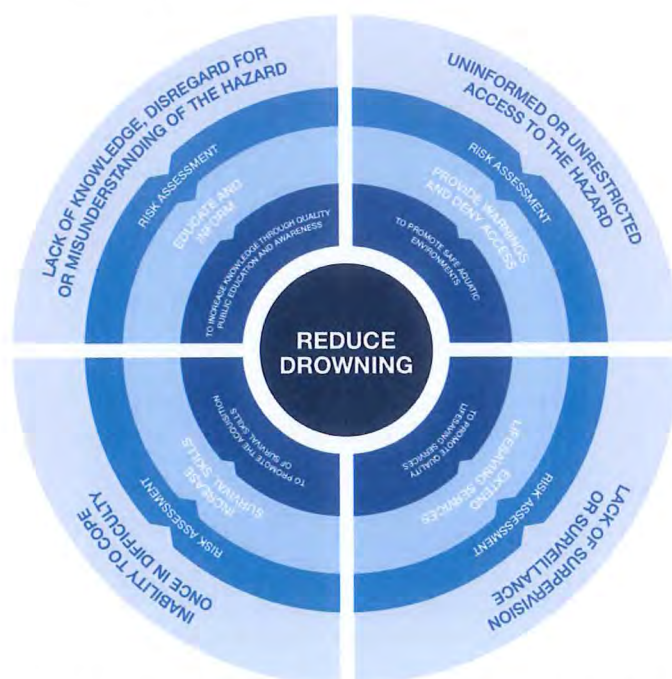


Figure 1: The International Life Saving Federation Drowning Chain (Source: ILSF Drowning Prevention Strategies, 2008)

Causal factors include:

- Lack of knowledge, disregard or misunderstanding of the hazard
- Uninformed or unrestricted access to the hazard
- Lack of supervision or surveillance
- Inability to cope once in difficulty.

Any of the above, either alone or in combination, could lead to a death by drowning. The strategies that have been identified to address the drowning chain include:

- Education and information
- Denial of access
- Improvement of infrastructure and/or provision of warnings
- Provision of supervision

¹ Surf Life Saving Australia. Annual Report 2012/13.

² Surf Life Saving Australia (2013) National Coastal Safety Report 2013. SLSA: Sydney, Australia.

- Acquisition of survival skills.

This document is a coastal public safety risk assessment and treatment plan specific to water safety related issues identified at unpatrolled locations of Amberton Beach located on the coast of Wanneroo in Western Australia.

This coastal risk assessment and treatment plan has been prepared following an on-site risk assessment undertaken by SLSWA for Stockland. The on-site assessments were based upon good practice risk management practices.

Both the on-site risk assessment and compilation of the risk assessment and treatment plan report have received contributions and input by SLSWA personnel including Mr Chris Peck, Ms Rachel Duczynski, Mr Matt du Plessis and Ms Belinda Fleay.

The identified risks are rated against a semi-qualitative assessment matrix and given a numerical value between 1 and 25, with 25 representing the highest risk and 1 the lowest. For the purposes of this risk assessment the Surf Life Saving Enterprise-Wide Risk Management – Risk Ranking Tool was used to assign risk scores and rankings.

The assessment of risks and their potential treatments are detailed in the risk register and risk treatment plan section. Risks and the potential risk treatments are grouped into one table for ease of understanding.

The risk register and risk treatment plan is a tabular summary of risks identified by SLSWA and how to possibly best deal with them. It includes a list of **potential** risk treatments as identified by SLSWA and those risk treatments identified that are already in place.

The Overview of Principal Risk Treatments section details SLSWA's recommendations for a coordinated system of access control (Section 4.2.4) and safety signage (Section 4.2.5), which reflects current good practice. Although an effective risk treatment, signage should not be the only method used in minimizing the identified risks.

2.2 Scope and Context

The risk assessment is based on available information and conditions as observed on several site visits between October 2013 and February 2014.

This report provides treatment recommendations about how to improve risk and safety management in line with current industry aquatic risk management good practices and international standards and Australian water safety signage standards.

Risk treatments are guiding recommendations only and are representative of SLSWA's opinion in relation to water safety at Amberton Beach.

Stockland in consultation with its key stakeholders should determine which risk treatments are appropriate and can feasibly be implemented at Amberton Beach.

2.3 Definition of Terms

The following is a summary of the definition of key terms used within this report.

ABSAMP means the Australian Beach Safety and Management Program.

Emergency Action Plan, means a plan that outlines the procedures to be used in the event of an emergency.



Fringe, means the periods between the summer school holidays and both the spring and autumn school holidays, excluding the actual school holidays and Easter. The fringe season is usually characterised by periods of high level beach activity on weekends and public holidays and medium level beach activity on week days.

Hazard, means a potential to threaten human life, health, property or the environment.

Hazard symbols, means a graphical symbol used together with a safety colour and safety shape to form a safety sign.

Lifesaving Service, means an organised and structured service comprised of volunteer lifesavers and/or paid lifeguards and appropriate rescue and first aid equipment supported by a coordinated backup team.

Off peak, means the winter period generally from May through to August and which traditionally has low levels of beach activity.

Peak, means the spring, summer and autumn school holiday periods, and Easter where not included within the autumn school holiday period. The peak season is usually characterised by a high level of beach activity on all days.

Observation tower, means an elevated platform from which provides a lifesaver or lifeguard with an unobstructed view of an area of water and/or beach from either a seated or standing position.

Recreational waters, means those natural waters used not only swimming, windsurfing, and water-skiing, but also for boating and fishing.

Rescue, means to withdraw, remove, free, save or deliver from a state of exposure to a hazardous or potentially hazardous event.

Rescue watercraft, means a watercraft designed and used for rescue; in this instance the rescue of people.

Rip, (aka rip current) means channelled currents of water flowing away from shore, typically extending from the shoreline, through the surf zone, and past the line of breaking waves.

Risk Register, means a table summarising the identified risks, the location, why it has been identified as a risk, what current treatments are in place to lessen the risk and an overall hazard rating.

Risk Treatment Plan, means a table summarising how to deal with the identified risks, including a list of potential risk treatments, the risk treatments currently and any residual risk.

SLSC, means a surf life saving club from which seasonal volunteer based lifesaving services are provided.



2.4 Report Authors

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3. Assessment Methodology

Assessed Beaches:

- 1 Alkimos-Pipidinnny-Yanchep (S) [Amberton]



3.1 Site Identification

Beach WA 893 commences on the northern side of the sandy foreland initially curving to the north for 1.5km to the lee of the prominent Amberton wreck, then continues north-northwest for another 6.5km past Pipidinny Beach and the southern side of Yanchep to the beginning of the Yanchep beachrock. The beach totals 8.3km in length with vehicle access at Pipidinny and Yanchep, as well as 4WD tracks backing most of the beach.

Amberton Beach is a relatively wide beach (40-50m) and for most of its 700m length is backed by a 10-20m high foredune. There is some evidence of dune erosion at the informal access points through the dunes with some dunes being well vegetated with minimal signs of erosion. The area surveyed in regards to the Amberton development starts just north of the Shorehaven development and continues north along the coast for approximately 700m. The northern section of Amberton Beach and for approximately another 1.3 kilometres north to Pipidinny Road is littered with rock platforms at the shoreline and in the water creating a series of hazards for swimmers and beach goers. The southern section of the beach (extending for approximately 200m from the southern boundary of the Amberton development) is largely sandy with significantly less or no rock platforms and would potentially be the best location for a designated swimming zone for beach users (refer to Appendix C).

Information and documentation has been provided to SLSWA to review in the completion of this report. The documentation provides context to coastal planning policies and plans that broadly guide any coastal development. In some instances district and local plans have specific reference to the beach development along the Alkimos- Pipidinny and Yanchep foreshore and in particular the placements of a Lifesaving facility, of relevant form and function, alongside other coastal node infra-structure or facilities. As the Amberton Beach development grows and matures within the context of the regional development of the Alkimos – Eglinton area, in the opinion of SLSWA, it is likely to attract local residents and other users to Amberton Beach. In the documentation reviewed by SLSWA it appears there is consistency in statement that Surf Life Saving facilities are a key consideration in any coastal development. In the broader context of Amberton Beach being a local beach but very much a part of a coastal stretch that is regional in designation, SLSWA identify that Amberton Beach will require a lifesaving and surveillance outpost to service the local beach use and the overflow that is likely to result from Amberton being a part of a broader regional beach development (within Alkimos –Eglinton).

Review of the following documentation provides the strategic context in which the development is being activated and confined;

1. Draft Perth Coastal Planning Strategy (December 2008).
2. City of Wanneroo Draft Coastal Management Plan. Part 1. July 2012.
3. City of Wanneroo Local Laws. Local Government Act 1995. Dog Act 1976. City of Wanneroo Animal Local Law 1999.
4. Identification of subdivision, timing of release and expected population.
5. Stockland Communities (Amberton) Pty. Ltd. Amberton Coastal Setback Assessment.
6. Eglinton Marina – Comments for local structure plan.
7. Eglinton Local Structure Plan.

3.1.1 Swimming

The beaches in the Amberton area are not easily accessible for swimming as the site is un developed with a lack of direct beach access. Access is generally via any of a series of 4WD tracks, or from Pipidinny Beach or Yanchep area in the north. There is currently no direct access and supporting infrastructure (paths/stairways, car parks, amenities, ablution facilities). The origin of users is unknown, but is likely to be a combination of local residents and visitors to the area. As access becomes more prevalent and formalised it is likely new members of the Amberton community will become frequent users of Amberton Beach.

The Amberton beach area is generally considered a suitable beach for swimming under average conditions; however, this can change depending on the prevailing swell, wind direction and strength, tide position, time of the year and ultimately the fitness and capability of each individual beach user. There is a large section of beach at the northern end of Amberton which is exposed to rock platforms in the surf and swash zone. Beach users should be discouraged from swimming in this area.

3.1.2 Surfing

Surfers are known to visit the area, however not in the same numbers as the more accessible beaches further north (the Spot) and south. Access is via a series of 4WD tracks which, in itself, presents hazards due to the poor conditions, range of visibility and gradient of some areas of the track. There are no facilities or infrastructure behind the beach.

The wreck of the Amberton and the surrounding reefs are known to be more frequented by surfers than the beach; however, a boat is usually required to access these surf breaks. It is highly likely that as the development is opened with roads and access paths a range of recreational beach and aquatic users are more likely to use this area of coastline such as:

- Kite surfers
- Wind surfers
- Ocean paddlers
- Water walkers
- Fitness groups

3.1.3 Fishing

There is first hand and anecdotal evidence that fishing occurs along this area of coastline, however similar access issues as those confronting swimmers and surfers are present. Historically, this area is accessed by beach fisherman when four wheel drive access was frequent and available.

The rocky sections of beach to the north are likely to be frequented by fisherman as beach visitation rates increase. Signage is recommended to warn fisherman of the hazards (slippery and uneven surfaces, dumping waves). Zoning is advised to separate swimmers and fishers and is another reason to discourage swimmers from using these areas.

3.1.4 Beach/Track Walking and Recreation

There are no existing formal tracks in the area, however 4WD tracks are abundant.

During site visits by SLSWA, 4WD access was witnessed.



Figure 2: Overview of Beach WA 893 and specifically highlighting the Amberton beach development frontage (yellow line) (Google Earth)

This report systematically progresses through the risk management steps with regard to Amberton Beach.

3.2 Site Inspection

Site visits were completed on the following dates:

Location	Date
Alkimos-Pipidiny-Yanchep (S) [Amberton Beach]	29 th October 2013 7 th , 8 th and 18 th November 2013 18 th February 2014

At no time during the inspection was the water entered. The inspection area was limited to the area outlined within the 'Site Identification' section of the report.

All inspections were performed from the land, along the edges of the water, along the rocks outcrops, headlands, and pertinent access tracks and informal access points.

3.3 Hazard Identification and Risk Assessment

During the site inspection hazards were identified within the area inspected and assessed in terms of their individual risk to public safety (extreme, high, medium, low) using a risk assessment matrix (see Appendix B). The risk assessment matrix considers both the type of

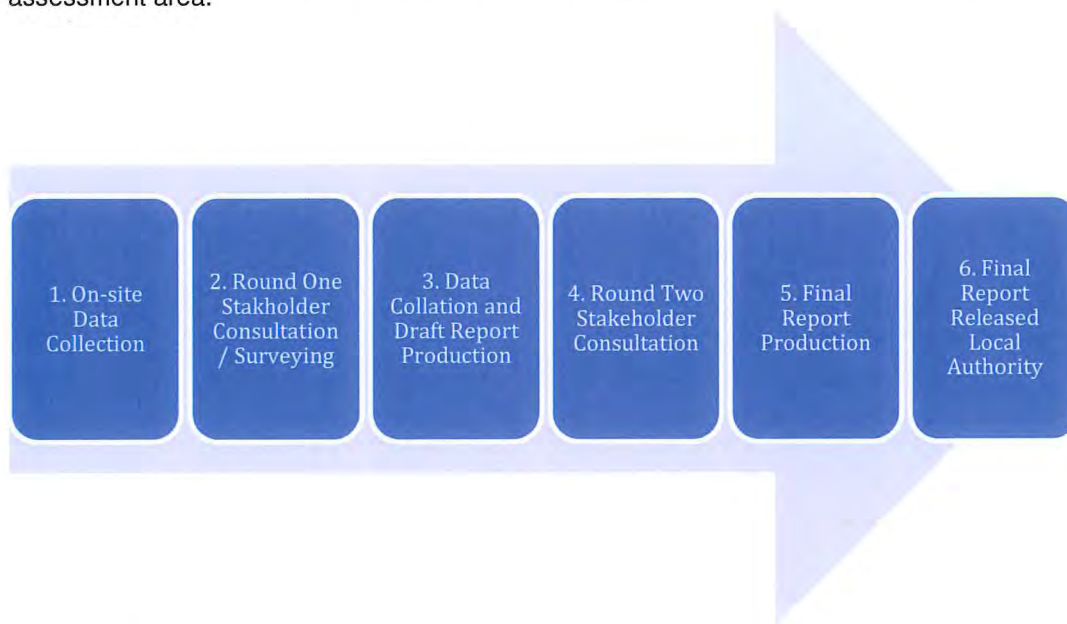


harm that could be sustained as a result of an individual hazard and the likelihood of this harm actually occurring. The matrix is not specific to Stockland risk tolerances.

International Life Saving (ILS) endorses the Surf Life Saving Australia (SLSA) Aquatic Public Safety Risk Assessment program. The methodology is as follows:

1. Determine the minimum acceptable level of risks and potential injuries through completion of a risk assessment in accordance with recognised guidelines and standards.
2. Provide economically sustainable risk mitigation options
3. Provide recommended staging plans considering the environmental conditions, forecast settlement areas, beach access and usage
4. Review the status of aquatic safety and signage management
5. Evaluate the level of compliance or noncompliance with relevant regulations and standards
6. The assessment will include reference to:
 - a) The Australian Beach Safety and Management Program (ABSAMP)
 - b) The Australian Coastal Public Safety Guidelines
 - c) Beaches of the Australian Coast-A guide to their nature, characteristics, surf and safety
 - d) The National Aquatic and Recreation Signage Style manual
 - e) Relevant standards including AS/NZS 2416:2010 Water Safety Signs and Beach Safety Flags (Parts 1, 2, 3) and AS/NZS ISO 31000:2009 Risk Management-Principles and Guidelines; and
7. Consult with relevant community stakeholders including volunteer surf life saving services and other community organisations involved in or impacted by beach safety

The diagram below shows the steps involved for the Project. These steps were repeated for each assessment area.



3.4 Data Analysis

Data relevant to risk assessment has been considered in the production of this report. This includes:

- News and media information
- SLSA Incident Reporting Database
- National Coronial Information System
- Coronial recommendations
- City of Wanneroo future local development
- City of Wanneroo beach usage statistics
- City of Wanneroo community profile data
- On-line local community survey
- Formal and informal interviews with identified stakeholders

All of these areas, factors and associated data have been taken into consideration within the risk register and risk treatment plans.

3.5 Beach Hazard Ratings and Overview

The hazards present at any given beach are very often determined by its geomorphology and the impact of water and weather conditions. Therefore it is important for land managers to understand the risks presented by these hazards. Since the late 1980s, Surf Life Saving Australia and the University of Sydney have partnered to identify the beach hazard ratings of every known beach in Australia.

The ABSAMP (Australian Beach Safety and Management Programme) was developed by Professor Andrew Short from the University of Sydney Coastal Studies Unit in conjunction with Surf Life Saving Australia and the State Associations. The programme has identified coastal hazards that affect bathers and rates the safety of the beach on a scale of one to ten, where one (1) is the least hazardous and ten (10) is the most hazardous.

The beach hazard ratings and definitions are provided in Table 1 below.

Table 1: ABSAMP Beach Hazard Ratings

Hazard Rating	Details
1 - 3	<u>Least Hazardous</u> : Low danger posed by water depth and/or weak currents; however, supervision still required, in particular for children and poor swimmers.
4 - 6	<u>Moderately Hazardous</u> : The level of hazard depends on wave and weather conditions, with the possibility of strong rips and currents posing a moderate risk.
7 - 8	<u>Highly Hazardous</u> : Experience in strong surf, rips and currents required, with beaches in this category considered dangerous.
9 - 10	<u>Extremely Hazardous</u> : Identifies beaches that are considered extremely dangerous due to strong rips and currents, and large breakers.

The beach hazard rating is calculated by determining the beach type and wave height. This can be done under either modal (average) or prevailing (current) conditions. The beach hazard rating is then calculated by using the following tables:

Table 2: Beach hazard rating calculation matrices for wave dominated beaches.

Wave Height \ Beach Type	< 0.5 (m)	0.5 (m)	1.0 (m)	1.5 (m)	2.0 (m)	2.5 (m)	3.0 (m)	> 3.0 (m)
Dissipative	4	5	6	7	8	9	10	10
Long Shore Bar Trough	4	5	6	7	7	8	9	10
Rhythmic Bar Beach	4	5	6	6	7	8	9	10
Transverse Bar Rip	4	4	5	6	7	8	9	10
Low Tide Terrace	3	3	4	5	6	7	8	10
Reflective	2	3	4	5	6	7	8	10

It should be noted that the beach hazard ratings presented in this report relate to modal beach conditions and as such the hazard rating of a beach may increase when conditions alter *e.g.* with increasing wave height, winds, strong tides and high tide.

Furthermore, a hazard rating is also applied to an average person and therefore depending upon an individual's own skill, understanding and competence in relation to a certain area the hazard may in fact be greater or less.

The ABSAMP hazard ratings for the inspected areas of Amberton Beach are detailed within the next section of the report.

3.6 ABSAMP Beach Types and Ratings for Amberton Beach

The ABSAMP Hazard Rating for Amberton Beach is listed in Table 3. The table provides an ABSAMP rating and descriptive label/name type for each specific beach location.

Table 3: ABSAMP Beach Hazard Ratings – Amberton

Location Name	ABSAMP no.	ABSAMP Rating	ABSAMP type
Alkimos-Pipidinny-Yanchep (S) [Amberton beach]	WA 893	4	Reflective plus low tide terrace

3.7 ABSAMP Beach Type Characteristic Overview and Hazards for Amberton Beach

Amberton beach characteristics and associated hazards are:

Table 4: Table description of Reflective Beach Type

Beach Type	Details
Reflective Beach (R) plus Low Tide Terrace (LTT)	Summary – Reflective Beach and Low Tide Terrace <u>Characteristics:</u> Consists of waves that tend to reflect back off the beach with 0.0m-1.0m breakers. These beaches generally only occur on very low wave beaches and on harbor beaches. <u>Hazards:</u> Normally the safest for bathing, apart from deep water close inshore and when the shore break is higher during periods of high wave conditions. <u>Beach Hazard Hints:</u> Caution as a steep beach and abrupt drop off to deeper water can make access hazardous for the young, elderly or infirm/disabled.
	Reflective Beach Characteristics: Reflective sandy beaches lie at the lower end of the wave dominated beach spectrum. They are characterized by relatively steep narrow beaches usually composed of coarser sand. On the WA open coast, sandy beaches require waves to be less than 0.5m to be reflective. For this reason they are normally found at entrance to bays, at the lower energy end of some ocean beaches and in the lee of the many calcarenite reefs and rock platforms. Reflective beaches always have a steep, narrow beach and swash zone. Hazards: Reflective beaches usually offer relatively safe swimming conditions due to the low waves and generally protected locations. Changing waves and currents can produce a number of hazards to both swimmers and surfers. These are summarised: • Steep, soft beach face may be a problem for toddlers, the elderly and disabled people, • Relatively strong swash and backwash can knock children and unwary people off their feet, • Swash zone step can cause a sudden drop off from shallow water into deeper water, • Deep water – the absence of a sand bar means deeper water close into shore, which can be a problem for non-swimmers and children, • Surging waves and shore break – when waves exceed 0.5m they break increasingly heavily over the step and lower beach face. The can knock unsuspecting people over. If swimming seaward of the break, swimmers may experience problems returning to shore, • Most hazardous when waves exceed 1m and shore break becomes increasingly powerful; and • When fronted by a rock platform or reef, additional hazards are associated with the presence of rock/reef.



	Summary: Reflective beaches present low hazards under low wave conditions, provided users are <u>competent swimmers</u> and experienced at swimming in the surf. Parents/guardians need to monitor children carefully due to the proximity of deep water to the shore. A hazardous shore break and strong surging swash is commonly present where waves are greater than 1m in height.
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Beach Type	Details
	<u>Low Tide Terrace</u> Characteristics: Low Tide Terrace beaches are the lowest energy intermediate beach type and the most common intermediate type in Western Australia. These beaches occur on the open coast where the sand is fine to medium and wave height averages between 0.5m and 1m, and particularly where near shore reefs and headlands lower waves to less than 1m at the shore. Low Tide Terrace beaches are characterised by a moderately steep beach face, which is joined at the low tide level to an attached bar or terrace. The bar usually extends between 20m and 50m seaward and continues along shore, attached to the beach. Mid tide conditions result in water being returned seaward, both by reflection off the beach and via the mini rips, even if no rip channels are present. The rips are usually weak, ephemeral (short-lived) and shallow. Hazards: Low Tide Terrace beaches are the least hazardous of the intermediate beaches because of their characteristically low waves and shallow terrace. Changing wave and tide conditions produce a number of hazards to both swimmers and surfers. These are summarised: • High tide: deep water close to shore; behaves like a reflective beach, • Low tide: waves may plunge heavily on the outer edge of the bar, with deep water beyond. Extreme care should be taken if body surfing or body boarding in plunging waves – the consequence is likely to be spinal injuries, • Mid tide: more gently breaking waves and waist deep water; weak mini rips return some water seaward, • Diving: care is required if diving into the surf as the water is usually shallow and can result in head/spinal injuries, • Higher waves: mini rips increase in strength and frequency, and may be variable in location; and • Oblique waves: rips and currents are skewed and may shift along the beach, causing a longshore and seaward drag Summary: Low Tide Terrace beaches are most hazardous at mid to high tide when waves exceed 1m and are oblique to shore, e.g. during summer when the winds are stronger.

3.8 Facility Visitation Rates (FVR) for Amberton Beach

The Facility Visitation Rate (FVR) is a term, which has been developed to provide a quantitative assessment that can be used to determine the most appropriate signage schedule for a facility (venue or location). The FVR is calculated using data collected during the assessment process and includes site population use, and frequency of use. As the FVR calculation is used to determine aquatic recreational warning signage requirements the figures used are those of the peak period of beach usage. The following calculation is derived using:

- I. Stakeholder observation, consultation and feedback relative to the table values outlined, and;
- II. Utilisation of the Facility Visitation Rate (FVR) formula, where:

$$\text{Facility Visitation Rate} = (\text{ABSAMP Rating} \times \text{Population}) + \text{Frequency}$$

The values and calculations are outlined as follows:

Table 5: Facility Visitation Rates – Amberton

LOCATION NAME	ABSAMP RATING	*	POPULATION	+	FREQUENCY	=	FVR
Amberton-Pipidinny-Yanchep (S) [Amberton beach]	4	*	1	+	1	=	6

Given the FVR scores, shown in the above table, listed below is an outline of the most appropriate sign characteristics pertinent to each location:

FVR Score between 7 and 10 –

This score would generally indicate that where access cannot be controlled, entrances to the beach provided by council have signage and spaced no greater than 500 metres apart around the beach perimeter. Additionally the signage should contain the following:

- The name of the facility
- A general warning message
- All Council's Ordinances that apply to the facility should appear on the sign as prohibition pictograms
- All potential hazards identified within the facility that have a risk rating of HIGH should appear on the sign as warning symbols. If no highs then the top hazard should appear
- Any information symbols relevant to the facility

3.9 Communication and consultation

Communicating with stakeholders about risk perception and tolerance is the heart of the risk management process.

During the onsite visits for the assessment from October 2013 to February 2014, consultation with a number of stakeholders was undertaken to ensure the report process was transparent and to gain local knowledge, background and visitor statistics on the areas inspected. Stakeholder interviews were conducted with:

- Chris Peck, Community Safety Manager, SLSWA
- Belinda Fleay, Health Promotion and Research Coordinator, SLSWA
- Matt du Plessis, Lifesaving Operations Coordinator, SLSWA
- Shane Spinks, Manager Community Programs and Services, City of Wanneroo
- Tom Barry, Development Manager, Stockland
- Chrystal King, Senior Environmental Consultant, Emerge Associates
- Chris Newton, Director, Senior Landscape Architect, Emerge Associates



The process of communicating risk estimates from the assessment process to decision-makers and ultimately to the public, sometimes referred to as risk education, is only one part of the communication process.

However, in getting those affected by risk to accept risk mitigation measures, and in providing decision-makers and communities with the information they need to tolerate and deal with risks, there needs to be two-way communications that includes those affected by risk, the public, into the decision-making process.

There is a great opportunity to have this wealth of knowledge actively participate in the implementation of many of the potential risk treatment options. In particular it would be strongly recommended that the recommendations of this report are discussed on a regular basis at the City of Wanneroo coastal aquatic risk review meetings.



4. Risk Assessment Findings

Assessed Locations:

- 1 Alkimos-Pipidiny-Yanchep (S) [Amberton beach]

4.1 Action Planning Priority (Gross Risk)

It must be noted that the below calculation of action planning priority index reflects the current status of the beach. Being a greenfield site with no formal access tracks, facilities or amenities and very little housing nearby the number of beach users is minimal. This will result in a 'very low' priority index for the region. Given the proposed residential development and the associated development in the coastal region over the next 10 years, visitation rates and conflicting activities on the beach will increase. For this reason consideration needs to be given to potential numbers and incorporate this in planning of the coastal zone at Amberton.

4.1.1 Action Planning Priority Index

The action planning priority index can be viewed as the gross risk score for a beach. The index seeks to identify the risks associated with the broader coastal environment under assessment, rather than specific hazards and risks present at a particular location or site. The majority of information detailed in this section of the report will be identified through pre-existing data (where available), with new data sourced where gaps are present or the data is not reliable.

The information is based on modal data for peak visitation during the busiest season(s). Appendix D of this report is site/hazard specific and will give greater detail for local control measures best suited to local requirements, including factors such as; weather, seasonal adjustments, times, activities etc.

The action planning priority index uses the following risk identification information (RII) - (where available):

1. Australian Beach Safety & Aquatic Management Program Rating (ABSAMP Rating)
2. Local Population Rating (LPR)
3. Human/Activity Interaction Rating (HAIR)
4. Access Rating (AR)

4.1.1.1 Australian Beach Safety & Aquatic Management Program Rating (ABSAMP Rating)

The University of Sydney Coastal Studies Unit developed ABSAMP (Australian Beach Safety and Management Program) in conjunction with Surf Life Saving Australia and the State Associations. The program has identified coastal hazards that affect bathers and rates the safety of the beach on a scale of one to ten, where one (1) is the least hazardous and ten (10) is the most hazardous (see appendix A for ABSAMP beach type characteristic overview). The scales are tabled below:

Location Name	ABSAMP no.	ABSAMP Rating	ABSAMP type
Alkimos-Pipidinny-Yanchep (S) [Amberton beach]	WA 893	4	Reflective plus low tide terrace

4.1.1.2 Local Population Rating

The Local Population Rating (LPR) expands on the information obtained from the Facility Visitation Rating (RII part 2). This additional population rating identifies the population of residents and/or non-residents located within 2km's of a coastal location under assessment. The highest figure (resident or non-resident) will be recorded.



Population Rating	Qualifying Description (all staying/living within 2km of beach)	
1	< 50 residents and/or < 20 non-residents (domestic or overseas tourists)	
2	50 - 250 residents and/or 21 - 100 non-residents (domestic or overseas tourists)	
3	250 - 1000 residents and/or 100 – 500 non-residents (domestic or overseas tourists)	
4	1000 – 2500 residents and/or 500 – 1000 non-residents (domestic or overseas tourists)	
5	2500 + residents and/or 1000 non-residents (domestic or overseas tourists)	
Location		LPR Total
Alkimos-Pipidinny-Yanchep (S) [Amberton beach]		1

4.1.1.3 Human/Activity Interaction Rating

The Human/Activity Interaction Rating (HAIR) identifies any conflicts present at the coastal environment between the number of people and activities taking place. Activities include both those in the water and those on the beach. A conflict may include a passive activity such as picnicking and ball games.

Population (in-water)		Conflicting activities		Population (on beach)		Conflicting activities	
100+	5	Persistent and dangerous	5	1000+	5	Persistent and dangerous	5
75-100	4	Persistent	4	750-1000	4	Persistent	4
50-75	3	Regular	3	500-750	3	Regular	3
25-50	2	Isolated conflicts	2	250-500	2	Isolated conflicts	2
1-25	1	No conflicts reported	1	1-250	1	No conflicts reported	1

Location	Population (in water)	Conflict	Population (on beach)	Conflict	HAI Total
Alkimos-Pipidinny-Yanchep (S) [Amberton beach]	1	1	1	1	4

4.1.1.4 Access Rating

Beaches or coastal environments that have increased accessibility (i.e. near major roads, cities, public transport, car parks, boat ramps, maintained access paths etc) increase the likelihood of users at that beach. This directly increases the level of risk of drowning and or injury and should be assessed as part of a wider risk assessment.

Access Rating	Qualifying Description
1	No identifiable access via road or track, no facilities, car parking or obvious access points
2	Access via un-maintained track with no facilities and/or via water access
3	Access via any form of track or walkway (either maintained or un-maintained) AND <u>any</u> provision of facilities or services including (but not limited to) public transport, shower, public toilet, payphone, kiosk, significant roadway, parking
4	Access via maintained tracks with clearly identified parking area AND/OR provision of basic facilities (i.e. public toilets, public shower/ wash down area) AND/OR within 10km of moderate sized town or city (population greater than 5,000)
5	Clearly evident, marked or signposted and maintained access points AND/OR within 10km of major town or city (population greater than 25,000) AND / OR car parking for 50 or more vehicles/boat trailers. Public transport provided within 250m of a beach access point

Location	Access Rating
Alkimos-Pipidinny-Yanchep (S) [Amberton beach]	2

4.1.1.5 Action Planning Priority Score

The action planning priority score provides an indicator for the overall level of risk of the location. The scores range from 0 to 60. These scores can be used to prioritise the order in which risk treatments described in Section 3 of this report are implemented.

Location	AMSAMP X 2 (Out of 20)	Population Support X 2 (Out of 10)	Human Activity/ Interaction (Out of 20)	Access X 2 (Out of 10)	Total Score (Out of 60)
Alkimos-Pipidinny-Yanchep (S) [Amberton beach]	8	4	4	4	20

Two beaches have an action planning priority score greater than 40. Scores of 40 or higher indicate a high overall level of risk. Where limited resources prohibit the implementation of all risk treatments recommended in this report, those beaches that have received a high action planning priority score should be treated first, then beaches with a medium score.

Priority	Priority location	Priority Action & Total Score	Comments
1	Alkimos-Pipidinny-Yanchep (S) [Amberton beach]	20	The lower frequency and population use and low conflicting activities keep this beach and mitigation options in the very low range. As the frequency, population loading and conflicting activity increase so will the priority of action.

Key to Action
Planning Priority

High 40+

Medium 31-40

Low 21-30

Very Low 0-20



4.2 Overview of Principal Risk Treatments

4.2.1 Overview of Principal Risk Treatments

There are ranges of risk treatment options that can be considered in the context of coastal risk management. The selection of the most appropriate option involves balancing the financial, social and environmental impacts of implementing each against the benefits derived from each. These may include any combination of the following

- Spread (share) risk – insurance
- Engineer (structural and technological) risk treatment – include modified practices
- Regulatory and institutional – change through revised regulations and planning
- Avoid – isolate the risk, move people away
- Research to better understand
- Educate and inform stakeholders

4.2.2 Hierarchy of risk treatments (controls)

In determining the most appropriate and cost effective option, it is important to consider the hierarchy of risk treatments (controls). The hierarchy is a sequence of options which offer a number of ways to approach the hazard control process.

- Hard controls deal with the tangible such as
 - Eliminate the hazard which in a coastal context is often difficult to achieve
 - Isolate the hazard which in a coastal context can be difficult due to the dynamic nature of environmental and weather conditions.
 - Use engineering controls such as design of access paths, installation of appropriate signage, and revegetation
 - Use administrative controls such as supervision, emergency action plans, other documented policies, practices and procedures
- Soft controls deal with human behaviour such as:
 - Awareness and education
 - Community and individual capacity building: and
 - Use of effective leadership, management, trust, ethics, integrity, and building relationships

Outlined below are principal risk treatment solutions that expand upon those listed within the Summary of Proposed Key Risk Treatments in Section 1.2 of this report. The solutions outlined endeavour to provide specific and detailed information relative to Amberton beach; however, due to the diverse nature of location characteristics, recommendations are at times generic in nature and may extend to risk mitigation at other City of Wanneroo beaches.

Stockland, as the land manager, should endeavour to adopt the most appropriate treatments specific to their organisations capabilities, and in consultation with all relevant stakeholders.

4.2.3 Haddon's Matrix Applied to the Amberton Beach

William Haddon Jr developed a conceptual model, The Haddon Matrix, over 40 years ago. The matrix applies basic principles of public health management to the problem of traffic safety (Runyan, 1998). The framework can be applied to any source of injury.

The Table below provides an overview of countermeasures for coastal aquatic hazards, as assessed using Haddon's Matrix.

Table 6: An overview of countermeasures, as assessed using Haddon's Matrix

	Host (Beach user)	Agent/Vehicle (Water, waves, rocks)	Physical Environment (Beach, rock platform)	Social Environment (Community norms, policies, rules)
Primary: Pre-Event (Prior to the beach user entering the water)	Education to choose appropriate locations and conditions Signage Weather warning systems Systems of supervision Dune vegetation maintenance; management of beach scarping and tunnelling	Activity Zoning Maintain access points	Restrict access Install safer access Maintenance programs Remove hazards	Regulate usage at times of heightened risk Cultural resistance to swimming at patrolled locations
Secondary: Event (Once the beach user has entered the water)	Provision of survival skills - education Swimming skill development Systems of supervision	Appropriate clothing/equipment Activity Zoning	Emergency Response Beacons / Alarms / Phones	Use of PFDs while engaging in other aquatic activity (especially if inexperienced)
Tertiary: Post Event (Once the beach user is in difficulty and requires assistance)	Education to teach others how to assist or advise the patient CPR and first aid Basic rescue techniques Systems of supervision	Public Rescue Equipment	Emergency markers Install better access for emergency services Emergency alarm/alert devices/systems	Improve response of emergency services Prompt/timely notification of an emergency

4.2.4 Beach Access and Public Amenity

The provision of access to the coast is a major contributor to the creation of risk in that access methods will guide people to the area and to any hazards that may be present. Access treatment, or otherwise, is a major contributor to managing coastal risk.

Currently there are no formal access tracks in place in the Amberton coastal zone, however there were a number of informal 4WD tracks observed during site visits (Figure 3). A full detail of access tracks observed at Amberton beach can be seen in Appendix F.

SLSWA has assessed the southern boundary of Amberton beach (proximal to the area 31°35'55.75"S, 115°39'7.84"E) (refer to Appendix C) to be the most suitable location for a recreational and leisure beach. In order to direct swimmers and beach users to the safest areas the southern boundary is recommended as the site for the primary access points and associated infrastructure.

This area is optimal as it has:

- Less exposure to submerged rocks and reef along the shoreline and in the surf zone
- A more gentle gradient in to the water with an extended bank
- Lower dune elevation

These characteristics will create a more positive experience for swimmers and beach users and make entry and exit of the water easier and safer. The lower elevation of the dunes at the southern end will potentially allow for the construction of a multi-use access path for pedestrians, disabled and emergency service and other approved vehicles.

With the existence of public access infrastructure (defined and open access), and amenities comes the necessity to maintain existing infrastructure/capital works and further develop infrastructure to match that of the growing and changing community/stakeholders' needs. A key outcome of the implementation of access tracks and safety signage is the need for a periodic inspection, maintenance and replacement program.

Access tracks will require periodic inspection and maintenance. Common issues include sand drift, overgrown vegetation, degraded footings and damaged fencing. Continual upkeep of defined access paths and associated barriers, including the grading of access paths and sweeping of stairs/steps will ensure continued usage of formal tracks and prevent the creation of additional hazards.

Once defined access tracks have been developed any informal tracks should be closed off. Fences along the base of dunes on the beach and road side would help prevent future use of these tracks, stop the creation of new tracks and also help protect the dunes from further erosion. Revegetation of the dunes in these areas is also advised to deter use of the informal tracks and improve the stability of the dunes.



Figure 3: Example of an informal access track observed at Amberton Beach

RECOMMENDATION 1

Engage broader input into beach safety issues along the coast through periodic inclusion of other representative groups such as City of Wanneroo Ranger Services, Residential Representative Groups, Volunteer Marine Rescue, Local Surf Life Saving Clubs and Local Police.

RECOMMENDATION 2

The party responsible for implementing and maintaining beach access should identify hazards specific to access tracks should be removed where appropriate. Access tracks that are no longer in use, unnecessary or that lead people to any high-risk location/s should be considered for closure. If closure cannot be achieved then barriers should be installed to restrict or discourage access.

4.2.5 System of Safety Signage

A coordinated approach to signage, with strategically placed signs which are clearly visible, is a very important part of and the first stage toward more effective coastal aquatic risk management.

Due to the undeveloped nature of the Amberton site there are currently no formal tracks in place to access the beach, understandably there is no signage either. As the Amberton coastal zone is developed SLSWA advise Stockland to install informative and hazard signage at all access points, on entry roads and at individual hazards (refer to Appendix E). Emergency markers are also recommended at each access track to aid emergency services in the case of an incident. Once paths, roads and other infrastructure is in place SLSWA can undertake a signage audit to advise on types of signage and the exact GPS locations of these.

Examples of suitable future signs include:

- Beach and aquatic safety signage
- Location signage
- Marine zoning signage
- Signage relating to location of toilets/disabled access
- Signage relating to location of nearest lifesaving service
- Local government regulation signage
- Environmental and conservation signage
- Dune management signage
- Community information signage including safety, security and crime prevention.

RECOMMENDATION 3

The party responsible for implementing and maintaining beach access and therefore communication of risk (i.e. aquatic safety signage) must implement an inspection regime to assess the installation, adequacy and visibility of in-situ aquatic and recreational safety signage. Records of the inspections and actions should be maintained.

RECOMMENDATION 4

The number of individual signs at any one location should be maintained to a minimum, wherever possible. A single point of information for warning, regulation and information signage reduces confusion and visual pollution.

RECOMMENDATION 5

The party responsible for implementing and maintaining beach safety signs adopts and maintains Emergency location signage identifiers, as shown in the National Aquatic and Recreational Signage and Style Manual (NARSSM). These should be incorporated within existing safety signage at Amberton beach and the City of Wanneroo beaches generally. This should be done in consultation with relevant emergency services agencies.

A numbering system will need to be developed and adopted by the City of Wanneroo. Future municipal/residential developments need to be taken into account (to avoid out of sync codes/location identifiers associated with future developments).

Below are examples of the types of signage and hazard symbols to be installed at Amberton Beach.

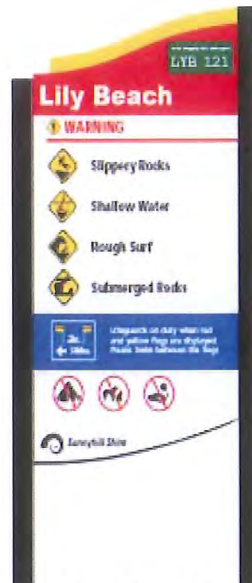


Recommended Signage Types

Provided below are examples of the types of signs recommended within each of the coastal aquatic locations.



Level 3: Defined Access
Type B: 3 or 4 Hazard Symbols



Level 3 Open Access/Car Park
Type C: 3 or 4 Hazard Symbols



Level 1: Road Sign



Level 4: Individual Hazard and Regulation Signs

Recommended Hazard Symbols

In reference to the hazard symbol pictorials they are listed in summary below. The alpha numerical code relates to how they are coded within *A/NZS 2416:2012 Water Safety Signs and Beach Safety Flags – Part 1 – Specifications for water safety signs used in public areas and the National Aquatic and Recreational Signage Style Manual, Third Edition*.



Swimming Not Advised (AWS,1)



Unstable Cliffs (WSW010)



Submerged Objects (WSW007)



Warning (WS,15)



Unstable Cliffs / Falling Rocks (WSW011)



Shallow Water (WSW006)



Slippery Area (WS,11)



High Surf, Large Waves (WSW023)



Slippery Stairs (WS,37)



Outfall (WSW013)



Strong Currents
(WSW015)



Deep shelving
beach
(WSW024)

Access and Signage Schedule – Access Specific Risk Treatments

The following signage schedules include existing and proposed risk treatments that are specific to accesses. These include, but are not limited to:

- **Closure (Elimination)** – involving revegetation of eroded ground and preventative measures (such as fencing and the removal of existing signage) that would prevent a reasonable person from concluding that access is provided.
- **Formalisation** – involving provision of access control measures (such as fencing and signage) that would allow a reasonable person to conclude that access is provided the desired location.
- **Maintenance** – existing signage & formal access tracks requiring maintenance to ensure they continue to provide the desired controlling of access, and ensure they do not become a hazard themselves.
- **Routine Maintenance** – Monitoring of implemented signage and formalised access to ensure a satisfactory condition is maintained.
- **Signage** – as described in “System of Safety Signage” (page 42). This may also involve the removal of non-standard signage that could cause confusion or detract from the desired purpose of standard aquatic and recreational signage.

Access and Signage Schedule – Recommendations for all signs

All signage should incorporate the following information:

- **General Information** – for example, the location and direction of the nearest patrolled location,
- **Regulations** – As required by Wanneroo ordinances,
- **Facility Manager** – If desired, the signs can incorporate the Wanneroo logo.

Emergency Location Indicators/Markers

Numbering of access tracks aids location of the incident in the case of an emergency. The City of Wanneroo must be contacted before any system of numbering is implemented to avoid out of sync codes or location identifiers associated with current or future development.



Emergency Vehicle Access to the Location

Access tracks for emergency vehicles are highly recommended. The ideal location for a main access track for vehicles would be near the allocated swimming area at the southern end of Amberton beach. Another reason why the southern section was recommended as the designated swimming zone is the reduced dune elevation. The lower dune heights allow for the construction of a vehicle access track in this location.

Those tracks that are used for emergency vehicles should be identified by appropriate signage at the nearest contact with the roadway. These signs should have an emergency location indicator/marker in accordance with the recommendations contained within this report and numbering scheme approved by the relevant emergency service providers.

Distance to closest Lifesaving Service Patrolled Area

The following signage should be used to direct the coastal users to permanent lifesaving services such as that provided by the four volunteer surf lifesaving clubs.



Where multiple signs are positioned at a location they will compete for the attention of visitors. More signs at a location not only create visual pollution, but may reduce the likelihood of any messages being understood. For this reason *A/NZS 2416:2010 Water Safety Signs and beach Safety Flags – Part 3 – Guidance for use*, provides options for the consolidation of signage onto a single multiple symbol sign. The use of such signs, in conjunction with the removal of any unnecessary signage, can reduce the overall number of signs used at a location and therefore reduce visual pollution. Most importantly, however, consolidation of signage may increase the likelihood of the messages on the signs being sighted by visitors and also may increase comprehension.

The recommended signage is, in the opinion of SLSWA, in compliance with both the Australian and International standards for Water Safety Signs and Beach Safety Flags and also mirrors the style guidance in the National Aquatic Recreational Signage Style Manual.

For more specific information on proposed signage at Amberton beach refer to Appendix E.

4.2.6 System of Supervision – Lifesaving Service Level Analysis

The direct or indirect supervision of aquatic coastal locations is often required to manage the risk of the location. The elevation in risk can be due to prevailing water conditions, the proximity to large populations of people, attendance at the beach/coastal area due to its proximity or attractiveness, seasonal fluctuations, the low capability and experience of beach users or due to the mix of activities in the same location.

The management of preventative and rescue services at coastal aquatic and recreational areas should distinguish between those areas that will receive a lifesaving service and those areas that will not receive such a service.

Levels of supervision that may be considered for Amberton Beach include:

- Beach access and point of hazard signage,
- Beach Camera streams/CCTV/ and other technologies
- Paid Lifeguard Roving Patrols,

- Paid Lifeguard in-situ services,
- Volunteer Lifesaving roving patrols; and
- Volunteer Lifesaving in-situ services;

The primary decision to be made by Stockland before establishing a lifesaving service is to decide which areas will be denoted as **guarded** (direct supervision) and which will be **unguarded** (indirect or no supervision).

A lifeguarded beach or designated safer bathing (swimming) area is one at which a trained lifesaver and/or lifeguard is stationed during prescribed times, with associated facility, plant and equipment and is designated by the erection of a pair of red and yellow flags. A mobile lifesaver/lifeguard or lifeguard vehicle that periodically visits or checks a location may be effective as a proactive prevention strategy.

Data gathering and education initiatives should not be considered as providing a guarded swimming location by either the land manager or the population served. The objective data collected; however, serves as a very important analysis and review tool to allow Stockland to make objective decisions around the cost benefits of implementing direct or in-direct supervision strategies.

Signage compliant with **AS/NZS 2416:2010 Water Safety Signs and Beach Safety Flags** is required at accessible beach locations. Signage is the first and most basic form of supervision.

Signage is known to increase the awareness of bathers at the location of the guarded/unguarded sites and the hazards present at each location, so that they may make an informed choice as to where to swim. This can be achieved through advertising in local media, and public awareness through residential, tourism and accommodation promotions.

The provision of supervision is difficult to establish, or may not be provided, for some or all of the following reasons:

- The provision of a service may encourage attendance at an unsuitable location, such as when the beach topography and morphology create a highly hazardous location,
- Difficulty resourcing lifeguards and/or lifesavers,
- Determined to be too cost prohibitive and therefore not provided by the responsible land manager; and
- The patronage of the location is low and the assessed risk level is minimal.

There is a range of aquatic supervisory services that should be considered - as one size does NOT fit all.

These include:

- **Full time Comprehensive Lifesaving Service** with appropriate levels of trained personnel, fixed and portable facilities, equipment, craft, vehicles and links to central command and emergency services.
- **Seasonal Lifesaving Service** with appropriate levels of trained personnel, portable facilities, equipment, craft, vehicles and links to central command and emergency services.
- **Seasonal Lifesaving Outpost Service with trained personnel**, portable facilities, some equipment and craft, and links to a command centre.
- **A flexible demand based service** with trained personnel which allocate resources to where they are most needed.



- **Beach Camera/CCTV recorded surveillance;**
- **Other technologies** which may include any combination of periodic monitoring, emergency response points/alerting and communication devices and on-line or other community surveys; and
- **No Service**, with the provision of safety signs and controlled access only.

VOLUNTEER LIFESAVING SERVICES

The City of Wanneroo currently provides resources to implement a comprehensive lifeguard service at two (2) ocean beaches (Quinn's beach and Yanchep Lagoon). Surf Life Saving Clubs (SLSCs) provide a voluntary highly skilled rescue service on weekends and public holidays through the patrol season. Neither of the beaches is patrolled 365 days a year.

These services collect data for days they are actively patrolling, which is logged into SLSC Surfguard database. Since Surf Life Saving Clubs offer voluntary services over wider period of time than current contracted lifesaving services, the statistics collected by these clubs can be used to quantify beach usage levels outside of the peak summer season. Even though the statistics collected by the Surf Life Saving Clubs pertain only to weekends and public holidays, it would be reasonable to expect that these figures could be used as a guide for mid-week usage, particularly during the school holiday periods.

Voluntary services provide an invaluable service to the community, and where possible should be used in conjunction with paid lifesaving services (Lifeguards) who are able to provide services throughout the week.

Currently no direct volunteer lifesaving services are provided at Amberton Beach. There are provisions for an outpost facility to be installed at Amberton Beach.

Table 7 below shows the current volunteer lifesaving service dates and times.

Table 8 below shows the current City of Wanneroo lifeguard service dates and times.

Table 7: Surf Life Saving Club patrol times

Location	Start Date	End Date	Days	Times
Quinns-Mindarie	3-Nov	30-Nov	Sun/PH (Exc Christmas)	0900 - 1500
	7-Dec	31-Mar	Sat	1000 - 1300
	7-Dec	31-Mar	Sun/PH	0900 - 1400
	1-Apr	21-Apr	Sun/PH	1000 - 1400
Yanchep	3-Nov	30-Mar	Sun	0800 - 1200

Table 8: SLSWA/City of Wanneroo lifeguards patrol times

Location	Start Date	End Date	Days	Times
Quinns	2-Dec	30-Mar	Mon – Fri (Inc Christmas)	0800 - 1300
Yanchep	2-Dec	30-Apr	Mon – Sat /PH	0900 - 1600
	2-Dec	28-Apr	Sun	1200 – 1600
	18- Apr	21-Apr	Fri – Mon (Easter)	0900 - 1600



Most likely the City of Wanneroo will be the responsible agency, long term, to meet the cost of developing and implementing a lifesaving service and this will require significant initial and ongoing financial commitment. There are a number of challenges with the Amberton beach site regarding the placement and storage of lifesaving assets and equipment to operate the service. The inclusion of appropriate infrastructure will also require significant planning, development and financial contribution to adequately support the delivery of a direct surveillance service at Amberton beach.

In the opinion of SLSWA there is not yet sufficient data or infrastructure to support the implementation of a lifesaving service to provide direct supervision of beach users at Amberton beach.

SLSWA believe the immediate and ongoing cost to support a direct surveillance service currently outweighs the benefit of investment. SLSWA believe that any investment in coastal safety for Amberton beach would be better directed to supporting the outcomes of recommendations for long term awareness and education programs and beach camera surveillance. However an outpost facility may be an option as beach visitation rates increase.

BEACH CAMERA/CCTV

Cameras through open and closed circuit television (CCTV) can aid supervision through remote periodic monitoring of screens. There are limitations as the effectiveness of this method as it is often only as good as the person watching the monitor, as well as the appropriateness of the response procedures and practices in place to respond to an alert initiated by the person watching the screen/s.

Camera streams can be effective for incident investigation and review. Beach cameras can also be used to stream a video feed to the public who can then virtually assess beach conditions prior to attending the site and make appropriate decisions regarding their attendance.

In the opinion of SLSWA the implementation of a camera stream will assist Stockland to collect additional objective evidence on beach usage and activity, population loading and the frequency of the loading at Amberton beach. This information can be analysed and used to assist in the development and planning for future risk mitigation strategies and infrastructure requirements at Amberton beach. Collection of objective data with this technology is cost effective, flexible, frequent and sensitive to seasonal fluctuations.

RECOMMENDATION 6

The party responsible for implementing and maintaining coastal aquatic beach safety should carefully consider the implementation of electronic surveillance/monitoring solutions, including, but not limited to, recorded closed circuit television (CCTV). This system should form part of a lifesaving surveillance and outpost facility.

Lifeguard service

The nature of the volunteer lifesaving service means that it is most difficult to provide a lifesaving service on days and times when volunteers may be working or studying. As a consequence it is vital that lifeguards be employed to provide a lifesaving service during these times and at locations where beach conditions and attendances dictate.

City of Wanneroo currently provides a paid lifeguard service at the following locations during peak summertime and school holiday periods:

1. Quinns Beach; and
2. Yanchep Lagoon

No paid lifeguard service is currently in place at Amberton Beach, however with development of a surveillance and outpost facility, paid services are the most logical first step.

Lifesaving Service Assessment:



The following table identifies the peak season (Summer, Autumn and Spring School Holiday periods, as defined in Section 1.3) calculated Lifesaving Service Level Scores for Amberton Beach using the ABSAMP Beach Hazard Ratings; Visitation Levels; Frequency of Use; Residency of Visitors; Incident History; and Remoteness of Location to determine best practice lifesaving service levels, and for which the information was available.

Table 9: Lifesaving Service Level scores – Amberton Beach

Alkimos-Pipidinny-Yanchep (S) [Amberton beach]: LIFESAVING SERVICE LEVEL CALCULATOR

Dates	ABSAMP Rating	Visitation Rating	Frequency Rating	Residency Rating	Incident History Rating		Remoteness Rating	Total LSSL Score
					New	Existing		
Summer – 2014/2015	4	1	1	1	0	0	4	11

NOTES TO Table 9:

Note 1: When Visitations and Frequencies are low yet rating is high consideration should be given to some form of surveillance patrols or IT solutions to overcome variations of population/visitation numbers.

Note 2*: The option to have one lifeguard on a beach is only permissible under specific circumstances, these being:

- The ABSAMP beach hazard rating is **less than 4**, or
- Access to other rescue services is **less than 5 minutes**, direct communication with services is in place, and a Rescue Water Craft is in place.

Otherwise the minimum number of lifeguards at a given location would be **two**.

Detailed analysis of lifesaving service level scores for Fringe and Off-Peak seasons have not been assessed in this report as this was outside of the scope of this assessment. SLSWA is able to provide this service; alternatively your lifesaving service provider can assist you with determining these levels.

Lifesaving service level descriptors

The following lifesaving service level descriptors provide the recommended lifesaving service level for the scores/rating as calculated in Table 9 above. The scores are not absolute and are to be used as a guide in determining the actual levels.

Table 10: Lifesaving Service Level scores

Rating	Lifesaving Service Level Description
<= 10	Warning Signage to Aquatic & Recreational Signage Style Guide standard
11-14	Emergency Beacons and/or Camera Surveillance or Swimming Enclosure (where applicable) Routine monitoring/surveillance patrols (land, sea, air) to also be considered
15-19	Lifesaving service = 1 x Lifeguard personnel during period assessed (refer to note 2)
20-25	Lifesaving service = 2 x Lifeguard personnel during period assessed
26-30	Lifesaving service = 3 x Lifeguard personnel during period assessed
31 and >	Lifesaving service= more than 3 Lifeguard personnel during period assessed

Where the number of people in the patrolled area is over 1,000, the lifesaving service provider should increase the number of lifesaving personnel in line with the following table.

Table 11: Impact of beach attendance on lifesaving service levels

No. of People on Beach	No. of additional lifeguards
1,000 - 5,000	2
5,000 - 10,000	4
> 10,000	6

Crowds can become in themselves hazardous as a result of difficulties of surveillance and heightened crowd interaction

Activity zoning

Activity zoning provides a beach management tool to isolate or separate activities that may be incompatible with the other activities or to isolate hazards or activities that are required to be contained to a particular area. Zoning of activities can be considered in lieu of direct lifesaving services establishing daily beach management plans and zones; however, compliance to the zoning may be much harder to enforce if persons of authority are not in-situ.

However, despite a direct lifesaving service not being in place the seasonal, temporary or permanent use of zoning should not be discounted by Stockland to assist in risk mitigation at Amberton Beach.

There are two ways that zoning should be applied:

- a. Confining a particular aquatic activity to a specific location; and
- b. The segregation of activities that are a risk to other aquatic users.

The activities that are most commonly zoned include:

- Swimming,
- Surf boards (stand, stand up),
- Wind craft,
- Paddle craft,
- Fishing,
- Powercraft (including personal water craft [PWC] and water-skiing),

Primary zones for water-based recreation should include:

- Kite surfing
- Sailboarding
- Surfing
- Sub-aqua
- Fishing and/or spear fishing
- Water-skiing
- PWC

Consultation with the local community is essential before putting any zoning in place.

RECOMMENDATION 14

The party responsible for implementing and maintaining coastal aquatic beach safety should investigate and where practical implement activity zoning measures at Amberton beach. Zoning of incompatible activity will assist to reduce conflict and the incidence of injury by users of this location. This action can assist in directing swimmers into a safer swimming area south of Amberton beach.



4.2.7 Existence of Coastal/Beach Emergency Action Plans

Coastal emergencies can vary between land and water, and may be the result of natural processes or human action.

A well-planned and rehearsed Emergency Action Plan (EAP) can greatly minimise the extent of injury and damage if an incident does occur.

While SLSWA and the Surf Life Saving Clubs have well-developed Emergency Action Plans for Quinns and Yanchep beaches, these plans do not extend to or have been tested at Amberton beach. The developed plans and associated procedures should give consideration to:

- The identification and response to emergencies,
- The nature and types of emergencies,
- Protocols in responding to each emergency,
- The competency and proficiency of responders,
- The type of plant and equipment required for each identified emergency,
- Emergency access to beach locations,
- Planned and scheduled training/practice opportunities; and
- Monitoring and review opportunities.

RECOMMENDATION 7

Stockland to develop, implement and periodically test the effectiveness of an Emergency Action Plan (EAP) specific to identified emergency scenarios at Amberton beach. The development and implementation of EAP's should take into account the difficulties in accessing locations and the inherent risks of the locations.

4.2.8 Education and Awareness Programs

The City of Wanneroo has a substantial base of residents that are new arrivals to Australia who many have selected to live in a suburb promising a beach lifestyle. The same can be expected in Stockland's Amberton development. The City of Wanneroo jurisdiction therefore offers a unique occurrence where many people are frequently accessing the coast and have poor water safety skills and beach safety awareness.

SLSWA recommend that Stockland and the City of Wanneroo in consultation and cooperation with education institutions and learning centres within the City's boundaries, develop a funded plan that leads to the delivery of programs with students from grades K – 10 and that serve to improve and build resilience to drowning.

SLSWA recommend the program needs to be delivered annually with some of the presentations completed by a facilitator external to that educational institution. The external facilitator must have suitable knowledge and experience in water safety and have access to resources that support the delivery of these programs.

SLSWA recommend the key outcome of this program must be to increase;

1. Awareness of key coastal aquatic safety messages and information portals, (i.e. BeachSAFE, Twitter, RecFish West)
2. Awareness of coastal aquatic recreational risks and hazards at Amberton beach,
3. Awareness of safety signage and the meaning of specific hazard symbols in a coastal setting,

4. Awareness of locations at Amberton and that lead to knowledge of the appropriate areas to undertake aquatic recreation; and
5. Awareness of the need to build individual capability to recreate in a coastal aquatic setting through participation in:
 - a. Learn to swim programs,
 - b. Swimming fitness programs, and
 - c. Surf activity and survival programs.

The development of a resident beach safety booklet or flyer with information specific to Amberton beach is another education tool. This booklet could be distributed to home owners in the area and assist in educating the wider community on the potential hazards at their local beach.

Items covered in the handbook or flyer may include:

- Beach access
- Hazards and warnings
- "Friendly" part of the beach for swimming
- Map showing beach zoning (for fishing, swimming, surfing, dog beach)
- Parking and other facilities
- Emergency Information
- Lifesaving services

Surf Life Saving Western Australia have investigated various education and awareness programs that are currently, or have been previously, in place to educate and inform beach users coming from both within and outside the City of Wanneroo boundaries, during the assessment and consultation phases of the project.

These include:

- School Education – Life Skills for Life at Mercy College (2012),
- Community Education (2012)
 - CPR Course – Irene McCormack Catholic College, Woodvale Senior High School, Mindarie Quinns Super Clinic
 - Senior First Aid – Woodvale Senior High School, Brightwater Care Group
 - Basic First Aid – Seacrest Homes, Bethanie
 - Remote First Aid – Irene McCormack Catholic College
- Edith Cowan University – Campus Surf Awareness Programs (Surf Educators Australia)

Existing programs should be regularly monitored and reviewed to confirm their effectiveness and ensure they are delivering the desired results.

A number of existing programs have been developed or are offered by various agencies, including Surf Life Saving WA that can assist Stockland to increase beach safety awareness and lifesaving skills. These programs which are imbedded in the SLSWA **BeachSAFE Initiative** include:

- **SurfBabies and SurfKids:** A six week program aimed at children from 2-7 years of age and their parents to increase awareness, confidence and safety at the beach.
- **Surf's Up:** A holiday program for participants between the ages of 7 & 10 years. Over a three day period, participants learn about and enjoy the beach environment with fun games on the beach and in the water, under the supervision of qualified Surf Lifesavers and trainers.
- **Beach Activities:** A way to educate students on the important aspects of sun and beach safety, while increasing their skills and fitness in the water and on the beach. Important safety

information is integrated into activities such as board riding, surf negotiation, swimming and beach games.

- **Life Skills for Life:** The program is an interactive two hour program designed to teach school children resuscitation and basic first aid.
- **The SunSmart SurfSmart Presentation:** An interactive PowerPoint presentation covering important topics of sun and beach safety. This includes dangers at the beach, warning signs and meanings, surf environments, identification of lifesavers, wave types, rips, sea creatures, sun protection and safety at the beach.
- **The On the Same Wave:** This program is a beach safety and awareness program aimed at people from multicultural backgrounds. The program can be tailored to suit each groups needs and includes any combination of the SunSmart SurfSmart Presentation, Beach Activities and Life Skills for Life programs using multilingual and culturally appropriate resources.
- **The Nippers Program:** Children aged 5 to 13 years participate in beach activities where they learn about beach safety, surf sports and the beach environment.
- **Indigenous Sports Program:** Aimed at educating indigenous students in rural communities by increasing their knowledge of beach safety and Basic first aid skills, through the SunSmart SurfSmart Presentation and the Life Skills for Life program.
- **The SLSWA School Cadets:** Aims to engage secondary school aged children to participate in personal development and leadership, and aims to foster qualities of community responsibility and service in the way of coastal aquatic safety.
- **The Ocean Paddling – Be Safe Project:** Aims to provide a safety framework and guidelines aimed at the recreational paddler in how to safely participate in recreational paddling activities at the WA coast.
- **The Kite Boarding – Be Safe Project:** Aims to provide a safety framework and guidelines aimed at the recreational kite boarder in how to safely participate in recreational kite boarding activities at the WA coast.
- **Community Surf Rescue Certificate:** Provides participants with the skills and knowledge of basic prevention/rescue and surf awareness in order to be able to participate in aquatic activity and supervise others; and
- **The BeachSAFE website and app:** Information portals that target at all beach users. People can find their nearest patrolled beach and check the associated hazards and recommended activities appropriate for that beach at any time. Other information is provided which allows beach users to make an informed decision about whether or not to recreate at the beach including; weather, UV index, patrol timetable, activities, beach hazard rating and beach facilities such as car parks and café's.



Table 12: Example template of education and awareness program

Program	Target audience	Location	Delivery (Who)
School based safety programs	Lifesavers/Lifeguards attending local LGA primary schools	All locations	SLSWA/Stockland
Indigenous safety awareness program	Visit by local lifesavers/lifeguards to indigenous communities to provide beach safety information	All locations	SLSWA/Stockland
Car park tickets	Use car parking ticketing to deliver key safety messages, e.g. <i>always swim between the red and yellow flags</i>	All locations	City of Wanneroo
QR Codes	Use of QR codes on signage and other infrastructure to link to location based beach safety information		SLSWA/Stockland
Media/Promotion	Use local media and promotional opportunities to deliver safety messages during the peak summer season, i.e. local newspapers, local radio, community publications and billboards Multi Media – Internet Social Media	All locations	Locally significant cultural events SLSWA/Stockland
Nipper programs	Encourage local children to join local SLSCs and take part in Nipper activities.	All locations	SLSWA and SLSCs
Surf survival program	Promote SLSAs surf survival program at local SLSCs and surf shops no tomb stoning message	All locations	SLSWA and SLSCs
Beach and ocean safety warnings	Media (e.g. Radio and TV), Internet, digital road signage, BeachSAFE, Digital information screens Edith Cowan University, SLSWA/CoW Lifeguards on local TV news doing beach reports – also promotes safety, conditions and the profile/capabilities of lifeguards and lifesavers	All locations	SLSWA and Stockland

QR Codes

There are many opportunities at present to make use of technology in innovative ways for education and awareness programs. One such opportunity is the use of smart phones to provide location based safety messaging. One method of delivering this would be to implement a system of Quick Response (QR) Codes. These codes can be included on signage and linked to specific beach safety information relating to the beach. The codes can be scanned by smart phones with freely available QR scanning applications installed, such as QR Reader on the iPhone. Below is an actual example of a QR code. This system would be relatively easy and cost effective to implement and would create opportunities for the media to increase public awareness of beach safety related issues. The Shire of Augusta-Margaret River has successfully retro fitted QR Codes to existing signage at beach access points.





Figure 4: An example of a QR Code linked to beach safety information

RECOMMENDATION 8

The party responsible for implementing and maintaining coastal aquatic beach safety should, in association with other water safety and emergency response organisations develop a planned and adequately resourced approach to improving long term education and awareness opportunities as they relate to safe aquatic recreation at Amberton beach.

RECOMMENDATION 9

Stockland to fund and develop a resident beach safety booklet or flyer to be distributed to new home owners in the Amberton development. This booklet will contain beach safety information specific to Amberton beach.

RECOMMENDATION 10

The party responsible for implementing and maintaining coastal aquatic beach safety should implement the use of Quick Reader (QR) codes on aquatic and recreational safety signage at Amberton beach. Users of this technology are taken to coastal aquatic safety information and in languages and translations that are relevant to their culture and language. The use of QR codes should form part of any aquatic education and awareness programs.

4.2.9 Public Rescue Equipment (PRE)

Public rescue equipment in coastal areas must be appropriate for the features and conditions of the coastline and water. The equipment should be easy to use by members of the public with minimal hesitation and without putting the safety of the rescuer at risk. Not only the type of PRE that is important, but also that it is positioned in the correct location and that maintenance and checking procedures are addressed and in place.

Primary considerations for the adoption of PRE at a coastal location include:

- PRE that requires the rescuer to enter the water to reach a casualty should not be used, for example a personal flotation device with line attached,
- PRE should have inherent buoyancy to support an adult casualty whilst in water,
- PRE device should be retrievable once deployed and then reusable,
- The traditional large life ring is less effective when a rescuer is required to throw rather than lower the equipment to a casualty,
- Line should float and have a breaking strain of no less than 0.5 tonne,
- The line should be no longer than 25m plus any additional drop to the water,
- PRE should be of a weight that is not overly affected by wind conditions and should not present a danger to the casualty,

- Minimum instructions should be presented in order, to reduce confusion and deployment time,
- PRE is not a suitable control measure for some types of shallow shelving beaches,
- The need for strategies to reduce the occurrence of vandalism,
 - Displacing and enforcing by-laws,
 - Electronic warning systems,
 - Awareness and education; and
 - Repositioning/removal of PRE.

Most rescue equipment that is available is for two types of rescue – reach rescue and throw rescue. This is because there is an element of danger associated with any rescue. Other rescue equipment is intended for use by trained lifeguards/lifesavers.

There is limited research, literature or guidelines available in Australia on the use of PRE. The Royal National Lifeboat Institute (RNLI) in the UK has published *A guide to coastal public rescue equipment* (2007). The New South Wales Department of Primary Industries commissioned a report titled a *Research Review of Rock Fishing in New South Wales* (2012). This report was named NSW Water Safety Research Project of the Year at the NSW Water Safety Awards in 2012. Page 47 of this report discusses tertiary prevention strategies (post event). This report also notes “Australia currently lacks a rigorous methodology or guideline for the installation of public rescue equipment”. Action item 1.16 of the report makes the recommendation to “develop, including necessary field testing, and implement a guideline for the use of public rescue equipment to ensure adequate methodology for the citing, installation, and maintenance of public rescue equipment”.

Rescue tubes are not recommended for public use for the following reasons:

1. Rescue tubes are a piece of lifesaving equipment requiring training for safe and proper use,
2. Lifeguards and lifesavers are trained to use rescue tubes in conjunction with swim fins; and
3. Rescue tubes require a rescuer to enter the water to perform a rescue and retrieve the victim by swimming back to shore.

The instalment of public rescue equipment is not recommended at this stage of development due to the lack of visitors to Amberton beach. As development of the region continues with the creation of paths, roads and other infrastructure leading to an increase in visitation rates to Amberton the use of public rescue equipment should be revised.

4.2.10 Dune Vegetation Maintenance, Beach Scarping and Tunnelling

People like to have fun on the beach and often dig holes, sculpture the sand or climb amongst the dunes. It is safe as long as people do not excavate or build structures that can collapse and bury them.

- Slopes of dry sand are extremely unstable because there is no attraction between the grains,
- Wet sand dries out quickly,
- Vibrations (from wind, waves or footsteps) can make sand slopes collapse, even when wet; and
- A tunnel or hole in sand can cave in at any time, without warning, when anyone tunnels or digs deep holes.

Dune and beach scarping has been identified as a hazard at Amberton beach fore dune, with the potential risk of tunnelling, sand collapse and fall injury.

Options to reduce the risk of tunnelling, sand collapse and falls in relation to erosion issues are limited. Some options may include:

- Individual hazard and/or temporary signage,
- Access restriction barriers (permanent or temporary); and

- Periodic monitoring of specific locations where this has been identified as a potential risk.

RECOMMENDATION 11

The party responsible for implementing and maintaining coastal aquatic beach safety should consider, and where practicable, implement engineered options to minimise the risks associated with dune and beach scarping presenting a risk of tunnelling, sand collapse and falls, or access to rock overhang areas.

RECOMMENDATION 12

The party responsible for implementing and maintaining coastal aquatic beach safety should consider that vegetation species planted in dune revegetation programs should be regularly monitored to ensure that they are not negatively impacting on the provision of safety and emergency services at a location. In particular the monitoring should ensure that plant foliage does not obscure vision of signs and reduce the effectiveness of the messaging.

4.2.11 Emergency Response Beacons, Alarms and Phones

Emergency response beacons are a mobile or fixed unit capable of providing emergency communications to high-risk unguarded localities where there is a history of fatal drowning or other coastal death. The time taken to raise the alarm and achieve an emergency service response in such locations is a contributing factor to the chance of survival. These types of units (pictured below in Figure 5) are capable of communicating over two-way radio network, GSM or fixed line network.

Public education and information as to the location of the lifesaving service, including typical response times, should be provided near/on the ERP, along with other emergency service information.

A suitable Standard Operating Procedure (SOP) and Emergency Action Plan must be developed if this mitigation strategy is adopted.

Simple and effective use of these technologies allows emergency reporting and voice information to be received by emergency communication centres using a range of technology. Field evaluation has proved the community recognises these devices, as they are common on motorways, public transport and access areas throughout the world today.

Any program initiated and supported by Stockland will need to monitor and review any malicious activations and vandalism of the device before determining this strategy as permanent.





Figure 5: An example of a mobile Emergency Reporting in place at a beach(s)

At this stage SLSWA does not recommend the installation of an Emergency Response Beacon. When the facility visitation rates and priority action score for Amberton beach increase the instalment of an Emergency Response Beacon should be revised.

4.2.12 Monitor and review

Monitoring and review activity are an important part of risk mitigation to ensure that risk treatment options are meeting their objectives, new hazards and risks are identified and addressed in a timely manner and evolving strategies are in line with community expectations.

Stockland should ensure there is a process of regular review of the effectiveness of any risk treatments implemented. This should include a process for the collection of data regarding any incidents affecting public safety.

RECOMMENDATION 13

The party responsible for implementing and maintaining coastal aquatic beach safety should review and continue to enhance aquatic recreation public safety injury data and information collection. This should include the collation and analyses deemed necessary to underpin accurate risk assessment and effective risk treatment plans and actions.

5. Actions Register

Assessed Locations

- 1 Alkimos-Pipidinnny-Yanchep (S) [Amberton beach]

5.1 Implementation Priorities

This section provides an example only of the charting and recording of actions taken in implementing a consistent risk mitigation program at Amberton beach. The actual implementation and records taken against actions is left to Stockland to confirm.

Priority 1

- Acceptance or otherwise of report recommendations to be completed by Stockland officers.
- Control measure implementation charts, to be completed and responsibilities assigned.
- Works programmes to be developed or re-affirmed from recommended control measure implementation charts, and in conjunction with relevant internal (or where appropriate) external stakeholder groups.
- High priority works to be commenced as soon as is practical.
- Communication with relevant stakeholders be maintained or increased.
- Risk monitoring practices and procedures is implemented with records retained.
- Enhanced data collection and collation procedures are implemented.
- Monitoring and review activity completed periodically and results documented.

Priority 2

Education and awareness

- Education and awareness program be identified, developed and implemented (development may be commenced earlier).

Risk Assessment Update

- An updated risk assessment to be conducted and information collected to be collated with the inclusion of relevant and up to date data collected and collated in the intervening period.

The following chart is provided as one example of how Stockland could log and manage its coastal aquatic risk management program at Amberton beach.

Table 5.1.1: Control Measure Implementation

Hazard Description (Location)	Recommended Additional Controls/Treatment Plans	Refer to section	Priority	Person responsible for implementing control measures	Complete by date	Details of action taken (date completed)	Review date
Ref			H M L				
	Amberton	Emergency Marker Sign: Stockland to identify each formal beach access track and provide each one with a unique identifier that can be posted onto access warning signs.					
	Amberton	Restrict access: Informal access points to the beach are to have barriers put in place to restrict in direct access to the beach via these locations.					
	Amberton	Education Program: SLSWA recommend that the Stockland (and land managers generally) in consultation and cooperation with education institutions and learning centres within the City of Wanneroo boundaries, develop a funded plan that leads to the delivery of programs with students from grades K -10 and that serve to improve and build resilience to drowning.					



Amberton	Residents Booklet: SLSWA recommend the development of a beach safety booklet/flyer containing coastal safety information specific to Amberton Beach to be distributed to new home owners in the area.								
Amberton	Maintained access tracks: Maintain growth of foliage from trees along formalised access tracks, especially so they do not obscure hazard warning signage. Maintain access track surface so they are evenly graded and relatively free from any significant changes in levels or rocks or boulders protruding up from the ground.								
Amberton	Emergency Action Plans: Stockland to develop an emergency action plan that specifically addresses the need to respond to emergencies that are likely to occur at Amberton beach.								
Amberton	Beach camera stream: The City of Wanneroo to install and maintain a beach camera that can be periodically monitored to collect data for beach conditions, use and activity.								



Amberton	Activity Zoning: The City of Wanneroo through its formalised policy framework actively work to separate incompatible activity through the use of activity zones (i.e. fishing, surfing, swimming, kite boarding)								
	Access and Signage: • Access paths to be clearly defined. • Appropriate safety signage be installed at the entrance to the pool • Inappropriate, damaged or vandalised signs to be replaced/removed								



6. Documentation and Reference Material



The following documentation was provided by Stockland to assist in compilation of this interim report:

- City of Wanneroo. Coastal Management Plan – Part 1 (July 2012)
- City of Wanneroo Local Laws. Local Government Act 1995. Dog Act 1976. City of Wanneroo Animal Local Law 1999.
- Identification of subdivision, timing of release and expected population.
- Stockland Communities (Amberton) Pty. Ltd. Amberton Coastal Setback Assessment.
- Amberton Marina – Comments for local structure plan.
- South Amberton Local Structure Plan.
- South Amberton Local Structure Plan
- Draft Perth Coastal Planning Strategy. December 2008.

Other documentation and reference points include:

- SLISA Australian Coastal Public Safety Guidelines (2007) 1st Edition
- Australian Beach Safety and Management Program. SLISA and Dr. Andrew Short (University of NSW). Beaches of the Western Australia Coast: Eucla to Roebuck Bay (2005). University of Sydney Publications. SLISA Coastal Aquatic Risk Assessment Process
- AS/NZS 2416.1:2010 Water safety signs and beach safety flags - Specifications for water safety signs used in workplaces and public areas (ISO 20712-1:2008, MOD)
- AS/NZS 2416.3:2010 Water safety signs and beach safety flags - Guidance for use
- National Aquatic and Recreation Signage Style Guide; Third Edition (July 2006)
- AS/NZS 2416.3:2010 Water safety signs and beach safety flags - Guidance for use
- ISO 7010: 2011. Graphical symbols – Safety colours and safety signs – Registered safety signs
- Beach Safety and the Law: Australian Evidence. Wilkes. J (Ed). (2008)
- Google Earth: Datum reference points and images
- SLISA Australian Coastal Public Safety Guidelines (2007) 1st Edition
- SLISA - 33rd Edition Public Safety and Aquatic Rescue
- SLISA Surfguard Database
- Australian Beach Safety and Management Program. SLISA and Dr. Andrew Short (University of NSW). Beaches of the Western Australia Coast: Eucla to Roebuck Bay (2005). University of Sydney Publications. SLISA Coastal Aquatic Risk Assessment Process
- National Coastal Safety Report 2012 (SLISA)
- National Aquatic and Recreation Signage Style Guide; Third Edition (July 2006)
- A Guide to Coastal Public Rescue Equipment. Version 1. 2007. Royal National Lifeboat Institute.
- BeachSAFE Initiative. Version 1. 2013. Surf Life Saving Western Australia.
- WA Coastal Safety Report 2013. Surf Life Saving Western Australia.
- Surf Life Saving Australia (2013) National Coastal Safety Report 2013. SLISA: Sydney.
- www.coastsafe.org.au
- www.ripcurrents.com.au
- www.beachsafe.org.au
- www.bom.gov.au



7. Appendices



APPENDIX A: Facility Visitation Rating (FVR) Reference Tables

Table 1 - Typical Development and Natural Hazards Rating for Reserves

Rating	Development	Natural Hazards
1	Virginal bush, cleared land, no infrastructure	No hazardous features
2	Cleared land, static infrastructure e.g. grass area with tables and chairs, toilet block, lookout	Sloping ground; no natural water; walking track around reserve
3	Cleared land with mobile infrastructure e.g. grassed area with play equipment, cycle way, market, leash free dog areas	Reserve contains natural waterway that runs during wet weather, drops less than 1 metre
4	Council owned infrastructure with no artificial lighting e.g. golf course, football field, recreational ground, caravan park	Creeks, ponds and ledges between 1 metre and 3 metres
5	Extensively developed infrastructure with artificial lighting e.g. sporting complex, artificially lit courts	Contains rivers, dams and cliffs greater than 3 metres

Table 2- a typical population use within a facility provided by Council. It is important that Council's table reflects as accurately as possible its actual situation.

Rating	Population Use
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

Table 3 - Suggested Frequency of use rating for a Facility

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



APPENDIX B: Enterprise Wide Risk Ranking Tool



ENTERPRISE-WIDE RISK MANAGEMENT – RISK RANKING TOOL

IMPACT TABLE

DESCRIPTOR	PEOPLE (Social) Due to SLSA Culpability or Negligence	PROPERTY & FINANCIAL Property loss; Increased expenses; lost revenue	ENVIRONMENTAL (Environment) e.g. Dune and Back beach; Creeks; Lagoons; Bushland; Air; Vegetation; Wildlife	REPUTATION (Governance) Social; Ethical; Heritage; Cultural; Leadership
Extreme	Death or total permanent disability	> \$1 million; Massive financial loss	Catastrophic event (e.g. habitat destruction) with national significance (e.g. endangered species) attracting national media attention	Wholesale resignation of Board Members and Senior Management Major State or National media coverage 1,000+ complaints Financial loss or fraud > \$100,000
High	Critical injury resulting in long-term partial disability	> \$100,000 - \$1 Million; Major financial loss	Major event (e.g. creek contamination, chemical spill, > 20t oil spill) with regional impact (e.g. lake, lagoon, creek) requiring external emergency agency clean up support	External Agency inquiry with adverse finding Significant regional media coverage 50 - 1,000 complaints Financial loss or fraud > \$50,000 < \$100,000
Medium	Very serious injury, e.g. broken arm, leg, wrist, etc which could result in hospitalisation and/or greater than 7 days off work	> \$10,000 - \$100,000; High financial rate	Major event (e.g. 10 - 20t oil spill) with localised impact (e.g. street, precinct)	External Agency request for clarification Regional & suburban media coverage 20 - 50 complaints Financial loss or fraud > \$5,000 < \$50,000
Minor	Minor injury, e.g. strain, sprain, gash, etc resulting in between 1-7 days off work	> \$1,000 - \$10,000; Minor financial loss	Minor event (e.g. < 10t oil spill) with localised impact (e.g. street, precinct)	Suburban media coverage 10 - 20 complaints Financial loss or fraud > \$1,000 < \$5,000
Insignificant	Minor injury, e.g. cuts, abrasions, etc requiring first-aid and/or resulting in less than 1 day off work	< \$1,000; Low financial loss	Negligible event (e.g. noise pollution) with localised impact (e.g. street, precinct)	Media enquiry / Letter to the Editor 0 - 10 complaints Financial loss or fraud < \$1,000

LIKELIHOOD TABLE

DESCRIPTOR	DESCRIPTION
Almost Certain	- Will probably occur more than once 100% chance of occurrence - Common or Frequent Occurrence - Is expected to occur in most circumstances
Likely	- High probability that will occur at least once 1 in 10 chance of occurrence (10%) - Likely to occur or "has happened to us a number of times in the past" - Might occur in a 2-3 year timeframe
Possible	- Reasonable likelihood that could occur more than once 1 in 100 chance of occurrence (1%) - Could occur or "I've heard of it happening elsewhere" - Might occur in a 5 year timeframe
Unlikely	- May occur once or less 1 in 1000 chance of occurrence (0.1%) - Not likely to occur - Might occur in a 10 year timeframe
Rare	- May occur in exceptional circumstances - Practically impossible 1 in 10,000 chance of occurrence (0.01%) - Could happen but probably never will

RISK SCORE MATRIX*

	IMPACT				
	1. INSIGNIFICANT	2. MINOR	3. MEDIUM	4. HIGH	5. EXTREME
5. ALMOST CERTAIN	M5	H10	H15	L20	L25
4. LIKELY	L4	M8	H12	L16	L20
3. POSSIBLE	L3	M6	H9	H12	L15
2. UNLIKELY	L2	L4	M6	H8	H10
1. RARE	L1	L2	L3	M4	M5

RISK LEVEL	ACTION YOU SHOULD TAKE
EXTREME* - (L25-L25)	Consider discontinuing - Immediate correction required
HIGH - (H8-H15)	Immediate corrective action required
MODERATE - (M4-M8)	Attention needed - correction required
LOW - (L1-L4)	Perhaps acceptable as is

* Risk Score Matrix consistent with ISO 31000: Risk Management



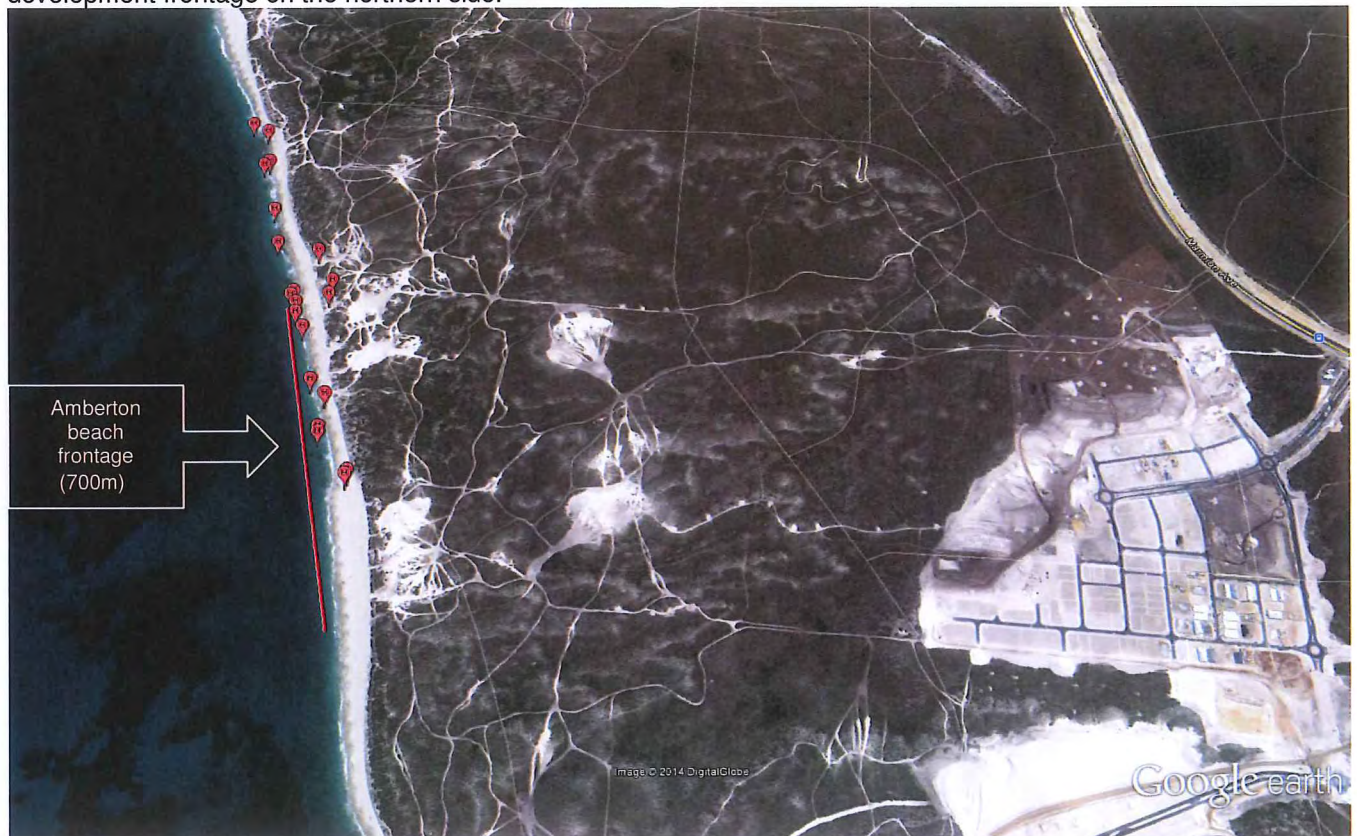
Appendix C: Amberton Beach Assessment Area

C1: Image of Beach WA 893 and Amberton Beach development frontage (yellow line) (Google Earth)



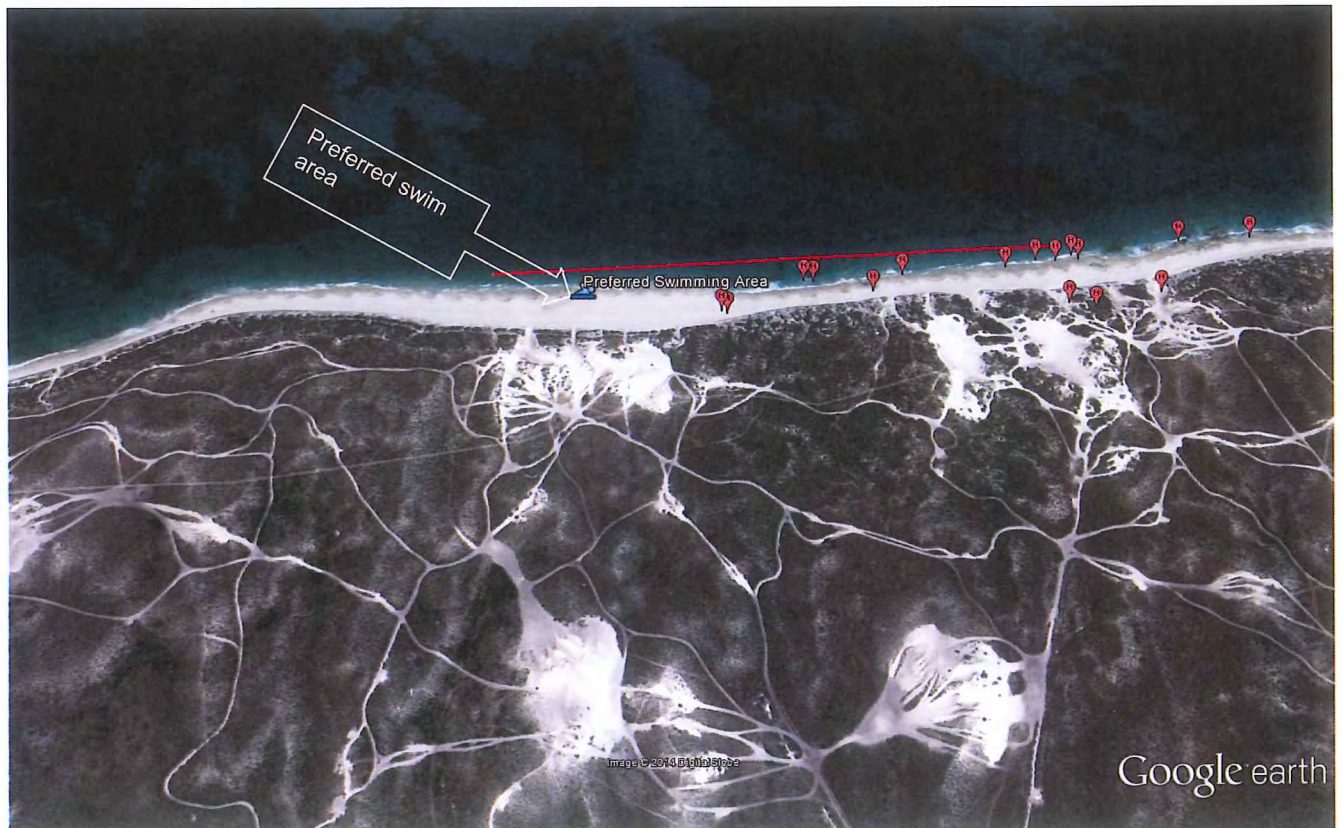
C2: Hazard and access data for Amberton overlayed on Google Earth.

Note: Hazards of the broader beach area are denoted with some hazards outside of the Amberton beach development frontage on the northern side.



C3: Map showing preferred swimming area at Amberton.

Note: Preferred swimming area location against 700m beach frontage for Amberton and in context of identified hazards.



C4: Graphical Observations



View south showing wide beach face and steep dunes



Rock platforms present in the swash zone at middle to northern sections of Amberton beach

Appendix D: Risk Register* and Risk Treatment Plan**

Assessed Beaches:

- 1 Alkimos-Pipidiny-Yanchep (S) [Amberton beach]



D1 Risk Register and Risk Treatment Plan – Alkimos-Pipidinny-Yanchep (S) [Amberton Beach]

Ref	Hazard Description (location)	Photo	Risk(s)	Risk Matrix's			Risk Groups	Existing Controls/Treatment Plans	Recommended Additional Controls/Treatment Plans	Action Priority & Residual Risk Level
				C	L	Risk Level				
1	Rock Shelves / Platforms		Spinal injury Slips, trips, falls Dislocation Minor First Aid Head Injury Major injuries / Hospitalisation Cuts and abrasions Broken Bones	Extreme	Possible	Extreme	Swimmers Walkers Children Beach users Elderly	Nil	Access restrictions Beach safety signage	High
2	Rock shelves/ platforms		Head Injury Major injuries / Hospitalisation Dislocation Spinal injury Broken Bones Cuts and abrasions Minor First Aid Slips, trips, falls	Extreme	Possible	Extreme	Children Swimmers Disabled Elderly Beach user	Nil	Beach safety signage Access restrictions	High



Ref	Hazard Description (location)	Photo	Risk(s)	Risk Matrix's			Risk Groups	Existing Controls/Treatment Plans	Recommended Additional Controls/Treatment	Action Priority & Residual
3	Dumping waves		Dislocation Spinal injury Head Injury	High	Likely	Extreme	Weak swimmers Elderly Children Swimmers Surfcraft users	Nil	Access restrictions Education Program Beach safety signage	High
4	Rock shelves/ platforms		Major injuries / Hospitalisation Spinal injury Broken Bones Dislocation Head Injury Cuts and abrasions Minor First Aid Slips, trips, falls	Extreme	Possible	Extreme	Disabled Rock platform users Children Swimmers Elderly	Nil	Activity Zoning Access restrictions Beach safety signage	High



Ref	Hazard Description (location)	Photo	Risk(s)	Risk Matrix's			Risk Groups	Existing Controls/Treatment Plans	Recommended Additional Controls/Treatment	Action Priority & Residual
5	Rock Shelves / Platforms		Broken Bones Slips, trips, falls Cuts and abrasions Minor First Aid Spinal injury Head Injury Head Injury	Extreme	Possible	Extreme	Elderly Disabled Children Swimmers	Nil	Activity Zoning Beach safety signage Access restrictions	High
6	Rock Shelves / Platforms		Minor First Aid Broken Bones Spinal injury Slips, trips, falls Cuts and abrasions Major injuries / Hospitalisation Head Injury	Extreme	Possible	Extreme	Disabled Children Fishers Elderly Swimmers	Nil	Beach safety signage Slippery rocks sign Controlled Access	High



Ref	Hazard Description (location)	Photo	Risk(s)	Risk Matrix's			Risk Groups	Existing Controls/Treatment Plans	Recommended Additional Controls/Treatment	Action Priority & Residual
7	Unstable and / or Eroded Dunes		Sand collapse Environmental damage	Medium	Possible	High	Beach user 4WD/ATV operator	Nil	Fence Dunal Restoration Create formal access paths	Medium
8	Snakes	No picture	Poisonous bite Minor First Aid	Medium	Unlikely	Medium	Walkers Beach user	Nil	Fence Restrict access	Low



Ref	Hazard Description (location)	Photo	Risk(s)	Risk Matrix's			Risk Groups	Existing Controls/Treatment Plans	Recommended Additional Controls/Treatment	Action Priority & Residual
9	Rock Shelves / Platforms		Dislocation Spinal injury Cuts and abrasions Major injuries / Hospitalisation Minor First Aid Slips, trips, falls Broken Bones Head Injury	Extreme	Possible	Extreme	Beach user Children Walkers Rock fishermen Rock platform users Disabled Elderly	Nil	Beach safety signage Access restrictions Activity Zoning	High
10	Unstable and / or Eroded Dunes		Environmental damage Sand collapse	Medium	Possible	High	4WD/ATV Operator Beach user	Nil	Access restrictions Dunal Restoration Controlled Access	Medium



Ref	Hazard Description (location)	Photo	Risk(s)	Risk Matrix's			Risk Groups	Existing Controls/Treatment Plans	Recommended Additional Controls/Treatment	Action Priority & Residual
11	Drop off in water		Non-Fatal Drowning Drowning Death	Extreme	Possible	Extreme	Children Elderly Weak swimmers	Nil	Education Program Access restrictions Beach safety signage	High
12	Rock shelves/ platforms		Slips, trips, falls Head Injury Minor First Aid Spinal injury Major injuries / Hospitalisation Cuts and abrasions Dislocation Broken Bones	Extreme	Possible	Extreme	Beach user Walkers Fishers Disabled Swimmers Elderly	Nil	Activity Zoning Access restrictions Beach safety signage	High



Ref	Hazard Description (location)	Photo	Risk(s)	Risk Matrix's			Risk Groups	Existing Controls/Treatment Plans	Recommended Additional Controls/Treatment	Action Priority & Residual
13	Rock Shelves / Platforms		Dislocation Slips, trips, falls Spinal injury Minor First Aid Broken Bones Cuts and abrasions Major injuries / Hospitalisation Head Injury	Extreme	Possible	Extreme	Elderly Swimmers Beach user Children Fishers Disabled	Nil	Access restrictions Activity Zoning Beach safety signage	High
14	Rock shelves/ platforms		Cuts and abrasions Broken Bones Dislocation Head Injury Minor First Aid Major injuries / Hospitalisation Slips, trips, falls Spinal injury	Extreme	Possible	Extreme	Beach user Disabled Walkers Elderly Swimmers Children	Nil	Controlled Access Safety signage Activity Zoning	High



Ref	Hazard Description (location)	Photo	Risk(s)	Risk Matrix's			Risk Groups	Existing Controls/Treatment Plans	Recommended Additional Controls/Treatment	Action Priority & Residual
15	Rock shelves/ platforms		Dislocation Slips, trips, falls Major injuries / Hospitalisation Cuts and abrasions Head Injury Spinal injury Missing person/s Minor First Aid	Extreme	Possible	Extreme	Disabled Elderly Swimmers Children	Nil	Access restrictions Beach safety signage Activity Zoning	High
16	Rock Shelves / Platforms		Spinal injury Broken Bones Cuts and abrasions Slips, trips, falls Head Injury	High	Possible	High	Elderly Rock platform users Disabled Children	Nil	Access restrictions Beach safety signage Activity Zoning	High



Ref	Hazard Description (location)	Photo	Risk(s)	Risk Matrix's			Risk Groups	Existing Controls/Treatment Plans	Recommended Additional Controls/Treatment	Action Priority & Residual
17	Submerged Reef		Minor First Aid Broken Bones Cuts and abrasions Head Injury Spinal injury	Extreme	Possible	Extreme	Children Elderly Swimmers Disabled	None	Activity Zoning Access restrictions Beach safety signage	High
18	Rock Shelves / Platforms		Minor First Aid Broken Bones Spinal injury Major injuries / Hospitalisation Head Injury Dislocation Slips, trips, falls Cuts and abrasions	Extreme	Possible	Extreme	Beach user Swimmers Rock fishermen Rock platform users	None	Slippery rocks sign Access restrictions Beach safety signage	High



Ref	Hazard Description (location)	Photo	Risk(s)	Risk Matrix's			Risk Groups	Existing Controls/Treatment Plans	Recommended Additional Controls/Treatment	Action Priority & Residual
19	Rock Shelves / Platforms		Cuts and abrasions Broken Bones Major injuries / Hospitalisation Head Injury Slips, trips, falls Minor First Aid Spinal injury	Extreme	Possible	Extreme	Children Beach user Fishers Water users Disabled Elderly	None	Access restrictions Beach safety signage	High
20	Dune drop off		Environmental damage Sand collapse	Medium	Possible	High	Beach users 4WD/ATV Operator	None	Dunal Restoration Controlled Access Create formal access paths Dunal Restoration	Medium



Ref	Hazard Description (location)	Photo	Risk(s)	Risk Matrix's			Risk Groups	Existing Controls/Treatment Plans	Recommended Additional Controls/Treatment	Action Priority & Residual
21	Rock Platforms		Slips, trips, falls Spinal injury Cuts and abrasions Broken Bones Head Injury	High	Possible	High	Elderly Children Disabled Rock platform users	Nil	Controlled Access Beach safety signage	High



Appendix E: Proposed Signage

Assessed Locations:

- 1 Alkimos-Pipidinnny-Yanchep (S) [Amberton beach]



Example Only 	Location Identification: Beach Name: Amberton Beach Site Reference: N/A Sign Type: Level 1 - Road Sign GPS Location: Location Description and Siting:	Road signs may be used to direct swimmers to certain areas (e.g. patrolled beaches) or can be warning signs (e.g. 'no lifesaving service'). Road signs are displayed along local roads leading to the beach.
Hazards and Warnings:  No Lifesaving Service AS/NZ: ZZW3		
Information:		
Regulations:		
General Notes on location: Reference: - AS/NZS: 2416.1. 2010. Water safety signs and beach safety flags. Specifications for water safety signs used in workplaces and public areas (ISO 20712-1: 2008 MOD) - Where available use symbols in diamond enclosure from this standard. - AS/NZS: 2416.3. 2010. Water safety signs and beach safety flags. Guidance for use - Where available use symbols in diamond enclosure from this standard. - National Aquatic and Recreational Style Guide Manual (Version 3. July 2006). - Use this manual to guide the development of the sign style.		

Example Only 	<table border="1"> <tr> <th colspan="2">Location Identification:</th> </tr> <tr> <td>Beach Name:</td> <td>Amberton Beach</td> </tr> <tr> <td>Site Reference:</td> <td><Street Name>. In case of emergency dial '000'</td> </tr> <tr> <td>Sign Type:</td> <td>Level 2 - Carpark Sign</td> </tr> <tr> <td>GPS Location:</td> <td></td> </tr> <tr> <td>Location Description and Siting:</td> <td>Designed to attract attention and to display important. Contains location name and emergency marker, hazards, lifesaving service/safety information and regulations.</td> </tr> </table>		Location Identification:		Beach Name:	Amberton Beach	Site Reference:	<Street Name>. In case of emergency dial '000'	Sign Type:	Level 2 - Carpark Sign	GPS Location:		Location Description and Siting:	Designed to attract attention and to display important. Contains location name and emergency marker, hazards, lifesaving service/safety information and regulations.												
Location Identification:																										
Beach Name:	Amberton Beach																									
Site Reference:	<Street Name>. In case of emergency dial '000'																									
Sign Type:	Level 2 - Carpark Sign																									
GPS Location:																										
Location Description and Siting:	Designed to attract attention and to display important. Contains location name and emergency marker, hazards, lifesaving service/safety information and regulations.																									
Hazards and Warnings:																										
<table border="1"> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>No Lifesaving Service</td> <td>Deep Water</td> <td>Submerged Rocks</td> <td>Dumping waves</td> <td>Unstable cliff</td> <td>Snakes</td> </tr> <tr> <td>NARSSM</td> <td>AS/NZS: 2416.1</td> <td>AS/NZS: 2416.1</td> <td>AS/NZS: 2416.1</td> <td>AS/NZS: 2416.1</td> <td>AS/NZ: 2416.1</td> </tr> <tr> <td>WS 15</td> <td>WSW005</td> <td>WSW007</td> <td>WSW023</td> <td>WSW011</td> <td>WSW013</td> </tr> </table>									No Lifesaving Service	Deep Water	Submerged Rocks	Dumping waves	Unstable cliff	Snakes	NARSSM	AS/NZS: 2416.1	AS/NZS: 2416.1	AS/NZS: 2416.1	AS/NZS: 2416.1	AS/NZ: 2416.1	WS 15	WSW005	WSW007	WSW023	WSW011	WSW013
																										
No Lifesaving Service	Deep Water	Submerged Rocks	Dumping waves	Unstable cliff	Snakes																					
NARSSM	AS/NZS: 2416.1	AS/NZS: 2416.1	AS/NZS: 2416.1	AS/NZS: 2416.1	AS/NZ: 2416.1																					
WS 15	WSW005	WSW007	WSW023	WSW011	WSW013																					
Information:																										
<table border="1"> <tr> <td data-bbox="183 1301 375 1570">  NARRSSM IS, 1 </td> <td data-bbox="375 1301 821 1570"> Yanchep Lagoon (Yanchep SLSC) is patrolled only when red and yellow flags are displayed. *??km North. Refer www.beachsafe.org.au or www.wanneroo.wa.gov.au. *Approximate assessment </td> <td data-bbox="821 1301 1013 1570">  AS/NZS: 2416.1 WSM002 </td> <td data-bbox="1013 1301 1377 1570"> Keep children under supervision at all times. </td> </tr> </table>			 NARRSSM IS, 1	Yanchep Lagoon (Yanchep SLSC) is patrolled only when red and yellow flags are displayed. *??km North. Refer www.beachsafe.org.au or www.wanneroo.wa.gov.au. *Approximate assessment	 AS/NZS: 2416.1 WSM002	Keep children under supervision at all times.																				
 NARRSSM IS, 1	Yanchep Lagoon (Yanchep SLSC) is patrolled only when red and yellow flags are displayed. *??km North. Refer www.beachsafe.org.au or www.wanneroo.wa.gov.au. *Approximate assessment	 AS/NZS: 2416.1 WSM002	Keep children under supervision at all times.																							
Regulations:																										
<table border="1"> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>No Animals</td> <td>No Horses</td> <td>No Vehicles</td> <td>No Motorbikes/Quad bikes</td> <td>No Littering</td> <td>No camping</td> </tr> <tr> <td>ISO 7010</td> <td>NARSSM</td> <td>NARSSM</td> <td>NARSSM</td> <td>NARSSM</td> <td>NARSSM</td> </tr> <tr> <td>PO21</td> <td>RS 17</td> <td>RS 03</td> <td>RS 04</td> <td>RS, 10</td> <td>RS 43</td> </tr> </table>									No Animals	No Horses	No Vehicles	No Motorbikes/Quad bikes	No Littering	No camping	ISO 7010	NARSSM	NARSSM	NARSSM	NARSSM	NARSSM	PO21	RS 17	RS 03	RS 04	RS, 10	RS 43
																										
No Animals	No Horses	No Vehicles	No Motorbikes/Quad bikes	No Littering	No camping																					
ISO 7010	NARSSM	NARSSM	NARSSM	NARSSM	NARSSM																					
PO21	RS 17	RS 03	RS 04	RS, 10	RS 43																					

Reference:

1. AS/NZS: 2416.1. 2010. Water safety signs and beach safety flags. Specifications for water safety signs used in workplaces and public areas (ISO 20712-1: 2008 MOD)
 - a. Where available use symbols in diamond enclosure from this standard.
2. ISO 7010: 2011. Graphical symbols – Safety colours and safety signs – Registered safety signs
3. National Aquatic and Recreational Style Guide Manual (Version 3. July 2006).
 - b. Use this manual to guide the development of the sign style.

<<INSERT GIS GRAPHIC>>

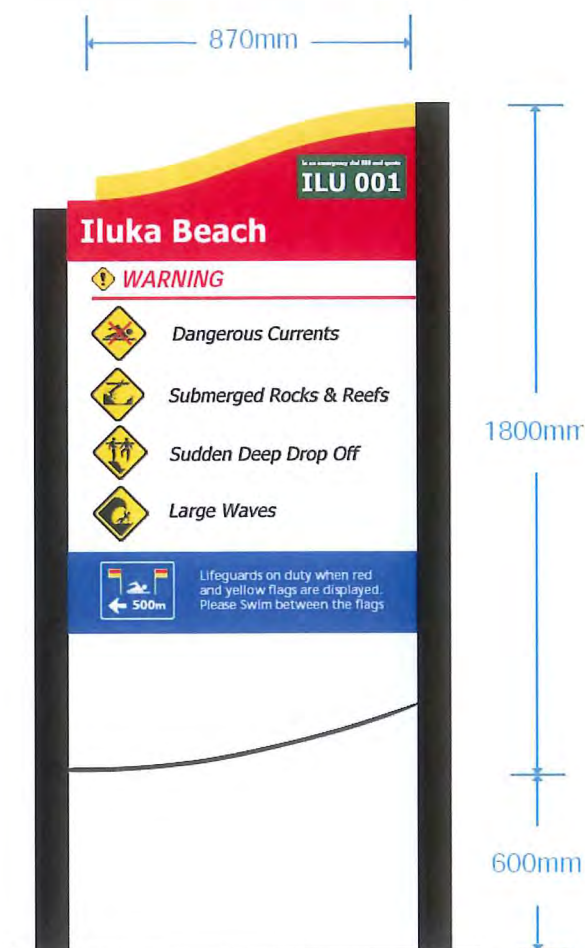


Figure 6: Example of Level 3 Open Access/Car Park signage for Amberton Beach

Example Only 	Location Identification:				
	Beach Name:	Amberton Beach			
	Site Reference:	<Street Name>. In case of emergency dial '000'			
	Sign Type:	Level 3 - Access Sign: Type A (defined access)			
	GPS Location:				
Location Description and Siting:	For use where access to the beach is controlled via a narrow pathway. Sign includes location identification, hazards and warnings, information, regulations and facility manager.				
Hazards and Warnings:					
 No Lifesaving Service NARSSM WS 15	 Deep Water AS/NZS: 2416.1 WSW005	 Submerged Rocks AS/NZS: 2416.1 WSW007	 Dumping waves AS/NZS: 2416.1 WSW023	 Unstable cliff AS/NZS: 2416.1 WSW011	 Snakes AS/NZ: 2416.1 WSW013
Information:					
 NARSSM IS, 1	Quinns Beach (Quinns Mindarie SLSC) is patrolled only when red and yellow flags are displayed. ??km South. Refer www.beachsafe.org.au or www.wanneroo.wa.gov.au . *Approximate assessment		 AS/NZS: 2416.1 WSM002	Keep children under supervision at all times.	
Regulations:					

					
No Animals	No Horses	No Vehicles	No Motorbikes/Quad bikes	No Littering	No camping
ISO 7010	NARSSM	NARSSM	NARSSM	NARSSM	NARSSM
PO21	RS 17	RS 03	RS 04	RS, 10	RS 43
Reference: 1. AS/NZS: 2416.1. 2010. Water safety signs and beach safety flags. Specifications for water safety signs used in workplaces and public areas (ISO 20712-1: 2008 MOD) a. Where available use symbols in diamond enclosure from this standard. 2. ISO 7010: 2011. Graphical symbols – Safety colours and safety signs – Registered safety signs 3. National Aquatic and Recreational Style Guide Manual (Version 3. July 2006). (NARSSM) c. Use this manual to guide the development of the sign style.					
<<INSERT GIS GRAPHIC>>					



Figure 7: Example of Level 3: Defined Access Signage for Amberton Beach

Example Only 	Location Identification: Beach Name: Amberton Beach Site Reference: N/A Sign Type: Level 4 - Individual Hazard Sign GPS Location: Location Description and Siting:	Used where a hazard is localised and identified at a level of risk that warrants sign posting. Also used for displaying regulations at known trouble spots or to indicate regulation boundaries (e.g. dogs permitted past this point)		
Hazards and Warnings:  Unstable rock AS/NZS: 2416.1 WSW011				
Information: <table border="1"> <tr> <td data-bbox="188 1310 427 1556">  AS/NZS: 2416.1 WSM002 </td> <td data-bbox="427 1310 794 1556"> Keep children under supervision at all times. </td> </tr> </table>			 AS/NZS: 2416.1 WSM002	Keep children under supervision at all times.
 AS/NZS: 2416.1 WSM002	Keep children under supervision at all times.			
Regulations:				
General Notes on location: Reference: AS/NZS: 2416.1. 2010. Water safety signs and beach safety flags. Specifications for water safety signs used in workplaces and public areas (ISO 20712-1: 2008 MOD)				

- a. Where available use symbols in diamond enclosure from this standard.
2. AS/NZS: 2416.3. 2010. Water safety signs and beach safety flags. Guidance for use
 - a. Where available use symbols in diamond enclosure from this standard.
3. National Aquatic and Recreational Style Guide Manual (Version 3. July 2006).
 - a. Use this manual to guide the development of the sign style.

<<INSERT GIS GRAPHIC>>



Appendix F: Access Schedule

Assessed Locations:

- 1 Alkimos-Pipidinnny-Yanchep (S) [Amberton beach]

Note: GPS Datum is WGS 84. Additionally, the GPS device used was an iPad 3 with a margin error of ± 5.0 metres.

F1: Access Schedule – Alkimos-Pipidinny-Yanchep (S) [Amberton Beach]

Access Reference	Photo	Access Location Description	GPS Position	Current Access Treatment	Proposed Risk Treatment for Access	Type	Hazards
1			31.590137,1 15.648453	Nil	Dunal Restoration Access restrictions Create formal access paths	Informal 4WD track	Unstable and / or Eroded Dunes Dune drop off
2			31.595648,1 15.651138	Nil	Dunal Restoration Access restrictions Create formal access paths	Informal 4WD track	Unstable and / or Eroded Dunes Dune drop off
3			31.866183,1 15.808713	Nil	Fence Create formal access paths Dunal Restoration	Informal Access	Dune drop off Unstable and / or Eroded Dunes



