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**NOM 22/03/2022 – NEWCASTLE SURF LIFE SAVING CLUBS**

**PAGE 3**      **ITEM-9**      **Attachment A:**      Deloitte Analysis – Between the Red and Yellow Fags

**PAGE 57**      **ITEM-9**      **Attachment B:**      Coastal Management Plan 2018

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**ITEM-9**            **Attachment A:**    Deloitte Analysis – Between the Red and  
Yellow Flags

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## Between the red and yellow flags

The social and economic value  
of Surf Life Saving Australia  
August 2020

**Deloitte**  
Access **Economics**









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# Social and economic value of Surf Life Saving Australia

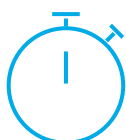
## Patrolling Australian beaches



**43,092**

**volunteer surf lifesavers**

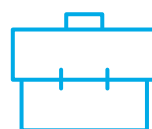
patrolling beaches around the country in 2018-19



**1.3 million+**

total volunteer **patrol hours**

## SLSA training and employment



**924**

**jobs** for  
SLSA  
members



**11,000**

average  
who **con**  
the first

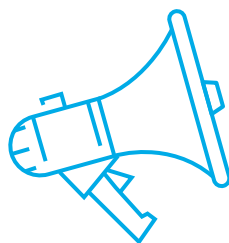
SLSA training provides skills that are relevant to the workforce. For members who completed an award, 25% of members assisted them to gain employment.

## Actions performed by lifesavers and lifeguards



**10,176**

**rescues performed**  
during beach patrols



**1.5 million+**

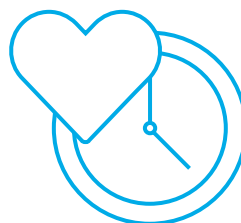
**preventative actions** were  
performed in 2018-19

## The impact of lifesaving skills in the community



**96,000+**

SLSA members and members of the Australian community receive **CPR training** for the first time each year



**294,855**

hours of **life saved**

The total net benefit of Surf Life Saving Australia to the Australian community is **\$97 billion** over 15 years

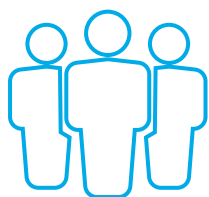
## Employment

1000+

number of SLSA members  
completed an award for  
time each year

relevant to employment.  
% believed their training  
employment.

## Supporting a culture of volunteering



170,000+

members and 314  
affiliated Surf Life  
Saving clubs across  
Australia in 2018-19



14 million+

hours of **volunteering**  
each year, in addition  
to patrols and delivering  
training

## Health benefits



67%

of members meeting  
the **Australian  
guidelines** compared  
to 45% of the  
population because  
being involved with SLS  
encourages high levels  
of physical activity

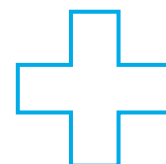
## The value of lives saved on patrols

The actions performed by Surf Life Saving Australia are expected to prevent 1,363 coastal deaths and 818 critical injuries each year.



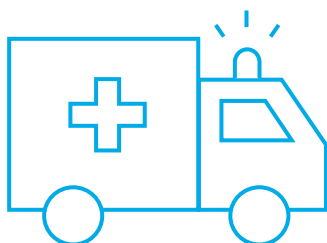
1363

**lives** will  
be saved



818

**critical injuries**  
will be prevented



\$6.1 billion

in **lives saved** and **injuries prevented**

For every **\$1.00** invested into Surf Life Saving Australia, a  
return of **\$20.20** is achieved for the Australian community







# Executive summary

## **About Surf Life Saving Australia**

Surf Life Saving Australia (SLSA) is Australia's peak coastal water safety, drowning prevention and rescue authority. With over 176,000 members and 314 affiliated Surf Life Saving (SLS) clubs, SLSA is a unique organisation; it is the nation's largest volunteer organisation and one of the largest volunteer movements of its kind in the world.<sup>1</sup>

SLSA has a proud heritage with over 110 years of history and tradition. Since 1907, the organisation has grown significantly, and knowledge gained has been passed on from one generation to the next. This growth has been fundamental to SLSA's success in managing some of the most dangerous and unpredictable beaches in the world. Over the years, more than 685,000 people have been rescued by a surf lifesaver.



### Estimating the social and economic value of Surf Life Saving Australia

SLSA exists to save lives, create great Australians and build better communities. Through its coastal safety, lifesaving, education, sport and recreation programs and services, SLSA generates significant social and economic benefits for the Australian community each year.

In generating these benefits, the organisation receives a significant proportion of its funding from external sources. These include government grants, fundraising, corporate sponsorships and community donations.

To promote understanding about the outcomes achieved with the support of these funding sources, SLSA has periodically undertaken and commissioned work to estimate the contribution, or value, generated by its activities for the Australian community.

Deloitte Access Economics was engaged to estimate the social and economic value of SLSA to the Australian community. This study involved identifying the various ways in which SLSA generates benefits for both its members and the wider Australian community, and developing suitable approaches to estimate the value of these benefits.

The social and economic value of SLSA has been estimated using a cost-benefit analysis (CBA) approach. For a given policy or investment, a CBA compares the total estimated costs to the community and economy with the total estimated benefits. In this way, a CBA determines whether the benefits outweigh the costs, and if so, to what extent.

This CBA compares the incremental costs and benefits associated with the services and operations of SLSA over a 15-year period, from 2014-15 to 2028-29.

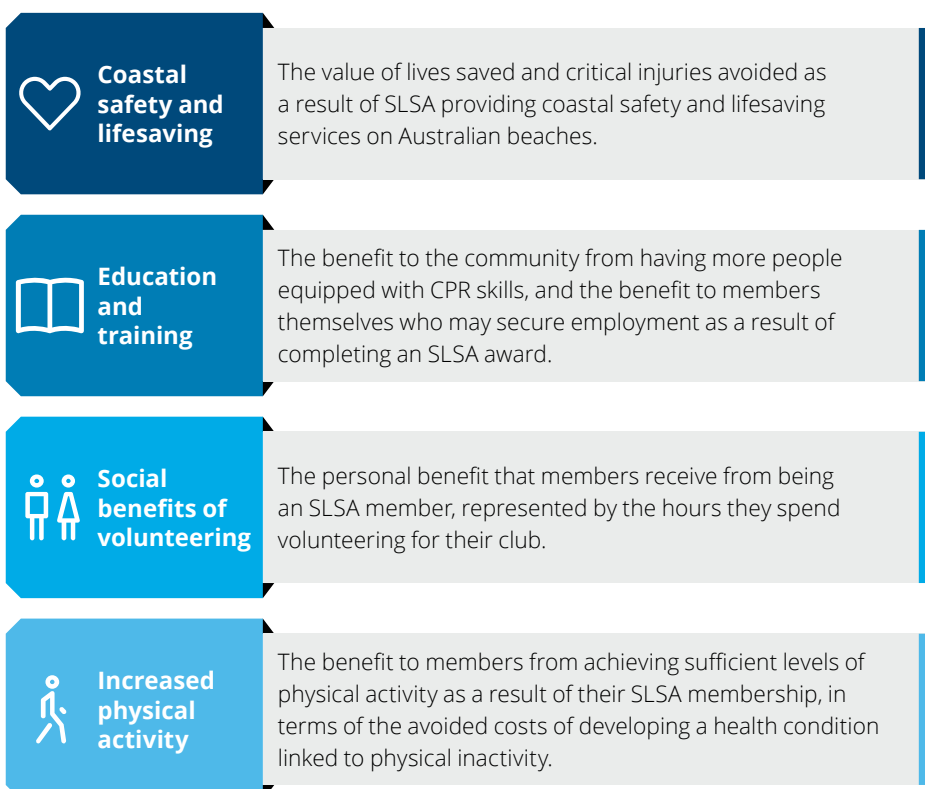
This period reflects five years of historic operations and 10 years of forecast activities and outcomes. The forecasts over the period of analysis have been established by drawing on data and evidence available from the historic five-year period.

Four sources of benefits generated by SLSA have been identified as measurable and are estimated in the CBA. These include:

- Coastal safety and lifesaving
- Education and training
- Social benefits of volunteering
- Increased physical activity.

A brief description of each of the benefits is presented in Figure 1.

Figure 1: Summary of measurable social and economic benefits



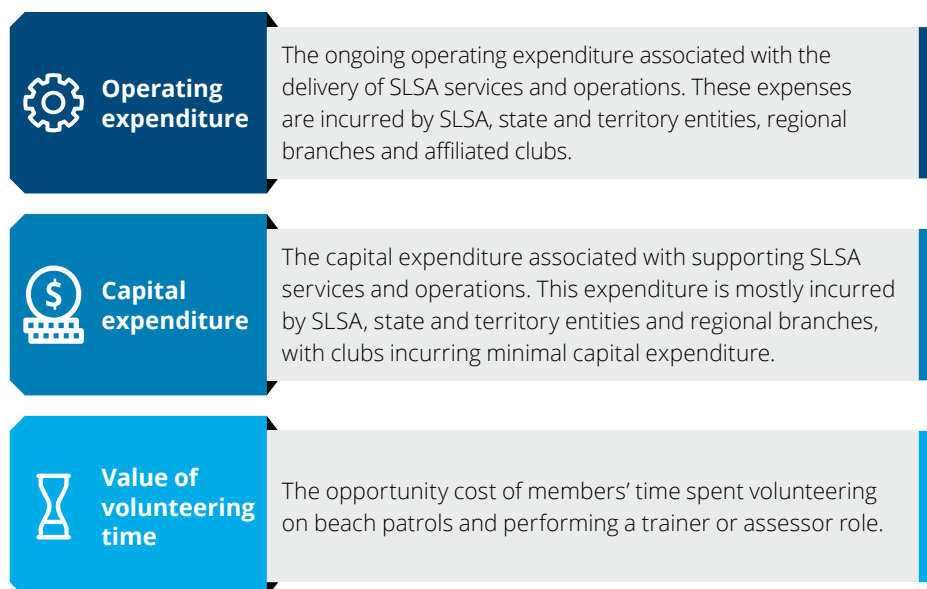
In delivering its coastal safety, lifesaving and education services, SLSA incurs a variety of costs. Three main sources of costs are estimated, which include:

- Operating expenditure
- Capital expenditure
- Value of volunteering time.

A brief description of each of the costs is presented in Figure 2. In undertaking the CBA, the estimated benefits and costs of SLSA's services and operations are compared to calculate a net benefit and benefit-cost ratio (BCR).

The total net benefit of Surf Life Saving Australia to the Australian community is \$97 billion over 15 years, including the last 5 years and the future 10-year period.

Figure 2: Summary of estimated costs



### Total social and economic value of Surf Life Saving Australia

The social and economic value of SLSA is expressed primarily through two main metrics: the net benefit (total benefits less total costs) and the BCR (total benefits divided by total costs). Over the 15-year period of analysis, it is estimated that SLSA will generate a total net benefit to the Australian community of \$96.9 billion. In addition, the services and operations of SLSA around the country – both now and in the future – yield a BCR of 20.2. This means that for every \$1.00 invested into SLSA, a return of \$20.20 is achieved (see Table 1).

The net benefit and the high BCR is largely driven by the value of SLSA's coastal safety and lifesaving services. This benefit accounts for 90% of total benefits – a value of \$91.6 billion in present value terms, or an average of \$6.1 billion each year. This significant value reflects the value of lives saved and critical injuries avoided as a result of the actions of SLSA's volunteer surf lifesavers and paid lifeguards. The remaining benefits estimated over the period of analysis are related to SLSA's education and training programs (\$2.1 billion, or \$140.0 million each year), the social benefits of volunteering for members themselves (\$8.1 billion, or \$538.5 million each year), and the health benefits of increased physical activity for members resulting from their involvement with SLS (\$101 million, or \$6.8 million each year).

Overall, this analysis demonstrates the substantial social and economic value SLSA generates for the Australian community. However, in estimating the value of the organisation it is important to note that there are other benefits that reach far beyond those which can be quantified. As the lead organisation for the SLS movement, SLSA represents a unique tradition of community service that holds a special place in the fabric of Australian culture. Its value includes the knowledge and experience accumulated over more than a century of lifesaving and support operations on the Australian coastline, which benefits the Australian community now and will continue to do so in generations to come.

For every \$1.00 invested into Surf Life Saving Australia, a return of \$20.20 is achieved.

Table 1: Summary of cost-benefit analysis outcomes, present value terms

Cost-benefit analysis outcome	
Benefits	\$ million
Coastal safety and lifesaving	\$91,630
Education and training	\$2,101
Social benefits of volunteering	\$8,078
Increased physical activity	\$101
<b>Total benefits</b>	<b>\$101,910</b>
Costs	\$ million
Operating expenditure	\$3,731
Capital expenditure	\$140
Value of volunteering time	\$1,178
<b>Total costs</b>	<b>\$5,049</b>
<b>Net benefits</b>	<b>\$96,861</b>
<b>BCR</b>	<b>20.2</b>

Source: Deloitte Access Economics. Note: The numbers in this table may not add due to rounding.







# 1 Introduction

There are few things more iconic to the Australian lifestyle than spending a day at the beach. Millions of people visit beaches across the country every year to enjoy the natural environment, whether that be laying on the sand, surfing or simply having fun in the water.

## 1.1 A special place in Australian culture

That Australians love the beach is revealed in where they live; 85% of the population lives within 50 km of the coast.<sup>2</sup> In addition, there were more than 300 million visitors to Australian beaches in the last year alone, including both locals and tourists from all over the world.<sup>3</sup> The beach holds a special place in the hearts of Australians, and is a place where people can come together, have fun and celebrate the natural beauty of this country.

The vast Australian coastline is also a place where three of the world's oceans meet – the Pacific, Indian and Southern oceans – with each presenting a unique set of conditions and experiences to locals and visitors. A visit to the beach should be one of fun, excitement or relaxation. However, the Australian surf can at times be dangerous and unpredictable. Many beachgoers identify as beginner or intermediate swimmers, with 46% reporting they are unable to swim 50 metres in the ocean without touching the bottom.<sup>4</sup> In addition, rip currents pose a major risk and are unidentifiable to untrained eyes. Despite significant advancements in technology, techniques and knowledge, many people still drown on the Australian coastline, with 122 coastal and ocean drowning deaths occurring across the country in 2018-19.<sup>5</sup>

## 1.2 About Surf Life Saving Australia

Surf Life Saving Australia (SLSA) is the peak coastal water safety, drowning prevention and rescue authority in Australia. SLSA is a not-for-profit, member-based organisation that provides crucial services in lifesaving and education to mitigate the risks posed by the nation's varied coastline. With over 176,000 members and 314 affiliated Surf Life Saving (SLS) clubs, it is also Australia's largest volunteer organisation and one of the largest volunteer movements of its kind in the world.<sup>6</sup>

SLSA can trace its origins back to October 1907, when representatives of the first SLS clubs that emerged on Sydney's ocean beaches formed the Surf Bathing Association of New South Wales. Since this time, more than 685,000 people have been rescued by a surf lifesaver.

In 2018-19, active patrolling members of SLSA performed over 10,000 rescues, responded to almost 90,000 incidents requiring first aid treatment, and carried out more than 1.5 million preventative actions. In generating these results, the organisation's volunteers performed more than 1.3 million patrol hours.<sup>7</sup>

A key feature of SLSA's coastal safety and surveillance system is the organisation's red and yellow flags. The area between the flags indicates the area which is patrolled by surf lifesavers and lifeguards. So effective and prevalent are the red and yellow flags on the beach that they have long been recognised as a nationally significant icon.

Surf Life Saving Australia is Australia's largest volunteer organisation and one of the largest volunteer movements of its kind in the world.

### 1.3 Services provided by Surf Life Saving Australia

SLSA carries out its services through its network of 314 affiliated SLS clubs, which are located at the busiest and most popular beaches across Australia. To assist with the governance of SLS clubs across the country, state-level bodies exist in all coastal states and the Northern Territory. In fact, the SLS movement in Australia is a federated structure made up of 493 separate legal entities, including state-level bodies, clubs, branches and support operations.

As the lead policy and decision-making body for the SLS movement, SLSA delivers a range of activities and programs including coastal safety, national sport events, fundraising campaigns, education, participation and other community programs.

#### 1.3.1 Coastal safety

As Australia's peak coastal water safety, drowning prevention and rescue authority, SLSA provides a risk management and evidence-based approach to coastal safety. In doing so, it addresses coastal safety issues by delivering a variety of public education programs, mitigation strategies and lifesaving services.

##### 1.3.1.1 Beach safety

The Beachsafe website is a resource developed and maintained by SLSA, which provides a range of information to the public about local beach conditions and safety advice.<sup>8</sup> Visitors to the website can search for any beach and retrieve up-to-date information about patrol status, facilities and hazards to weather, swell and tide; much of this information is also available via the Beachsafe mobile app.

The website is also designed to help people learn about the beach more generally, including the science of the surf and how to identify and escape from rip currents, how to stay safe at the beach, the meaning of the various safety signs, Australia's marine animals, surf skills and first aid.

##### 1.3.1.2 Lifesaving services

SLSA coordinates an integrated national coastal lifesaving service, which includes both volunteer surf lifesavers and paid lifeguards. Through its network of affiliated clubs, volunteer surf lifesavers are assigned to patrol designated beaches and protect beachgoers by rendering assistance when required; this includes performing rescues, preventative actions and administering first aid.<sup>9</sup>

As part of the SLS movement, the Australian Lifeguard Service (ALS) provides paid lifeguard services to over 65 local government authorities and land managers across Australia. The ALS is the sole provider of lifeguard services to coastal local government areas in Victoria, South Australia, Tasmania, Northern Territory and the main provider of services in Queensland, Western Australia and New South Wales. In addition, the ALS is one of the largest providers of paid lifeguards in the world and the largest in the southern hemisphere; it employs over 700 lifeguards and provides services at over 200 beaches across the country.

##### 1.3.1.3 Research and campaigns

SLSA undertakes research initiatives and campaigns focused on coastal drowning deaths, other coastal fatalities and risk factors, rip current safety and community perceptions relating to coastal hazards. The national *Think Line* campaign aims to increase awareness of the rip current hazard and influence risky behaviours, particularly in young men between the ages of 15 and 39 years, who are highly represented in drowning statistics.

The annual *National Coastal Safety Report* provides a detailed analysis of coastal drowning deaths in Australia, including an identification of the circumstances under which these deaths occur. The report also includes research into first aid treatments and preventative actions, as well as visitation and community perceptions relating to coastal hazards. The analysis provides SLSA with evidence-based insights that are used to inform water safety and education initiatives for the community.

SLSA also develops *Coastal Safety Briefs* to explore specific coastal issues, including ways to prevent and address incidents in the future. Topics considered in recent *Coastal Safety Briefs* have included boating, rock fishing, surfing and watercraft, rip currents, and snorkelling and scuba diving.

SLSA also undertakes a range of other projects in collaboration with research institutions, which are designed to inform specific water safety and drowning prevention issues. For example, previous research projects have focused on the characteristics of rescues undertaken by bystanders (i.e. individuals who are not either a volunteer surf lifesaver or paid lifeguard) and strategies to mitigate the risks encountered by people who participate in rock fishing.

### 1.3.2 Education and training

SLSA offers a wide variety of education and training programs to both members and non-members. Although the content of these programs vary, they are primarily designed to equip participants with the knowledge and skills required to carry out their role as surf lifesavers.

The Bronze Medallion is SLSA's core operational award. It is available to all members over the age of 15 years, and is the minimum educational requirement for members to be involved in beach patrols. In addition to a highly physical component (see section 2.4.1), it includes a range of transferable skills such as first aid and cardiopulmonary resuscitation (CPR), rescue techniques, radio communications and teamwork. The Bronze Medallion is recognised by the International Life Saving Federation and meets the requirements of the Public Safety Training Package.<sup>10</sup>

In addition to awards that focus on developing the fundamental skills required for beach patrols, other awards allow members to expand their skills so they can take on greater responsibilities for their club and on patrol. For example, some awards relate to inflatable rescue boat (IRB) operation, facilitating training and assessments, and becoming qualified as a coach or competition official for surf sports.

### 1.3.3 Sport events

SLS sports – or surf sports – are a way for lifesavers to apply the skills and physical abilities required to save a life in a fun, competitive environment. The competitive sporting environment encourages patrolling members to expand and maximise their lifesaving skills, while also promoting increased physical activity among members. Each year, thousands of members use their lifesaving skills to compete in carnivals at club, branch, state and national levels across a range of disciplines.

SLSA hosts a variety of national sporting events, many of which are open to both members and the general public. For example, SLSA hosts the annual *Australian Surf Life Saving Championships* – commonly known as *The Aussies* – in which members from all 314 affiliated clubs are invited to compete in more than 480 beach and ocean events, making it one of the largest events of its kind in the world.

In addition to hosting national surf sport events, SLSA also provides opportunities for international competition. Supported by the Australian Sports Commission and in partnership with Royal Life Saving Society Australia (RLSSA), an Australian team is selected to compete in the biennial World Lifesaving Championships and other national team competitions.

## 1.4 Estimating the social and economic value of Surf Life Saving Australia

Through its coastal safety, lifesaving and education programs and services – along with the range of other activities coordinated by its affiliated clubs – SLSA generates significant social and economic benefits for the Australian community each year. Over the years, SLSA has periodically undertaken and commissioned work which has sought to estimate the contribution, or value, generated by its activities for the Australian community.

While previous studies undertaken in 2005<sup>11</sup> and 2011<sup>12</sup> resulted in different outcomes (a BCR between 10.4 and 16.5 in 2005 and a BCR of between 21.7 and 29.3 in 2011), one thing remained consistent – the benefits of SLSA were found to far outweigh the costs. Each of these studies unquestionably confirmed the unique, significant and ongoing value that SLSA brings to the Australian community and economy.

The different outcomes in these studies can be attributed to the refinement of the modelling approach over time. Further explanation of these differences is outlined in Appendix B.

Deloitte Access Economics was engaged to estimate the social and economic value of SLSA to the Australian community. This study involved identifying the various ways in which SLSA generates benefits for both its members and the wider Australian community, and developing suitable approaches to estimate the value of these benefits. A cost-benefit analysis (CBA) approach was used for this purpose. Appendix A provides further details about the approach used in undertaking this study.







# 2 Measuring the benefits

Through its coastal safety, lifesaving and education programs and services, the wide range of activities coordinated by affiliated clubs and the positive impacts of SLS involvement for members themselves, SLSA generates significant social and economic benefits for the Australian community each year.

Four sources of benefits have been identified as measurable and are estimated in the CBA. These include:

1. Coastal safety and lifesaving
2. Education and training
3. Social benefits of volunteering
4. Increased physical activity.

A brief description of each of the benefits is presented in Figure 2.1.

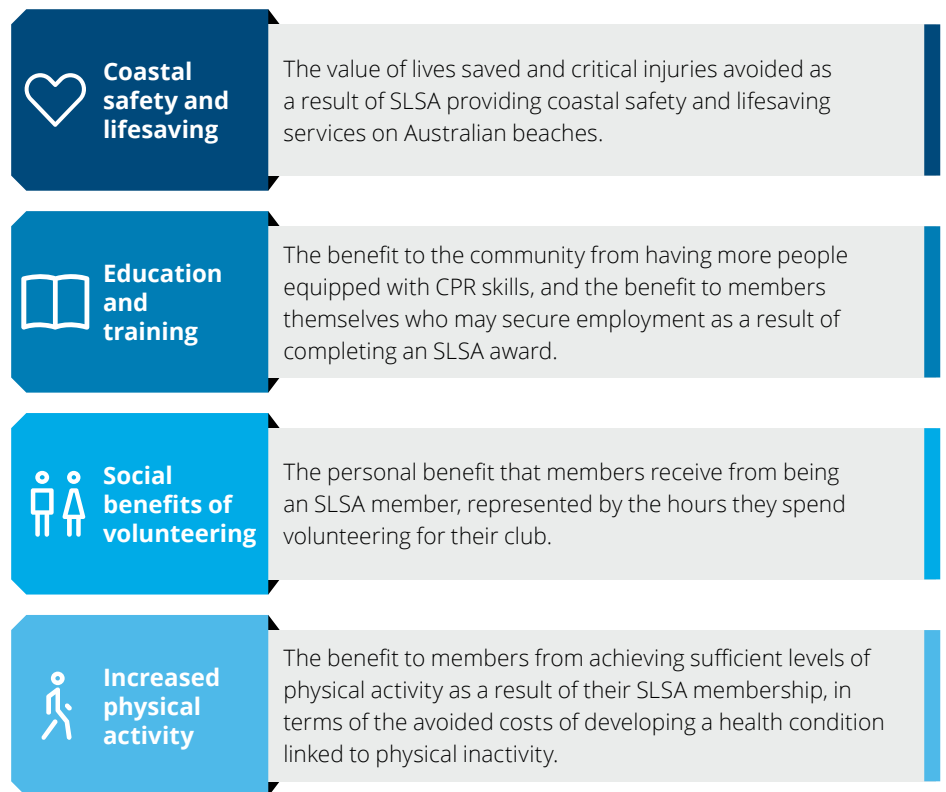
The following sections discuss each of the benefits, along with the key data inputs and assumptions that have been used in estimating their value.

## 2.1 Benefit 1: Coastal safety and lifesaving

### 2.1.1 Summary

The red and yellow flags are recognised across the nation for marking the area which has been assessed by surf lifesavers or lifeguards as suitable for swimming, and which is being supervised. This lifesaving service is fundamental to SLSA's coastal safety and surveillance system, enabling the organisation to provide immediate assistance to swimmers and other beachgoers who encounter danger while at the beach. In performing this role, the most significant contribution made by SLSA to the Australian community is when a surf lifesaver or ALS lifeguard rescues a beachgoer who would have either died or been seriously injured if they were not rescued.

**Figure 2.1: Summary of measurable social and economic benefits**



The national coastal lifesaving service coordinated by SLSA includes both volunteer surf lifesavers and paid lifeguards. At the club level, beach patrols are coordinated by assigning volunteer surf lifesavers to patrol specific beaches during the nominated patrol hours, which vary across beaches. These volunteers are then available to immediately assist beachgoers when the need arises. The interventions they perform usually take the form of either rescues, preventative actions or administering first aid.

Reflecting its standing as Australia's largest volunteer organisation and one of the largest volunteer movements of its kind in the world, in 2018-19 a total of 43,092 volunteer surf lifesavers spent more than 1.3 million hours on patrol at beaches around the country. This reflects an average of 32.0 hours for each volunteer surf lifesaver. As a result of these efforts, volunteers performed 6,357 rescues, carried out 372,195 preventative actions, and responded to 34,383 incidents requiring first aid treatment (see Table 2.1).<sup>13</sup> These volunteer surf lifesavers are highly qualified, holding either a Bronze Medallion or a Surf Rescue Certificate (if under the age of 15 years) and engaging in regular requalification processes to ensure that fundamental lifesaving skills are maintained.

In addition to volunteer surf lifesavers, paid lifeguard services are provided through the Australian Lifeguard Service (ALS) to over 65 coastal local government areas and land managers in all coastal Australian states. The ALS is one of the largest providers of paid lifeguards in the world and the largest in the southern hemisphere, employing over 700 lifeguards and servicing over 200 beaches across Australia. In 2018-19, ALS lifeguards collectively spent 426,580 hours on patrol at Australian beaches. These lifeguards performed 3,819 rescues, issued almost 1.2 million preventative actions, and responded to 55,312 incidents requiring first aid treatment (see Table 2.1).

In total, the combined impact of SLSA's services in 2018-19 is a significant 10,176 rescues, more than 1.5 million preventative actions, and 89,695 first aid treatments. These actions are a critical part of SLSA's efforts to protect beachgoers from coastal dangers; without them, many beachgoers may be seriously injured, and others may have lost their lives. Therefore, the value of SLSA's coastal safety and lifesaving services is estimated by measuring the value of fatalities and critical injuries avoided as a result of the intervening actions of surf lifesavers and ALS lifeguards.

In 2018-19, 43,092 volunteers spent more than 1.3 million hours on patrol at Australian beaches.

**Table 2.1: Actions performed by SLS clubs, support operations and lifeguards, 2018-19**

Source of action	Rescues	Preventative actions	First aid treatments	Patrol hours
SLS clubs (volunteers)	5,561	354,458	34,300	1,346,454
SLS support operations (volunteers)	796	17,737	83	32,602
ALS lifeguards	3,819	1,194,254	55,312	426,580
<b>Total</b>	<b>10,176</b>	<b>1,566,449</b>	<b>89,695</b>	<b>1,805,636</b>

Source: Surf Life Saving Australia, *Annual Report 2018-19*.

**2.1.2 Key inputs and assumptions**

**2.1.2.1 Number of rescues and preventative actions**

Historic data on the number of rescues and preventative actions performed between 2014-15 and 2018-19 was sourced from annual reports published by SLSA and state entities. Over the five-year period, the number of rescues and preventative actions each year have not moved in a consistent direction. Rescues have actually decreased in each successive each year since a peak of 13,034 in 2015-16, while preventative actions have changed from year to year, reaching a peak of over 1.5 million in 2018-19 (see Chart 2.1). These changes likely reflect the impact of a range of factors, which may include climate, the perception of risk related to marine life activity, or simply the number of people entering the water. The number of active patrolling surf lifesavers and ALS lifeguards may also impact the number of interventions performed. As a result, it is difficult to predict the number of future rescues and preventative actions.

Although the number of future rescues and preventative actions is difficult to accurately forecast, it is reasonable to assume that the number of interventions will increase over time. As the Australian population grows and more coastal areas become accessible, so will the number of people visiting Australian beaches.

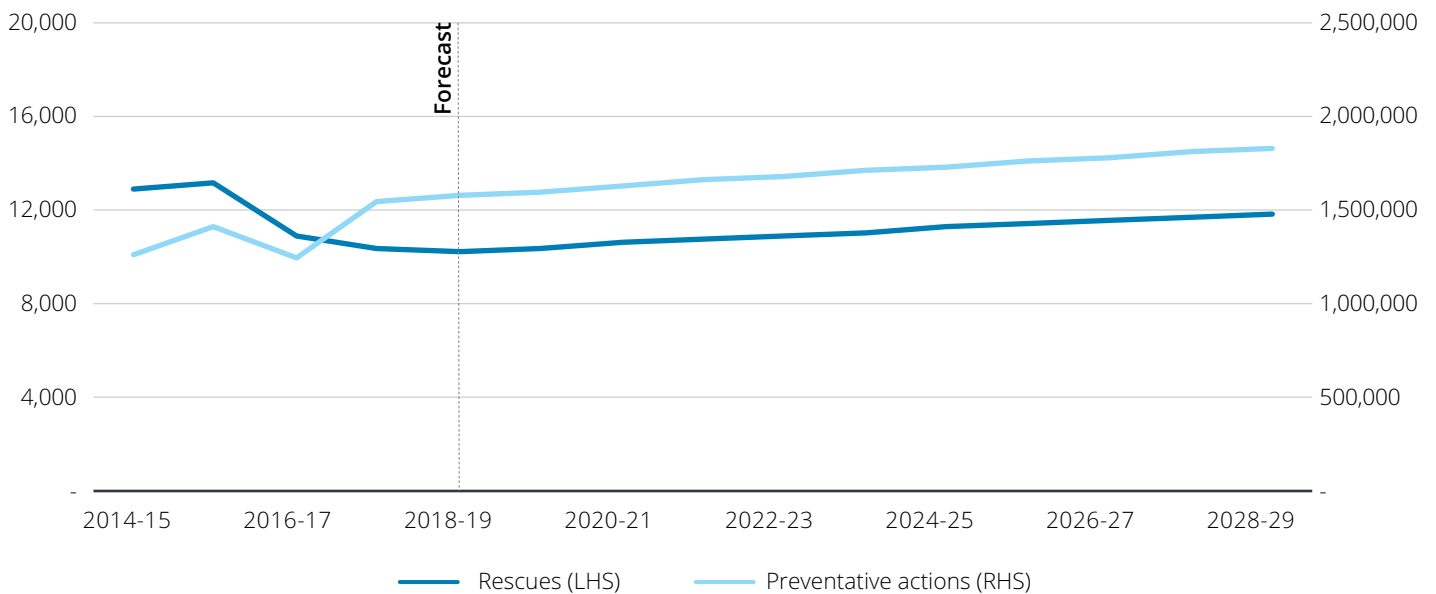
Therefore, it has been assumed that the number of rescues and preventative actions will increase over time in line with Australian population growth forecasts. The Australian Bureau of Statistics (ABS) population growth forecasts indicate expected annual population growth of 1.7% in 2019-20 and 2020-21, decreasing to 1.6% in 2021-22 and 1.5% by 2023-24.<sup>14</sup> Forecast annual population growth continues to decrease every few years until it reaches 1.3% in 2028-29, the final year of the forecast period.

Over the period of analysis, it is estimated that a total of 168,128 rescues and more than 24.0 million preventative actions will be performed by surf lifesavers and ALS lifeguards. This reflects an average of 11,209 rescues each year, and over 1.6 million preventative actions each year.

**2.1.2.2 Avoided fatalities and critical injuries**

Each time a surf lifesaver or ALS lifeguard performs a rescue or a preventative action, the risk of a fatality or critical injury is significantly reduced – or avoided entirely. However, not all of these actions can be expected to have resulted in a fatality or critical injury in the absence of an intervention. In some cases, it is possible that the beachgoer may have eventually gotten themselves out of danger, or that someone else on the beach may have rendered assistance.

**Chart 2.1: Number of rescues and preventative actions, 2014-15 to 2028-29**



Source: Surf Life Saving Australia, Deloitte Access Economics.



Reflecting these possibilities, a 2005 study commissioned by SLSA found that in the absence of action by surf lifesavers and lifeguards, 5% of all rescues would have resulted in a fatality and 3% of all rescues would have resulted in a critical injury.<sup>15</sup> The remaining rescues are expected to have required only minor first aid treatment, or have resulted in no injury at all.

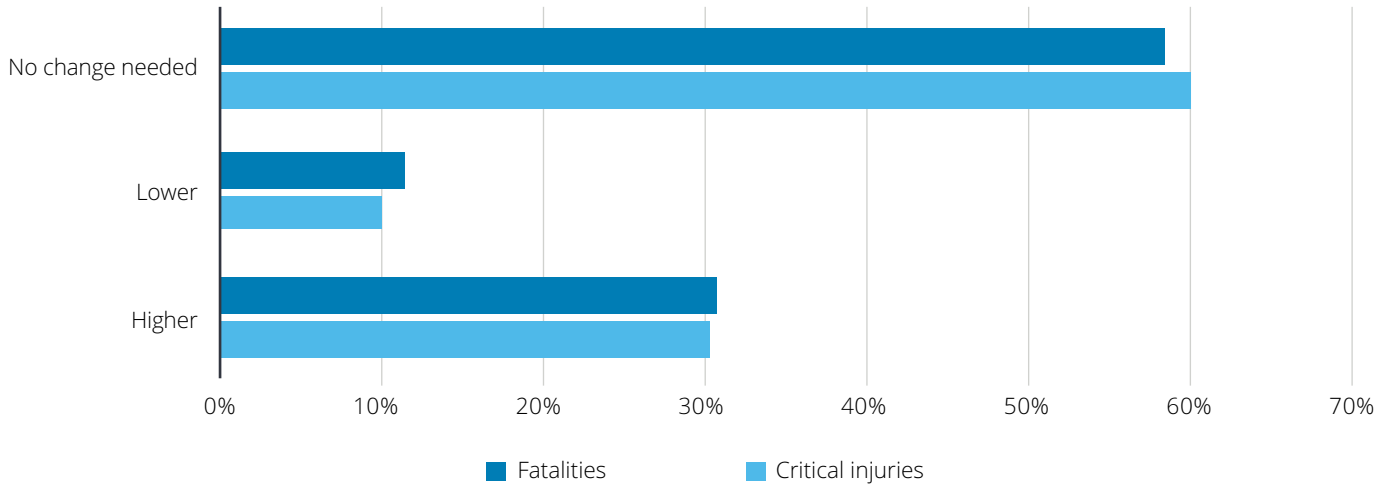
In addition to rescues, it is reasonable to expect that preventative actions also prevent fatalities and critical injuries from occurring. The same 2005 study estimated that in the absence of an intervention, 1% of all preventative actions would have resulted in a beachgoer needing to be rescued. A small proportion of these avoided rescues would then be expected to have resulted in a fatality or critical injury; again, 5% and 3% for fatalities and critical injuries respectively. These assumptions were also applied in a 2011 study commissioned by SLSA.

In undertaking this study, Deloitte Access Economics sought to revisit these assumptions as part of the survey. Patrolling members were first asked whether they considered the rescues assumptions used in the 2005 study to be reasonable. The majority of patrolling members indicated that they felt the rescues assumptions were reasonable, with 71% and 72% indicating this for the fatalities and critical injuries assumptions respectively.

Patrolling members were also asked whether they felt the rescues assumptions used in the 2005 study should be higher or lower. The majority of patrolling members indicated that no change was needed for either the fatalities (58%) or critical injuries (60%) assumptions. For those who did indicate that a change in the assumptions was required, most suggested that the proportion of rescues that would have resulted in either a fatality or a critical injury should be higher (see Chart 2.2).

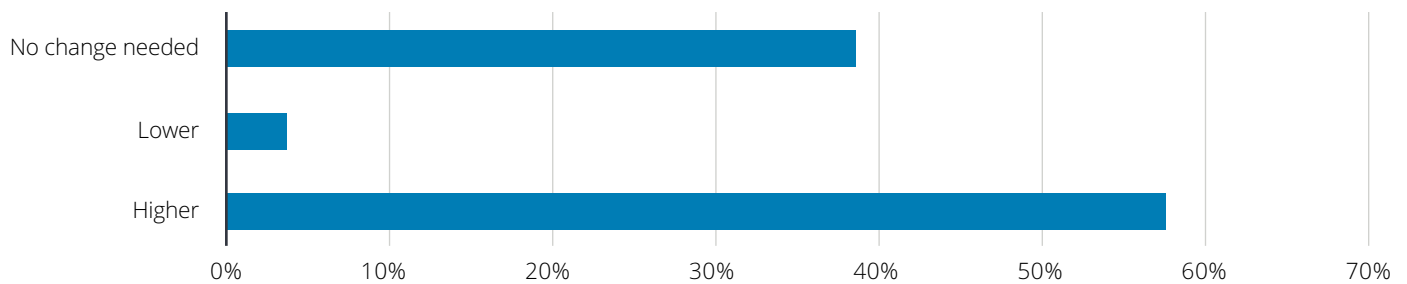
In addition, patrolling members were asked whether they considered the preventative actions assumption used in the 2005 study to be reasonable. The majority of patrolling members (51%) indicated that they felt the assumption was reasonable. However, when asked whether they felt the preventative actions assumption used in the 2005 study should be higher or lower, most (58%) suggested that the proportion of preventative actions that would have resulted in a rescue should be higher than 1% (see Chart 2.3).

**Chart 2.2: Response to 'Based on your patrolling experience, should these estimates be higher or lower?' (Proportion of rescues that would have resulted in a fatality or critical injury)**



Source: Deloitte Access Economics' national survey of SLS members.

**Chart 2.3: Response to 'Based on your patrolling experience, should this estimate be higher or lower?' (Proportion of preventative actions that would have resulted in a rescue)**



Source: Deloitte Access Economics' national survey of SLS members.

These survey findings were used to inform discussions with SLSA about what assumptions relating to the outcomes of its lifesaving services should be used in the analysis. The survey responses were also considered according to a range of member characteristics, including by years of active involvement in patrols, number of rescues, age and location or state. Although some minor variations were identified in responses across these member groups, there was a high level of consistency with the findings identified across all patrolling member groups.

Based on the broad support established from the recent survey for the assumptions used in the 2005 study, the current analysis retains these assumptions to estimate the incidence of fatalities and critical injuries in the base case. This reflects the expected outcomes in a scenario where the lifesaving services provided by SLSA do not exist. This approach promotes consistency and comparability with the results of the 2005 and 2011 studies.

It also can be viewed as a conservative approach, given that the survey findings showed many patrolling members felt the proportions of rescues, and preventative actions in particular, would be higher than those reflected in the earlier assumptions. However, the findings from the current survey have been used to inform sensitivity testing of the analysis results (see sections 5.2.2 and 5.2.3).

Using the assumptions from the 2005 study, Chart 2.4 illustrates the relationship between the estimated number of rescues, avoided rescues (which are avoided as a result of preventative actions), and avoided fatalities and critical injuries. Over the period of analysis, it is estimated that the actions performed by SLSA will prevent 1,363 coastal deaths and 818 critical injuries from occurring each year.

**2.1.2.3 Value of lives saved and critical injuries avoided**

To estimate the value of the lives saved as a result of the actions performed by surf lifesavers and ALS lifeguards, the value of an individual life must be defined. Guidance published by the Department of the Prime Minister and Cabinet suggests that a credible estimate of the value of a statistical life is \$4.9 million in 2019 dollars;<sup>16</sup> this reflects a value of \$4.98 million in 2020 dollars. In line with this guidance, each life that is saved as a result of an action performed by SLSA is valued at \$4.98 million in the analysis.

For critical injuries, a study by Royal Life Saving Society Australia found that the average cost of a non-fatal drowning incident is approximately \$400,000 in 2016 dollars.<sup>17</sup> This reflects a cost of \$429,466 in 2020 dollars, which has been used in the analysis to estimate the value of each critical injury avoided as a result of SLSA actions. The cost of a non-fatal drowning takes into account the costs of medical care, burden of disability and ongoing healthcare needs, as well as short and long-term impacts on productivity.

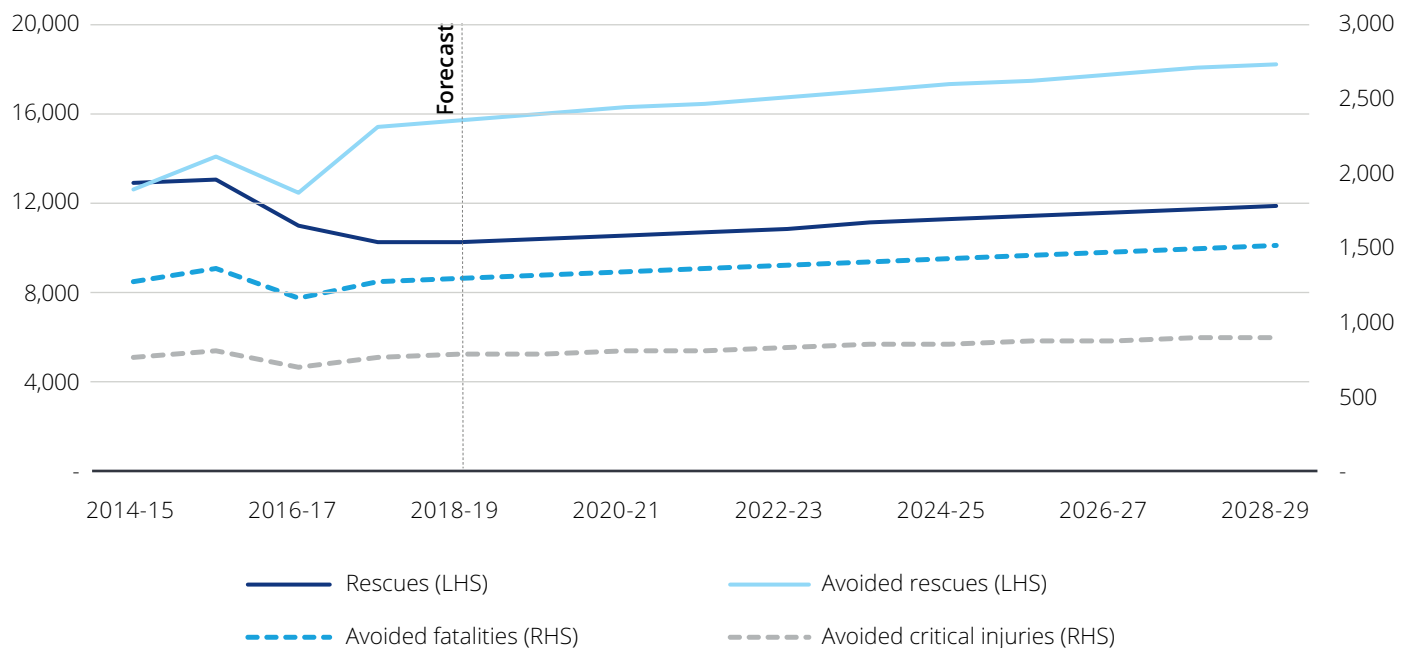
**2.1.3 Estimated value**

Over the period of analysis, it is estimated that the interventions performed by surf lifesavers and ALS lifeguards will result in 20,450 avoided fatalities and 12,270 avoided critical injuries. This reflects an average of 1,363 avoided fatalities each year, and 818 avoided critical injuries each year.

The value of these avoided fatalities and critical injuries is estimated at \$91.6 billion in present value terms, or an average of \$6.1 billion each year.

The actions performed by Surf Life Saving Australia are expected to prevent 1,363 coastal deaths and 818 critical injuries each year.

**Chart 2.4: Estimated number of rescues, avoided rescues, avoided fatalities and critical injuries, 2014-15 to 2028-29**



Source: Surf Life Saving Australia, Deloitte Access Economics.



## 2.2 Benefit 2: Education and training

### 2.2.1 Summary

Through its network of affiliated clubs, SLSA offers both members and non-members the opportunity to complete a wide variety of education and training programs, known as 'awards'. The content of these programs vary, giving participants the opportunity to attain proficiency in skills that are relevant not only to lifesaving, but also across a range of other disciplines.

Some awards are considered fundamental in developing the skills required for beach patrols. For example, all adult patrolling members must hold a current Bronze Medallion – and those under the age of 15 must hold a Surf Rescue Certificate – before they can be involved in patrols on the beach.

Other awards are more voluntary in nature, allowing members to broaden their skills so they can assist their club to a greater extent in lifesaving and other activities. For example, some awards are related to radio operation, inflatable rescue boat (IRB) operation (as a driver or crew member), assisting as a member of an aquatic search team, facilitating training and assessments, and becoming qualified as a coach or competition official for surf sports.

With each additional qualification that a member completes, they are able to take on greater responsibilities for their club and on beach patrols. However, many of these awards also have application outside the SLS setting. For example, courses in first aid and CPR enable participants to assist not only with an emergency on the beach, but also to render assistance in a non-patrolling medical emergency.

In addition, it can reasonably be expected that completing an SLSA award will assist some members to find employment. For example, completing a Bronze Medallion – which also qualifies members for a Certificate II in Public Safety (Aquatic Rescue) – may lead to a participant becoming a paid lifeguard. First aid qualifications are often relevant for roles in the education, hospitality, sport and recreation and medical industries, and award holders may receive a higher wage because of this.

For some roles within these industries, it may be either a requirement or a recommendation for workers to hold a first aid qualification, or there may be a requirement for one member of staff on premises to hold a qualification. Finally, training and assessment qualifications also have application in a variety of professional settings.

Given the wide potential application of SLSA awards, the value of SLSA's education and training programs is estimated from two sources:

- The benefit to the Australian community from having more members of the population (including members and non-members) equipped with CPR skills, in terms of lives saved
- The benefit to members themselves from completing an SLSA award, which may assist them to secure paid employment.

### 2.2.2 Key inputs and assumptions

#### 2.2.2.1 Number of awards completed

The first source of benefit is related to the lives saved by both SLSA members and members of the community that complete a first aid award. Many of the awards offered by SLS clubs contain some element of first aid training; however, in this analysis, it is assumed that only awards that contain a CPR component will equip participants to save a person's life in an emergency situation. A list of SLSA awards that contain a CPR component is provided in Appendix C.

In addition, only the first instance of an individual completing an award with a CPR component is considered. That is, if an individual completes a number of CPR awards, only completion of the first award is considered. This reflects the fact that successive completions of a CPR award likely result in a person maintaining their competency or level of skill in this area, rather than acquiring new skills that allow them to assist in a wider variety of emergencies.

From 2014-15 to 2018-19, it is estimated that an average of 10,582 SLSA members and 86,285 members of the Australian community completed a CPR award for the first time with SLSA each year.<sup>18</sup> It is assumed that the number of CPR awards to be completed for the first time by SLSA members will remain constant over the period of analysis. That is, the number of members to complete a CPR award for the first time is expected to remain constant at 7,148 per year, which is consistent with the last year of available data, 2018-19.

The number of community members who complete a CPR award for the first time is forecast to increase over time in line with Australian population growth forecasts (see section 2.1.2.1). This growth is applied to the estimated 99,217 community members who completed a CPR award for the first time in 2018-19.

The second source of benefit is related to the ability of members to secure paid employment as a result of the qualifications and skills they have acquired from their SLSA training.<sup>19</sup> All awards, whether they contain a CPR component or not, have the potential to contribute to a member securing paid employment. Again, only the first award that an individual completes is considered.

From 2014-15 to 2018-19, it is estimated that an average of 11,107 SLSA members completed an award for the first time each year. Similar to the number of members to complete a CPR award for the first time, it has been assumed that the number of awards to be completed for the first time by SLSA members will remain constant over the period of analysis. That is, the number of members to complete any award for the first time is expected to remain constant at the 2018-19 level, with 8,110 first-time award completions per year.

Over the period of analysis, 124,392 SLSA members and more than 1.5 million members of the Australian community are expected to complete a CPR award for the first time. Further to this, 136,633 SLSA members are expected to complete any award for the first time.

### 2.2.2.2 CPR and rate of survival

A study by Groeneveld et al (2005) considered the costs and health benefits of alternative resuscitation training strategies for adult laypersons; that is, those without professional first-responder occupations. The study found that each CPR qualification may be associated with 2.7 quality-adjusted hours of life saved.<sup>20</sup> In other words, for each additional person who completes CPR training, an average of 2.7 hours of life is expected to be saved in the future.

This estimate reflects the fact that many people who complete CPR training may never be required to perform it. However, some people will encounter a life-threatening emergency in which their CPR training enables them to render care that saves a person's life. Therefore, this study applies an assumption that for each person that completes a CPR award for the first time with SLSA – including both members and non-members – 2.7 hours of life is saved in the future.

The findings from the survey support the assumption that some people who complete a CPR award with SLSA will encounter a life-threatening emergency in the community, in which their training enables them to provide care. Across patrolling and non-patrolling members, 88% indicated that they had completed CPR training with either SLSA or an external organisation, or both. For CPR-trained members, almost one in five (19%) indicated that they had encountered a non-patrolling medical emergency in which they had been able to use their skills to administer CPR.

In addition to formal CPR training, SLSA also provides members with opportunities to practice their skills during beach patrols in the form of scenario training, which may assist to improve CPR performance. For example, one study found that frequent, short-duration CPR training was effective in improving CPR performance, with monthly training more effective than training every three, six or 12 months.<sup>21</sup>

### 2.2.2.3 Value of lives saved

In estimating the value of the lives saved as a result of the actions of surf lifesavers and ALS lifeguards, this study aligns with guidance published by the Department of the Prime Minister and Cabinet. The guidance suggests that a credible estimate of the value of a statistical life is \$4.9 million in 2019 dollars (see section 2.1.2.3).<sup>22</sup> The same guidance note suggests that a value of \$213,000 should be used as an estimate for the value of a statistical life year. This reflects a value of \$216,340 in 2020 dollars.

Based on an average year of 365.25 days (or 8,766 hours), an estimate of \$24.68 is derived for the value of an hour of life. This value is used in the analysis to estimate the value of the hours of life saved by members and non-members who complete CPR training with SLSA.

### 2.2.2.4 Contribution of awards to securing paid employment

While it is unlikely to be a primary reason that members undertake training with SLSA, the findings from the survey indicate that some members who complete awards find that their qualifications and skills assist them to secure paid employment. The survey found that 77% of members had completed an award through their SLS club. Among those that had completed an award, 25% believed their training had assisted them at least to some extent to secure paid employment.

The analysis weighted responses to estimate the extent to which the award had contributed to a member securing employment, depending on whether a member had indicated their training assisted them 'to some extent', 'to a large extent' or 'to a very large extent'. Using this approach, the analysis derived an assumption that 10.1% of members who complete an award with SLSA will secure paid employment as a result of the new qualifications and skills they have acquired.

One in five members who completed CPR training encountered a non-patrolling medical emergency and administered CPR.

For members who completed an award, 25% believed their training assisted them to gain employment.





#### 2.2.2.5 Average tenure of employment

For members that do secure employment as a result of their SLSA award, it is reasonable to assume that they would remain in their role for a period of time until either their employment ends or they decide to pursue other opportunities. Analysis by McCrindle (2019) suggests that the average tenure of employment for Australian employees is 2.9 years.<sup>23</sup> The analysis therefore assumes that members who secure employment as a result of their award will remain in their role for 2.9 years.

It is also unlikely that a member would secure employment immediately following the completion of their award. To account for this, the analysis assumes that a member commences their employment in the financial year following the year in which they complete their award.

#### 2.2.2.6 Average income

SLSA awards equip participants with a broad range of employment-related skills, including first aid and CPR, water safety, leadership, as well as coaching, teamwork, communication, facilitation and training skills. As a result, members who complete SLSA awards may find employment across a variety of industries (see section 2.2.1).

Given the variety of roles for which an SLSA award may be relevant, average weekly earnings across all industries is used to estimate the value of this source of benefit. The average income of an individual is estimated at \$1,256.20 per week, which reflects average weekly earnings for all employees, including full-time, part-time and casual workers.<sup>24</sup>

#### 2.2.3 Estimated value

Over the period of analysis, it is estimated that more than 4.4 million hours of life will be saved by members and non-members who complete CPR training with SLSA; this reflects an average of 294,855 hours of life saved each year.

In addition, 13,853 members are expected to secure employment as a result of SLSA awards, or an average of 924 per year.

The value of SLSA's education and training programs is estimated at \$2.1 billion in present value terms, or an average of \$140.0 million each year.

Each year, 294,855 hours of life is expected to be saved as a result of CPR training provided by Surf Life Saving Australia.

## 2.3 Benefit 3: Social benefits of volunteering

### 2.3.1 Summary

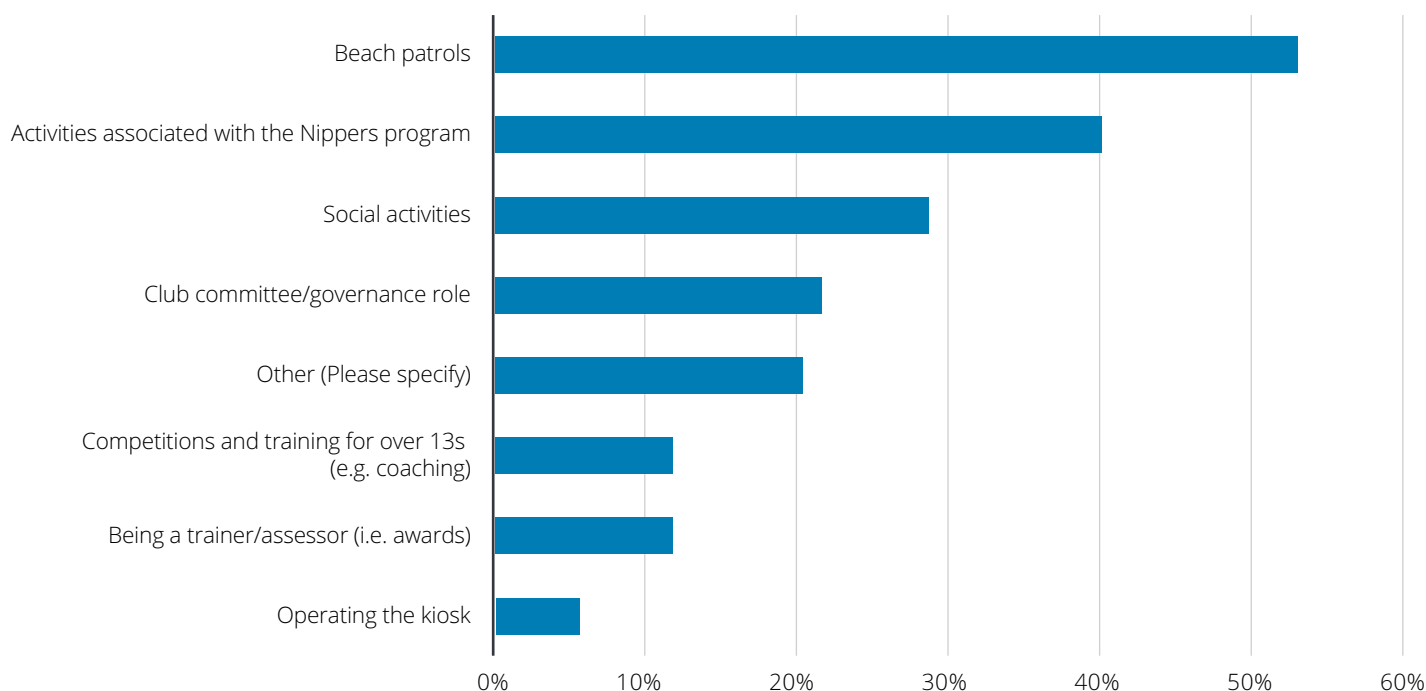
SLSA members volunteer in a variety of ways for their club. The findings from the survey indicate that 90% of members volunteer for their club in some way. Members are most commonly involved in volunteer beach patrols, with 53% of all respondents selecting this option (see Chart 2.5), broadly reflecting the proportion of respondents who indicated they were patrolling members who were actively involved in patrols (51%). In addition to beach patrols, a substantial proportion of respondents (40%) volunteer by supporting activities associated with the Nippers program. These may include parents of children who assist with water safety during the program, or age group managers who facilitate the activities.

Other members volunteer for their club by supporting social activities (29%), by fulfilling a club committee or governance role (22%), officiating and coaching for surf sport competitions (12%) and delivering training courses (12%).

Each member receives a personal benefit from the hours they spend volunteering. This can be assumed because volunteer commitments represent an opportunity cost on members' time. The time spent by a member to volunteer for their club comes at the cost of the next best use of that member's time. It follows that the benefit that a member receives from volunteering must exceed the opportunity cost of doing so, otherwise a member would spend their time on other activities.

This analysis assumes that working in paid employment represents the next best use of an individual's time. That is, if a member chooses to spend their time volunteering for their club, then they must receive at least as much benefit, if not more, from volunteering as they would from a wage that could be earned. Using this assumption, the benefit that SLSA members receive from their membership is estimated by valuing the hours that they spend volunteering, based on a relevant hourly wage rate.

Chart 2.5: Response to 'In what ways do you volunteer for your club? Please select all that apply.'



Source: Deloitte Access Economics' national survey of SLS members.

## 2.3.2 Key inputs and assumptions

### 2.3.2.1 Volunteer hours

The value of the personal benefit that SLSA members receive from their membership is primarily driven by the number of hours that members – both patrolling and non-patrolling – spend engaged in volunteer activities for their club. However, it should be noted that this benefit does not consider the number of hours that members spend patrolling beaches and delivering training courses as a trainer or assessor. The exclusion of these hours avoids double counting the benefits, since Benefit 1 and Benefit 2 already capture the outcomes generated by volunteer time spent patrolling beaches and delivering training courses. Therefore, the value of this benefit is intended to capture only the benefits of additional volunteer time, such as time spent officiating competitions, coaching surf sports, undertaking a club committee or governance role, or assisting with running the Nippers program.

The number of patrolling and non-patrolling members across Australia was sourced from SLSA annual reports from 2014-15 to 2018-19. Average annual growth in the number of members (excluding Nippers) over this period was 1.8%; however, this growth was inconsistent from year to year, with only 0.2% growth in the number of members between 2015-16 and 2016-17, compared to 2.6% growth from 2016-17 to 2017-18. Therefore, the number of patrolling and non-patrolling members is forecast to increase over time in line with Australian population growth forecasts (see section 2.1.2.1). This growth is applied to the total of 114,268 patrolling and non-patrolling members in 2018-19.

The findings from the survey indicate that in addition to the time spent on beach patrols and delivering training courses, patrolling members spend an average of 2.8 hours volunteering for their club each week. Similarly, in addition to the time spent delivering training courses, non-patrolling members spend an average of 2.0 hours each week volunteering for their club. Both of these estimates reflect a seasonal adjustment, as both patrolling and non-patrolling members spend more time volunteering each week during the surf season than during the off season. Over the period of analysis, it is estimated that SLSA members will collectively spend over 14.4 million hours each year volunteering for their clubs, in addition to beach patrols and delivering training courses.

### 2.3.2.2 Wage rate

An average hourly wage of \$43.65 is used in this analysis. This reflects an average full-time wage for employees across all industries of \$1,658.70 per week,<sup>25</sup> and a full-time working week of 38 hours.<sup>26</sup>

### 2.3.3 Estimated value

Over the period of analysis, SLSA members are expected to spend more than 216.3 million hours volunteering for their clubs (over 14.4 million hours each year) in addition to hours spent on beach patrols and delivering training courses. The value of the social benefits received by members is estimated at \$8.1 billion in present value terms, or an average of \$538.5 million each year.

Members are expected to spend over 14 million hours volunteering each year, in addition to patrols and delivering training.

## 2.4 Benefit 4: Increased physical activity

### 2.4.1 Summary

Being a member of an SLS club provides access to a range of volunteering and other recreational opportunities, many of which involve various forms of physical activity. For example, the process of qualifying to become a volunteer surf lifesaver requires completion of the Bronze Medallion. To complete this qualification, participants must have a high level of fitness; as a prerequisite, each participant must be able to swim 400 metres in nine minutes or less prior to undertaking any water training or assessment activities.

Obtaining the qualification itself requires participants to demonstrate their surf skills through intense physical activities, including a 200 metre run followed by a 200 metre swim and another 200 metre run within eight minutes, patient lifts and carries without any equipment, and board and tube rescues.<sup>27</sup>

Once qualified, continuing in a volunteer surf lifesaver role requires members to maintain a high level of fitness, which is consistent with the level required to gain the Bronze Medallion. This is assured through the skills maintenance requirements of the award, which require members to complete an annual requalification activity under the supervision of an SLSA assessor to demonstrate their ongoing proficiency as a surf lifesaver.

In addition to the requirements to qualify as a surf lifesaver, patrolling members who meet their minimum patrol hour requirement are eligible to compete in surf sport competitions. A variety of members-only national competitions are hosted by SLSA, and state competitions are also hosted by each state or territory entity.

These competitions allow patrolling members to apply their lifesaving skills in a competitive environment, which encourages members to maximise their capabilities through preparation and physical training so they can perform at their best at competitions.

For non-patrolling members, many clubs offer other opportunities that both support and encourage members to engage in physical activities. For example, many clubs offer gym facilities, which are increasingly available to those who may want to join the gym but prefer not to become involved with other club activities.

The health and wellbeing benefits of regular physical activity are well documented in research, and include:

- Reduced risk of cardiovascular disease
- Reduced risk of type 2 diabetes
- Improved blood pressure, cholesterol and blood sugar levels
- Reduced risk of some cancers
- Reduced risk of and improved management of mental health issues
- Assistance with weight loss
- Increased muscle and bone strength.<sup>28</sup>

The Australian Department of Health publishes guidelines on physical activity, which are designed to help Australians achieve sufficient physical activity to realise the benefits for their health. For adults aged 18 to 64 years, the guidelines recommend accumulating minimum of 150 minutes of moderate intensity physical activity or 75 minutes of vigorous intensity physical activity each week, or an equivalent combination of both moderate and vigorous activities. The guidelines also recommend that people should be active most days of the week, and do muscle strengthening activities on at least two days each week.

The Australian Institute of Health and Welfare (AIHW) defines physical inactivity as an adult who did not participate in sufficient regular physical activity to gain a health benefit. Similar to the Department of Health guidelines, the AIHW indicator of insufficient physical activity for adults aged 18 to 64 years old is measured as those completing less than 150 minutes of moderate intensity physical activity, or 75 minutes of vigorous intensity physical activity, across five sessions per week. For adults aged 65 years and older, the AIHW indicator of insufficient physical activity is measured as those completing less than 30 minutes of moderate or vigorous intensity physical activity on at least five days per week. In 2017-18, more than half of all adults (55%) across Australia did not participate in sufficient physical activity for their age group.<sup>29</sup>

In contrast, the findings from the survey indicate that the majority of SLS members (67%) are currently sufficiently physically active based on the Department of Health guidelines on physical activity. For many members, being a part of SLS encourages them to live a more active and healthier lifestyle, which ultimately benefits their physical and mental health. As a result of achieving the national standards of sufficient physical activity, these members are at a reduced risk of developing a range of serious chronic health conditions and diseases, which reduce a person's quality of life and may result in early mortality. Therefore, the value of increased physical activity for members as a result of their involvement with SLS is estimated by measuring the avoided costs of developing a health condition linked to physical inactivity.

## 2.4.2 Key inputs and assumptions

### 2.4.2.1 The cost of physical inactivity

Physical inactivity is associated with an increased risk of several chronic health conditions and diseases. In 2015, physical inactivity was associated with over 121,000 disability-adjusted life years (DALY).<sup>30</sup> The DALY is a measure of disease burden and reflects the number of years lost due to ill health, disability or early death. In other words, across Australia, insufficient physical activity resulted in the premature loss of over 121,000 years of life, either due to people dying prematurely or suffering from conditions which decreased their quality of life.

It may seem extreme to suggest that insufficient physical activity results in some people dying prematurely. However, the analysis considers that insufficient physical activity leads to an increased risk of several diseases identified by the AIHW, including bowel cancer, breast cancer, coronary heart disease, stroke, type 2 diabetes and uterine cancer. Each of these diseases may, in time, lead to premature death or a lower quality of life.

The total burden of diseases linked to physical inactivity in 2015 is estimated at \$26.2 billion in 2020 dollars. This is based on the estimated value of a statistical life year used in this analysis of \$216,340 (see section 2.2.2.3). This burden is largely accounted for by the older population, with 67% of the total burden associated with Australians aged 65 years and older.

The *National Health Survey 2014-15* found that more than 9.6 million Australian adults were insufficiently physically active.<sup>31</sup> The proportion of the population that were insufficiently physically active increased with each age group, ranging from 48% of those aged 18-24 years to 65% of those aged 65 years and older.

Using the estimated total cost of physical inactivity in Australia, and the number of people who were insufficiently physically active, an estimate of the average cost per insufficiently physically active person was derived. The average cost of physical inactivity per person is estimated at \$2,709.99. The estimated cost per person varies greatly with age, with a cost of \$57.97 for each person aged between 15 and 24 years, and \$22,200.10 per person for those aged over 85 years.

### 2.4.2.2 Number of members who would be insufficiently physically active without SLS

As part of the survey, members were asked to indicate the number of minutes of moderate and vigorous intensity exercise they performed in the past week and how much exercise they normally do in the off season compared to the surf season. Moderate intensity exercise was defined as when a person's breathing quickens but they are not out of breath; it includes activities such as brisk walking, swimming, yoga and light cycling. Vigorous intensity exercise was defined as when a person's breathing is deep and rapid and includes activities such as running, interval training, hill hiking and rapid or uphill cycling. Members were also asked to indicate the days of the past week on which they performed their exercise sessions.

The findings from the survey indicate that patrolling members perform an average of 221 minutes of moderate intensity exercise and 122 minutes of vigorous intensity exercise each week. Non-patrolling members were found to have performed a similar amount of exercise, with an average of 220 minutes of moderate intensity exercise and 119 minutes of vigorous intensity exercise per week. On average, both patrolling and non-patrolling members performed exercise on 5.4 days per week.

Based on the survey findings and the Department of Health guidelines on physical activity, it is estimated that 67% of SLS members are sufficiently physically active. This proportion is significantly higher than the 45% of Australian adults that were sufficiently physically active in 2017-18, as reported by the AIHW (see section 2.4.1).

To credibly estimate the value of increased physical activity for members as a result of their involvement with SLS, it must be established whether members who are currently sufficiently physically active would remain so if they were not involved with SLS. This concept is difficult to ascertain. A potential approach is to assume that in the absence of SLS, the proportion of members who would remain sufficiently physically active would match the proportion of the Australian population (45%). However, this approach ignores the possibility that many SLS members are people who intrinsically value a healthy and active lifestyle; therefore, in the absence of SLS, it is entirely possible that most members would still maintain a high level of physical activity in other forms of recreation.

To account for this possibility, members were asked as part of the survey how they expect their level of exercise would change if they were no longer a member of their SLS club. The majority of members (74%) indicated that they didn't expect the amount of exercise they do would change. Members were also asked to provide a reason for their response, with many respondents using the free-text response field to state that their level of exercise would not change because they would simply participate more in another sport or fitness activity. This includes those who indicated that they would take up an entirely new activity and those who already participate to a large extent in another activity outside of SLS. Only 4% of members indicated that they would perform more exercise each week if they were no longer a member of SLS, with 37% of these members suggesting this was because they would have more time to exercise.

Almost a quarter of members (23%) indicated that they would do less exercise each week if they were no longer a member of their SLS club. The main reasons given for this were that members do much of their exercise in order to remain fit for their role with SLS (33%) and because they do much of their exercise as part of their membership, including participating in beach patrols and surf sports (33%).

However, for many members who indicated that they would do less exercise if they were no longer a member of SLS, the analysis found that they would still be considered sufficiently physically active according to the Department of Health guidelines on physical activity. This finding was derived by weighting responses for minutes of exercise per week, depending on whether a member had indicated that they would do 'less than half' of what they currently do or 'a half or more' of what they currently do if they were no longer a member of SLS.

Using this approach, the analysis estimates that of the members who are currently sufficiently physically active, 4.8% of them would no longer be sufficiently active if they were not a member of SLS. This reflects about 5,485 people when applied to all patrolling and non-patrolling members in 2018-19. Due to their involvement with SLS, these members are at a reduced risk of developing a range of serious chronic health conditions and diseases linked to physical inactivity. Therefore, these members experience positive health benefits that are directly attributable to their involvement with SLS.

#### **2.4.3 Estimated value**

Over the period of analysis, it is estimated that more than 548.1 disability-adjusted life years (DALYs) will be avoided as a result of increased levels of physical activity among members due to their involvement with SLS; this reflects an average of 36.5 avoided DALYs each year.

The value of these avoided DALYs is estimated at \$101.4 million in present value terms, or an average of \$6.8 million each year.







# 3 Counting the costs

In delivering its coastal safety, lifesaving and education services, SLSA and its related entities incur a variety of costs, which are considered in the analysis.

Three main sources of costs are estimated, which include:

1. Operating expenditure
2. Capital expenditure
3. Value of volunteering time.

A brief description of each of the costs is presented in Figure 3.1.

These costs are discussed in the following sections, along with the approach that has been used in estimating their value.

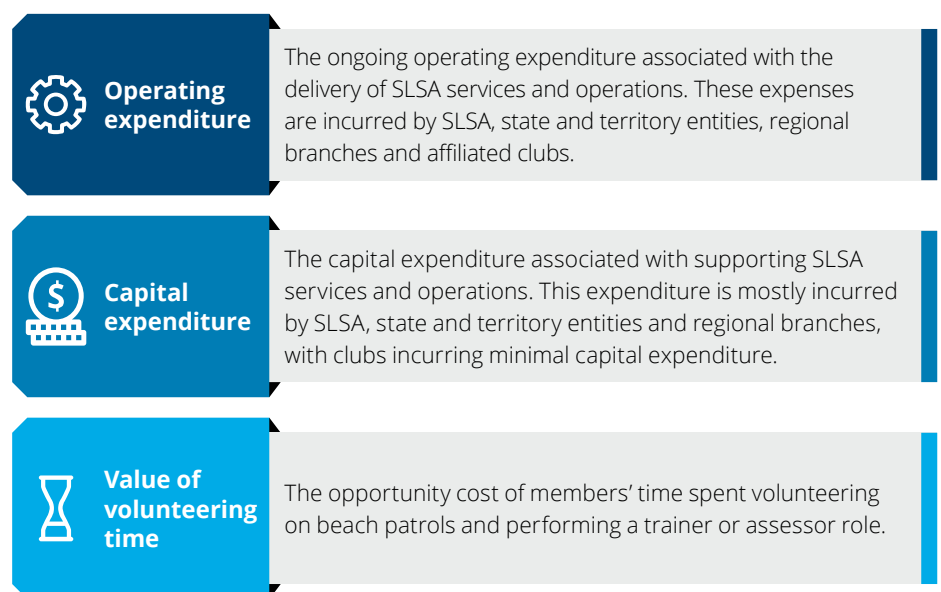
## 3.1 Cost 1: Operating expenditure

SLSA, state and territory entities, branches and affiliated clubs incur operating expenditure associated with the delivery of their services and operations. To estimate total operating expenses for SLSA and its related entities, financial data was collected from a combination of publicly available financial statements and club-level financial data held by the various state and territory entities. In total, financial data was collected for 354 individual SLS entities.<sup>32</sup>

The operating expenses represent the largest proportion (73%) of total costs incurred from 2014-15 to 2018-19, with a total value of \$1.3 billion in 2020 dollars.<sup>33</sup> This excludes any expenses that relate to distributions between SLS entities.

Total operating costs averaged \$257.4 million per year between 2014-15 and 2018-19. Across all entities (SLSA, state centres, branches and clubs), the main expense items relate to the delivery and servicing of member programs and services associated with lifesaving, education, training, member development, helicopter and support operations, insurance and building expenses.

**Figure 3.1: Summary of estimated costs**







Between 2014-15 and 2018-19, total operating costs increased by an average annual growth rate of 2.4% in real terms. Therefore, the analysis assumes that operating costs for SLSA entities will continue to increase beyond 2018-19 at a rate of 2.4% per year. This suggests that over time, as the SLS movement continues to grow both in terms of the number of members and its core services and operations, it is expected that the ongoing operating expenses associated with the running of the organisation will also continue to increase. Over the period of analysis, total operating expenses for all entities is estimated at \$3.7 billion in present value terms, or an average of \$248.8 million each year.

### 3.2 Cost 2: Capital expenditure

Compared to operating expenses, total capital expenditure incurred by SLSA and its related entities is relatively small, accounting for only 3% of total costs incurred from 2014-15 to 2018-19 with a total value of \$53.8 million in 2020 dollars.<sup>34</sup> One reason for this is that the majority of club facilities are leased, with few clubs holding ownership of their land and facilities. Therefore, most clubs do not incur significant capital expenditure. Instead, capital expenditure is mostly incurred by SLSA and the state and territory entities, and so data was collected from publicly available financial statements for these entities.<sup>35</sup>

Total capital expenditure averaged \$10.8 million per year between 2014-15 and 2018-19. For SLSA, state and territory entities and the branches, capital expenditure generally relates to the purchase of equipment on behalf of clubs to support them in carrying out their patrolling duties.

This may include motor vehicles, helicopters, inflatable rescue boats (IRBs) and jet skis. It may also relate to the purchase or refurbishment of buildings, land and leasehold improvements.

From 2014-15 to 2018-19, total capital expenditure decreased by an average of 13.1% each year in real terms. However, capital costs are not expected to continue to decrease for an extended period of time. Instead, capital expenditure is likely to fluctuate from year to year, with the timing of those fluctuations difficult to predict.

Therefore, the analysis assumes that capital costs for SLSA entities will remain constant during the forecast period. Beyond 2018-19, the annual average of total capital expenditure incurred between 2014-15 and 2018-19 (\$10.8 million) is used for this purpose. Over the period of analysis, total capital expenditure for all entities is estimated at \$139.6 million in present value terms, or an average of \$9.3 million each year.

### 3.3 Cost 3: Value of volunteering time

As discussed in section 2.3.1, the time spent volunteering represents an opportunity cost to members. In 2018-19, a total of 43,092 volunteer surf lifesavers spent more than 1.3 million hours of their own time patrolling beaches across Australia.<sup>36</sup> This reflects an average of 32.0 hours for each patrolling member. The time spent by volunteer surf lifesavers on beach patrols is a major factor that underpins the benefits generated from avoided fatalities and critical injuries (see section 2.1), and therefore the opportunity cost of this time is included as a cost in the analysis.

It is assumed that each patrolling member will continue to complete a comparable number of patrol hours over the period of analysis, and so the 5-year average of 31.9 hours is used to forecast the total number of patrol hours in the future. Consistent with the approach used in estimating the value of the personal benefits that SLSA members receive from their membership, the number of patrolling members is forecast to increase over time in line with Australian population growth forecasts (see section 2.3.2.1). This growth is applied to the total of 43,092 patrolling members in 2018-19. Over the period of analysis, it is estimated that volunteer surf lifesavers will collectively spend over 21.8 million hours on patrol at Australian beaches, or an average of over 1.4 million hours each year.

Both patrolling and non-patrolling members also volunteer their time to assist with the delivery of training courses. As estimated as part of Benefit 2 (see section 2.2), these training programs generate benefits both for the members who undertake the training as well as for the Australian community from having more members of the population equipped with CPR skills. The time spent by volunteers in providing this training also represents an opportunity cost to members.

The findings from the survey indicate that 19% of patrolling members and 3% of non-patrolling members volunteer as either a trainer or assessor. In addition, it was found that on average, patrolling members who volunteer as trainers or assessors commit an average of 1.4 hours each week, while non-patrolling trainers and assessors commit an average of 0.2 hours per week. These estimates of average weekly hours reflect that members spend more time delivering training courses during the surf season compared to the off season. Using these survey findings, it is estimated that in 2018-19, patrolling and non-patrolling members committed a total of 612,759 hours to volunteering as trainers and assessors.

It is assumed that the proportions of patrolling and non-patrolling members who volunteer as either a trainer or assessor will remain unchanged in the future.

Therefore, the number of trainers and assessors in the future is based on the forecasts of the total number of patrolling and non-patrolling members over time, which were established in estimating the value of the personal benefits that SLSA members receive from their membership (see section 2.3.2.1). Using this approach, it is estimated that members will collectively spend over 9.7 million hours in delivering training courses over the period of analysis. This reflects an average of 647,034 hours each year.

Consistent with the approach used to estimate the value of the personal benefits that SLSA members receive from their membership, an average hourly wage of \$43.65 is used to capture the opportunity cost of each hour of volunteering (see section 2.3.2.2). This reflects the opportunity cost of members' time by estimating the income that may have been earned if they spent their time working in paid employment, rather than volunteering on beach patrols or delivering training courses.

Over the period of analysis, it is estimated that the volunteer hours spent by members on beach patrols and delivering training courses represents an opportunity cost of \$1.2 billion in present value terms, or an average of \$78.5 million each year.







# 4 Qualitative benefits

The social and economic benefits generated by SLSA for the Australian community are wide ranging. Although this analysis presents an estimate of the value of SLSA's services in economic terms, not all of the benefits can be measured in this way. For some benefits, it is difficult to attribute a meaningful measure of economic value.

This section identifies three benefits that could not be reliably quantified as part of the analysis. The following benefits are discussed:

1. Improved mental health
2. Positive pathways for young people
3. Improved water safety for children.

## 4.1 Improved mental health

This study presents an estimate of the value of increased physical activity for members as a result of their involvement with SLS, which leads to benefits for their physical health in terms of a reduced risk of developing a serious chronic health condition or disease (see section 2.4).

However, evidence suggests that being a part of SLS may also lead to benefits for members' mental health, which is more difficult to measure in economic terms.

First, the increased physical activity of members also contributes to improved mental wellbeing. Exercise promotes the release of feel-good chemicals in the brain – like endorphins and serotonin – and supports improved sleep by allowing one to rest more fully at night, leading to increased energy levels during the day.<sup>37</sup> As a result, regular physical activity is associated with better mental health and emotional wellbeing and a reduced risk of developing a mental illness.

Studies have also revealed that physical activity may be beneficial as a complementary treatment for mental illnesses, including depression and anxiety.<sup>38</sup> Some studies also suggest that in treating depression, exercise may be as helpful as psychological therapy and antidepressants.<sup>39</sup>

There is also a social connection aspect of exercise. Many forms of exercise and sports take place as a shared activity with others, and often as part of a team; this is also true of surf sport events and competitions hosted and supported by SLSA.



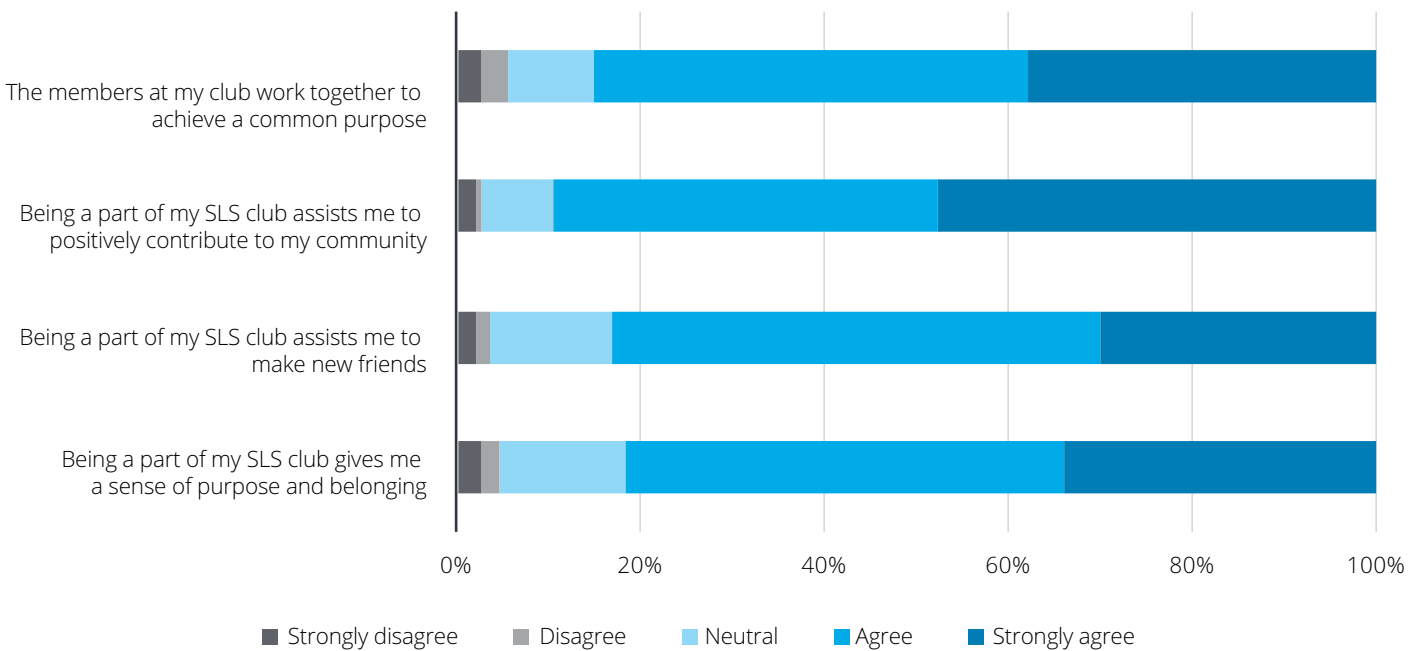
Participation in team sports can often assist a person to make new friends and build their personal support network, learn the value of teamwork and how to deal with setbacks and disappointments, and to develop leadership skills that are relevant in many areas of life.<sup>40</sup>

Many of these benefits also have relevance to being a part of a community group or organisation such as an SLS club, which provides opportunities for social connection. People with positive social connections report better quality and satisfaction with their life, are less likely to suffer from dementia, and experience less trouble sleeping. Being part of a group of like-minded people with shared interests also contributes to a sense of belonging and purpose.<sup>41</sup>

As part of the member survey, a range of statements were posed to both patrolling and non-patrolling members. These included whether being a part of their club gives them a sense of purpose and belonging, assists members with making new friends and contributing to their community, and whether they felt the members at their club worked together to achieve a common purpose. On average, 85% of members either agreed or strongly agreed with the relevant statements (see Chart 4.1).

These findings do not provide conclusive evidence that being a member of an SLS club results in positive mental health benefits; however, they do suggest that most members feel they experience personal benefits related to their mental health and wellbeing as a result of their membership. In addition, there is credible evidence to suggest that members' participation in surf sports and other physical activities related to their SLS involvement contributes to improved mental health and emotional wellbeing, and a lower risk of developing a mental illness.

**Chart 4.1: Responses to statements about the experience of being part of an SLS club**



Source: Deloitte Access Economics' national survey of SLS members.

## 4.2 Positive pathways for young people

A comprehensive study undertaken by the Australian Institute of Criminology investigated whether sport and organised physical activity programs positively impact on youth antisocial behaviour. Over 600 programs focusing on sport and physical activity were identified and analysed by means of literature review, surveys and case studies. The study found that well-structured sport and physical activity programs may assist in reducing youth antisocial behaviour. While this does not suggest that sport and physical activity programs have a direct impact on reducing antisocial behaviour, the report noted that these programs are an important mechanism through which positive personal and social development may occur.<sup>42</sup>

SLS provides opportunities for children aged five to under 14 years to enjoy the beach in a safe environment through the Nippers program. In 2018-19, 62,603 children across Australia participated in the Nippers program, across all age groups.<sup>43</sup> Delivered at beaches across Australia by SLS clubs, the Nippers program involves weekly activities which are generally scheduled on Sunday mornings during surf season. Nippers is designed to ensure children have fun at the beach while participating in lessons that provide them with a pathway to becoming an experienced participant in both lifesaving and surf sports.

The program progressively introduces knowledge and skills through lessons that are tailored to age groups, with each age group having between 10 and 16 lessons specific to their age and expected abilities. The program also acts as a learning pathway toward the Surf Rescue Certificate, which members can commence from the age of 13 years.

Completion of the Surf Rescue Certificate provides children with the opportunity to become involved with beach patrols, encouraging them to become involved in serving their community from a young age. This also provides a pathway to continued patrol service as an adult, with young patrolling members also able to complete the Bronze Medallion when they reach the age of 15 years. As long as a member completes the annual requalification process to demonstrate their ongoing proficiency, they may continue to participate in volunteer beach patrols for years to come.

In addition, many patrolling members participate in surf sports, with some competing in local, branch, state, interstate and national competitions. These competitions allow patrolling members to apply their lifesaving skills in a competitive environment (see section 2.4.1), providing pathways for members to maximise their capabilities and continue to compete at higher levels.

Although no direct link can be established between SLS programs and reducing antisocial behaviour in young people, the programs provide a sports and physical activity pathway that is available to children from a young age and leads to increasing opportunities as a member progresses in age and skill. Indeed, one of the aims of the Nippers program – apart from educating children in water safety – is to develop children into adult surf lifesavers who continue to serve the Australian community and carry on the legacy of the SLS movement into the future.

## 4.3 Improved water safety for children

This study presents an estimate of the value of SLSA's education and training programs in terms of the benefit to the community from having more people equipped with CPR skills, and the benefit to members themselves who may secure employment as a result of completing an SLSA award (see section 2.2). However, there are other benefits that may result from SLSA's education and training programs, which are more difficult to measure in economic terms.

One example is the improvement in coastal water safety skills for children who complete programs with SLSA, including SurfBabies (ages two to four years), SurfKids (ages five to seven years) and the Nippers program (see section 4.2). While the literature on surf awareness programs for children specifically is limited, a study by Brenner et al (2009) found that participating in formal swimming lessons is associated with an 88% reduction in the risk of drowning in children aged one to four years.<sup>44</sup> This finding may also have relevance for SLSA programs, which aim to build skills in water safety, beach safety and surf awareness, while also engaging parents to increase their ability to provide appropriate supervision to their children.







# 5 Total social and economic value

## 5.1 Summary of cost-benefit analysis outcomes

Over the 15-year period of analysis, it is estimated that Surf Life Saving Australia (SLSA) will generate a total net benefit to the Australian community of \$96.9 billion (total benefits less total costs). In addition, the services and operations of SLSA around the country – both now and in the future – yield a benefit-cost ratio (BCR) of 20.2. This means that for every \$1.00 invested into SLSA, a return of \$20.20 is achieved. Table 5.1 summarises the benefits and costs estimated in the analysis in present value terms.

The total net benefit of Surf Life Saving Australia to the Australian community is \$97 billion over the 15-year period of analysis.

Table 5.1: Summary of cost-benefit analysis outcomes, present value terms

Cost-benefit analysis outcome	
<b>Benefits</b>	<b>\$ million</b>
Coastal safety and lifesaving	\$91,630
Education and training	\$2,101
Social benefits of volunteering	\$8,078
Increased physical activity	\$101
<b>Total benefits</b>	<b>\$101,910</b>
<b>Costs</b>	<b>\$ million</b>
Operating expenditure	\$3,731
Capital expenditure	\$140
Value of volunteering time	\$1,178
<b>Total costs</b>	<b>\$5,049</b>
<b>Net benefits</b>	<b>\$96,861</b>
<b>BCR</b>	<b>20.2</b>

Source: Deloitte Access Economics. Note: The numbers in this table may not add due to rounding.





The net benefit and the high BCR is largely driven by the value of Benefit 1, which estimates the value of SLSA's coastal safety and lifesaving services. This benefit accounts for 90% of total benefits, or \$91.6 billion in present value terms.

The significant value of this benefit reflects the value of lives saved and critical injuries avoided as a result of the actions of SLSA volunteer surf lifesavers and paid lifeguards. The analysis estimates that each year, the rescues and preventative actions performed by surf lifesavers and ALS lifeguards will prevent 1,363 coastal deaths and 818 critical injuries from occurring. The value attached to these outcomes is high, with each life saved as a result of an action performed by SLSA valued at \$4.98 million in the analysis, and each critical injury avoided valued at \$429,466 (see section 2.1.2.3).

Even if all other benefits generated by SLSA were ignored, the social benefits of volunteering alone – which reflect the personal benefits received by members as a result of their volunteering – is sufficient to cover the costs associated with deriving all of the estimated benefits. This illustrates the significant benefits generated by SLSA for its members and the Australian community.

## 5.2 Sensitivity testing

Five sensitivity tests were undertaken by varying the key assumptions in the analysis. This allows the relative impact that these assumptions have on the net benefit and the BCR to be evaluated. The sensitivity tests undertaken include:

- Varying the value of a life
- Varying the proportion of rescues that would have resulted in a fatality or critical injury
- Varying the proportion of preventative actions that would have resulted in a rescue
- Varying the discount rate
- Varying the period of analysis.

The results of these sensitivity tests are discussed below.

### 5.2.1 Test 1: Varying the value of a life

Each life saved – or fatality avoided – as a result of an action performed by SLSA volunteer surf lifesavers and paid lifeguards is valued at \$4.98 million in the analysis (see section 2.1.2.3). This aligns with guidance published by the Department of the Prime Minister and Cabinet on estimates that may be used for the value of a statistical life and the value of a statistical life year.<sup>45</sup> However, a study by Royal Life Saving Society Australia provides an alternative value of a life.

For every \$1.00 invested into Surf Life Saving Australia, a return of \$20.20 is achieved.

**Table 5.2: Outcome of Test 1 – Varying the value of a life**

CBA outcome	Value of a life: \$4.98 million	Value of a life: \$4.56 million
Total benefits (\$ million)	\$101,910	\$94,667
Total costs (\$ million)	\$5,049	\$5,049
<b>Net benefits (\$ million)</b>	<b>\$96,861</b>	<b>\$89,618</b>
<b>BCR</b>	<b>20.2</b>	<b>18.8</b>

Source: Deloitte Access Economics.

This study found that the average cost of a fatal drowning incident is approximately \$4.25 million in 2016 dollars.<sup>46</sup> This reflects a cost of \$4.56 million in 2020 dollars. This estimate takes into account the value of hospital and medical costs, as well as the prematurity of death based on the age of the victim. As shown in Table 5.2, using this alternative estimate of the value of a life – or an avoided fatal drowning – does not significantly affect the net benefit and BCR.

**5.2.2 Test 2: Varying the proportion of rescues that would have resulted in a fatality or critical injury**

This analysis uses assumptions that were originally established in a 2005 study to estimate the incidence of fatalities and critical injuries in the absence of SLSA's lifesaving services (see section 2.1.2.2). That study found that in the absence of action by surf lifesavers and ALS lifeguards, 5% of all rescues would have resulted in a fatality and 3% of all rescues would have resulted in a critical injury.<sup>47</sup>

The findings from the survey undertaken as part of the current study indicate that the majority of patrolling members consider these assumptions to be reasonable, and most also indicated that they felt no changes were needed (see section 2.1.2.2). However, for those who indicated that a change in the assumptions was required, most suggested that the proportion of rescues that would have resulted in either a fatality or a critical injury should be higher (see Chart 2.2).

For those who suggested that the proportions should be higher, the majority (56%) suggested that the proportion of rescues that would have resulted in a fatality should be between 5% and 10%, while a further 18% of patrolling members felt it should be between 10% and 20%. The findings relating to the proportion of rescues that would have resulted in a critical injury were more varied, with 75% of patrolling members suggesting that the proportion of rescues that would have resulted in a critical injury should be between 3% and 20%. This included 18% who suggested it should be between 3% and 5%, 40% who suggested it should be between 5% and 10%, and 18% who suggested it should be between 10% and 20%.

On average, patrolling members indicated that in the absence of SLSA actions, 10% of all rescues would have resulted in a fatality and 8% of all rescues would have resulted in a critical injury. These findings reflect the average across all respondents, including those who indicated that the proportions should be lower, the majority who indicated no change was needed, and those who suggested the proportions should be higher.

Based on these findings, a sensitivity test is undertaken to investigate the impact of increasing the proportions of fatalities and critical injuries in a way that aligns with the averages across all respondents. In addition, a more moderate increase that aligns with the midpoint of the increase is tested. Table 5.3 presents the results of this sensitivity test, which demonstrates that the net benefit and BCR increase significantly in response to an increase in the estimated proportions of rescues that would have resulted in a fatality or critical injury.

**Table 5.3: Outcome of Test 2 – Varying the proportion of rescues that would have resulted in a fatality or critical injury**

CBA outcome	Fatalities: 5.0% Critical injuries: 3.0%	Fatalities: 7.5% Critical injuries: 5.5%	Fatalities: 10.0% Critical injuries: 8.0%
Total benefits (\$ million)	\$101,910	\$149,228	\$196,547
Total costs (\$ million)	\$5,049	\$5,049	\$5,049
<b>Net benefits (\$ million)</b>	<b>\$96,861</b>	<b>\$144,180</b>	<b>\$191,498</b>
<b>BCR</b>	<b>20.2</b>	<b>29.6</b>	<b>38.9</b>

Source: Deloitte Access Economics.

### 5.2.3 Test 3: Varying the proportion of preventative actions that would have resulted in a rescue

Similar to the proportion of rescues that would have resulted in a fatality or critical injury, this analysis uses an assumption from the 2005 study to estimate the proportion of preventative actions that would have resulted in a beachgoer needing to be rescued (see section 2.1.2.2). That study estimated that in the absence of an intervention, 1% of all preventative actions would have resulted in a rescue. A small proportion of these avoided rescues would then be expected to have resulted in a fatality or critical injury.

Although the survey findings from the current study indicate that the majority of patrolling members consider this assumption to be reasonable, most still

felt that the estimated proportion of preventative actions that would have resulted in a rescue should be higher than 1% (see Chart 2.3). For those who suggested that the proportion should be higher, the majority (58%) suggested that it should be between 1% and 10%. This included 23% who suggested it should be between 4% and 5% and 21% who suggested it should be between 9% and 10%.

On average, patrolling members indicated that in the absence of an intervention, 12% of all preventative actions would have resulted in a beachgoer needing to be rescued. This finding reflects the average across all respondents, including those who indicated that the proportion should be lower, those who indicated no change was needed, and the majority who suggested the proportion should be higher.

Based on this finding, a sensitivity test is undertaken by increasing the proportion of preventative actions. However, rather than aligning the sensitivity test with the averages across all respondents, a more modest increase is tested. As shown in Table 5.4, increasing the proportion of preventative actions that would have resulted in a rescue has a significant impact on the net benefit and BCR, even when compared to the impact of increasing the proportions of rescues that would have resulted in a fatality or critical injury (see section 5.2.2). This is mainly due to the large number of preventative actions performed over the period of analysis, with a total of more than 24.0 million preventative actions compared to 168,128 rescues (see section 2.1.2.1).

**Table 5.4: Outcome of Test 3 – Varying the proportion of preventative actions that would have resulted in a rescue**

CBA outcome	Preventative actions: 1.0%	Preventative actions: 2.0%	Preventative actions: 3.0%
Total benefits (\$ million)	\$101,910	\$155,607	\$209,305
Total costs (\$ million)	\$5,049	\$5,049	\$5,049
<b>Net benefits (\$ million)</b>	<b>\$96,861</b>	<b>\$150,559</b>	<b>\$204,256</b>
<b>BCR</b>	<b>20.2</b>	<b>30.8</b>	<b>41.5</b>

Source: Deloitte Access Economics.

### 5.2.4 Test 4: Varying the discount rate

Future benefits and costs estimated in this analysis are discounted at the rate of 7.0% per annum to derive their present values (see Appendix A, section A.2.6). This aligns with guidance published by the Department of the Prime Minister and Cabinet on the use of CBA for policy proposals.<sup>48</sup>

A sensitivity test is undertaken to investigate the relative impact of the discount rate on the net benefit and the BCR, which includes testing both a lower (4.0%) and a higher (10.0%) discount rate. As shown in Table 5.5, applying either a lower or a higher discount rate does not significantly affect the net benefit and BCR.

**Table 5.5: Outcome of Test 4 – Varying the discount rate**

CBA outcome	Discount rate: 4.0%	Discount rate: 7.0%	Discount rate: 10.0%
Total benefits (\$ million)	\$108,333	\$101,910	\$96,550
Total costs (\$ million)	\$5,378	\$5,049	\$4,774
<b>Net benefits (\$ million)</b>	<b>\$102,955</b>	<b>\$96,861</b>	<b>\$91,777</b>
<b>BCR</b>	<b>20.1</b>	<b>20.2</b>	<b>20.2</b>

Source: Deloitte Access Economics.



**5.2.5 Test 5: Varying the period of analysis**

The period of analysis for this CBA is defined as a timeframe of 15 years, from 2014-15 to 2028-29 (see Appendix A, section A.2.3). This period reflects five years of historic operations and 10 years of forecast activities and outcomes.

In 2018, Deloitte Access Economics undertook a study for Surf Life Saving Western Australia to estimate the economic value of its activities to the Western Australian community.<sup>49</sup> This study employed a 25-year period of analysis, including five years of historic operations and 20 years of future activities and outcomes. To support comparison with the results of the WA study, a sensitivity test is undertaken by extending the period of analysis to 25 years to reflect 20 years of forecast activities and outcomes. In addition, a more moderate extension to the timeframe is also tested.

Table 5.6 presents the results of this sensitivity test. Extending the period of analysis has a substantial impact on the net benefit, largely because of the longer time period over which the benefits are realised. Despite the increase in the net benefit, the longer timeframe results in a small decrease in the BCR. This is mostly due to the impact of discounting of future benefits and costs. The discount factor applied increases in each successive year of the analysis, meaning that benefits and costs occurring in more distant years into the future are subject to larger discount factors. This gradually erodes the values of benefits and costs over time, with the larger benefits seeing the most significant decreases.

**Table 5.6: Outcome of Test 5 – Varying the period of analysis**

<b>CBA outcome</b>	<b>Period of analysis: 15 years</b>	<b>Period of analysis: 20 years</b>	<b>Period of analysis: 25 years</b>
Total benefits (\$ million)	\$101,910	\$123,486	\$139,772
Total costs (\$ million)	\$5,049	\$6,204	\$7,117
<b>Net benefits (\$ million)</b>	<b>\$96,861</b>	<b>\$117,282</b>	<b>\$132,655</b>
<b>BCR</b>	<b>20.2</b>	<b>19.9</b>	<b>19.6</b>

Source: Deloitte Access Economics.







# Appendix A: Methodology

## A.1. About cost-benefit analysis

### A.1.1. What is cost-benefit analysis?

The basis of a cost-benefit analysis (CBA) is simple: for a given policy or investment, it compares the total estimated costs to the community and economy with the total estimated benefits. As such, a CBA determines whether the benefits outweigh the costs, and if so, to what extent.

CBAs are often undertaken to support government and commercial decisions regarding investment. However, CBAs can also be used to evaluate policy decisions about taxation, regulation and program spending.

The rationale for using a CBA as a decision-making tool is strong, given that public funds come at a significant cost to the economy (through taxes collected by local, state, and Commonwealth governments), and private funds can be invested into various other opportunities. Therefore, understanding the benefits generated from a particular investment is of significant value.

### A.1.2. The logic of cost-benefit analysis

In undertaking a CBA, the total estimated benefits of a policy or investment are compared with the total estimated costs in a discounted cash flow (DCF) framework, to determine whether the benefits exceed the costs in present value terms. The net return is expressed in the form of a ratio, referred to as the benefit-cost ratio (BCR).

A BCR greater than one indicates that net benefits related to the policy or investment are greater than net costs, suggesting value in undertaking the investment (or for every \$1.00 of investment, a return greater than \$1.00 is achieved). The reverse is true if the BCR is below one. However, not all benefits are quantifiable under a CBA framework. In many cases, significant, non-quantifiable benefits are relevant and must be taken into account when investment decisions are made. As such, a CBA should not be the sole tool used to support decision-making.

Nonetheless, a CBA provides a robust framework for analysing information in a logical and consistent manner. It can assist governments and private entities to determine if a policy or investment efficiently achieves a stated objective. This can assist decision-makers to optimise the level of funding allocated to an initiative, or to adjust the scope of the initiative to help deliver the highest net return.

## A.2. Approach to undertaking this cost-benefit analysis

### A.2.1. Summary of approach

This CBA compares the incremental costs and benefits associated with the services and operations of SLSA between a 'base case' and an 'investment case' scenario over a 15-year period, from 2014-15 to 2028-29. Five key steps have been taken to prepare this CBA:

1. Scenario definition
2. Period of analysis definition
3. Benefit specification and estimation
4. Cost specification and estimation
5. Discounted cash flow modelling.

### A.2.2. Scenario definition

#### A.2.2.1. Base case

Defining a counterfactual scenario, or base case, is a critical component of a CBA. The benefits and costs are measured as the incremental change from the base case. This ensures that only the benefits and costs that can be reasonably attributed to the investment are included in the analysis.

For this analysis, the base case is defined as a scenario in which the services and operations of SLSA are entirely non-existent. This base case ensures that the full value derived from SLSA's services and operations is captured in the analysis.

For example, if the 'service gap' left by SLSA was assumed to be fulfilled by another provider in the base case, this would reduce the incremental benefits attributable to SLSA in the analysis. Although such a scenario is possible, there exists no evidence to suggest that this would actually occur. As such, the base case used in this analysis implicitly assumes that in the absence of SLSA, coastal lifesaving services would not be provided on Australian beaches.

#### A.2.2.2. Investment case

The investment case of a CBA reflects a scenario where the economic benefits and costs associated with an investment are realised. This analysis defines the investment case as the status quo; that is, a scenario in which SLSA operates in its current capacity in Australia, providing coastal safety and lifesaving services, and education and training to its members and the community.



### A.2.3. Period of analysis definition

The period of analysis for this CBA is defined as a timeframe of 15 years, from 2014-15 to 2028-29. This period has been selected as it reflects five years of historic operations and 10 years of forecast activities and outcomes. The forecasts over the period of analysis have been established by drawing on data and evidence available from the historic five-year period.

### A.2.4. Benefit specification and estimation

The specification of benefits in a CBA involves identifying the impacts of the investment that result in positive or desirable effects. To be included within the CBA framework, the benefits must be measurable; that is, it must be possible to attribute each benefit with a meaningful measure of economic value.

For the purposes of this analysis, four sources of benefits have been identified as measurable:

1. Coastal safety and lifesaving
2. Education and training
3. Social benefits of volunteering
4. Increased physical activity.

Chapter 2 provides a description of each of the benefits, along with the key data inputs and assumptions that have been used in estimating their value.

### A.2.5. Cost specification and estimation

The specification of costs in a CBA takes into account all the impacts of the investment that produce negative or undesirable effects, including what has to be given up or forgone in order to implement the investment. Importantly, all costs that are incurred in achieving the benefits must be captured within a CBA.

This analysis considers three sources of costs:

1. Operating expenditure
2. Capital expenditure
3. Value of volunteering time.

These costs are described in Chapter 3, along with the approach that has been used in estimating their value.

### A.2.6. Discounted cash flow modelling

Discounted cash flow modelling is undertaken to estimate the present values of future costs and benefits. The discounting of future costs and benefits to derive present values reflects the time value of money and uncertainty of future cash flows, and the fact that people generally attribute a higher value to consumption today than consumption in the future. The BCR is calculated by dividing the total present value of benefits by the total present value of costs.

Future benefits and costs are discounted at the rate of 7.0% per annum to derive their present values. This aligns with guidance published by the Department of the Prime Minister and Cabinet on the use of CBA for policy proposals.<sup>50</sup> As the analysis also considers five years of historical benefits and costs, which occur during the period 2014-15 to 2018-19, these benefits and costs are converted to present values by adjusting them to 2020 dollars.

## A.3. Member survey

In undertaking this study, Deloitte Access Economics developed and fielded an online survey of the national SLSA member base. The purpose of the survey was to collect data that could be used to inform a range of assumptions required to undertake the analysis. The survey was targeted at topics that relate directly to the costs and benefits estimated as part of the CBA.

In total, 10,043 completed survey responses were received from members across all coastal states and territories of Australia. This included responses from 5,801 patrolling members and 4,242 non-patrolling members. Where the findings from the survey have been used to inform assumptions in the analysis, this has been identified and referenced within the report.

# Appendix B: Previous studies

## B.1. Summary of differences in previous studies

Over the years, SLSA has periodically undertaken and commissioned work which has sought to estimate the contribution, or value, generated by its activities for the Australian community. Previous studies undertaken have resulted in different estimates of the value that SLSA brings to the Australian community. A 2005 study resulted in a BCR of between 10.4 and 16.5, where the variation was dependent on whether the imputed value of salaries for volunteer surf lifesavers was included in the calculation of costs.<sup>51</sup> Similarly, a 2011 study resulted in BCR of between 21.7 and 29.3.<sup>52</sup>

Despite the variation in results, one thing remained consistent in both of these studies – the benefits of SLSA were found to far outweigh the costs. Each of these studies confirmed the unique, significant and ongoing value that SLSA brings to the Australian community and economy. The following sections consider the differences in key parameters or economic modelling techniques which led to different outcomes and results.

## B.2. Economic modelling

In this study, the social and economic value of SLSA is estimated using a cost-benefit analysis, which compares the costs and benefits associated with SLSA's activities over 15 years. In comparison, the 2005 and 2011 studies both used input-based and output-based approaches. This involved comparing the output value at a point in time with the input value to derive a BCR.

The 2011 study was also different in that it estimated the flow-on economic impacts to the wider Australian community using a Computable General Equilibrium (CGE) model. This model measures the increase in GDP, employment and other economy-wide variables as a result of SLSA activities. This accounted for approximately \$154 million in additional benefits in the 2011 study.

## B.3. Costs

The total costs (or inputs) associated with SLSA's activities were calculated differently in the 2005 and 2011 studies. Both studies include two BCRs – one which does not include the imputed value of salaries for volunteer surf lifesavers as a cost, and one which does. The quoted BCRs of 16.5 in the 2005 study and 29.3 in the 2011 study do not include this as a cost.

This approach differs to the current study, which includes the opportunity cost of volunteer surf lifesavers' time as a cost, estimated at \$78.5 million on average per annum (see section 3.3). For comparison, if the costs associated with salaries for volunteer surf lifesavers of \$47.0 million and \$50.1 million were included in the 2011 and 2005 studies, the BCRs would be 21.7 and 10.4 respectively. Also, in the previous studies, travel expenses incurred by volunteers were captured in these costs, unlike this study.

Another difference in the costs involves total club expenditure. This has increased to an average of \$127.6 million per annum in 2020 dollars, as estimated in this study over the period of analysis. Previous annual expenditure amounts estimated were \$84.7 million in the 2005 study and \$116.6 million in the 2011 study.

## B.4. Benefits

Total benefits (or outputs) associated with SLSA's services were calculated differently in the 2005 and 2011 studies.

The studies similarly estimate the benefit associated with avoided fatalities and critical injuries. While the value of benefits associated with avoided fatalities has consistently increased from an annual amount of \$831.7 million in the 2005 study to \$2.2 billion in the 2011 study, and finally to an average of \$2.9 billion per annum in this study, the value of benefits associated with avoided critical injuries has decreased. In this study, the value of avoided critical injuries is estimated at \$376.2 million per annum in 2020 dollars, whereas it was estimated at an annual amount of \$568.3 million in the 2005 study and \$1.2 billion in the 2011 study.

The main reason for this difference is the value attributed to an avoided critical injury. This study used a value based on research undertaken by Royal Life Saving Society Australia, which found that the average cost of a non-fatal drowning incident is approximately \$400,000 in 2016 dollars. This reflects a cost of \$429,466 in 2020 dollars (see section 2.1.2.3). In comparison, the 2005 study used the cost of permanent incapacitation to estimate this benefit (\$1.8 million) and the 2011 study used the cost of spinal cord and traumatic brain injuries (\$2.1 million).

In addition, while the value of first aid treatment was included as a benefit in the 2005 and 2011 studies – with annual values of \$500,000 and \$90,000 respectively – this is not included in the current study. However, this study includes the benefits relating to SLSA's education and training programs, the social benefits of volunteering, and the increased physical activity for members as a result of their involvement with SLS. These benefits were not included in previous studies.

# Appendix C: CPR awards

The value of SLSA's education and training programs is estimated from two sources (see section 2.2.1). The first source of benefit is related to the lives saved by both SLSA members and members of the community that complete a first aid award. However, it is assumed that only awards that contain a CPR component will equip participants to save a person's life in an emergency situation (see section 2.2.2.1). Table C.1 provides a list of SLSA awards that were identified to equip participants with CPR skills, based on a review of the course competencies and outcomes.

**Table C.1: SLSA awards with a CPR component**

Award	Total member	Total commercial	Grand total
<b>Patrolling Lifesaver Awards</b>			
Bronze Medallion	6,729	17	6,746
Certificate II in Public Safety (Aquatic Rescue) PUA21012	6,427	208	6,635
Certificate III in Public Safety (Aquatic Search and Rescue) PUA31312	149	87	236
Gold Medallion (Advanced Lifesaving)	227	0	227
Surf Rescue Certificate (CPR Endorsed)	4,702	572	5,274
<b>Emergency Care Awards</b>			
Advanced Resuscitation Techniques [AID]	2,681	178	2,859
Apply first aid	124	1	125
Basic Emergency Care	47	1,192	1,239
Basic Life Support [AID]	45	0	45
First Aid [AID]	3,433	910	4,343
Provide advanced first aid HLTAID006	109	379	488
Provide advanced resuscitation HLTAID007	2,810	1,230	4,040
Provide basic life support	1,740	635	2,375
Provide cardiopulmonary resuscitation [CPR]	11,173	68,288	79,461
Provide first aid HLTAID003	4,373	28,455	32,828
Provide first aid in remote situation HLTAID003	16	0	16
Provide first aid in remote situations HLTAID005	33	74	107
Remote Area First Aid	19	74	93
Resuscitation [AID]	2,031	6	2,037
Silver Medallion Advanced First Aid [AID]	20	0	20

Source: Surf Life Saving Australia, *Annual Report 2018-19*.



# Limitation of our work

## **General use restriction**

This report is prepared solely for the use of Surf Life Saving Australia. This report is not intended to and should not be used or relied upon by anyone else and we accept no duty of care to any other person or entity. The report has been prepared for the purpose of estimating the social and economic value of Surf Life Saving Australia's activities to the Australian community. You should not refer to or use our name or the advice for any other purpose.

# Endnotes

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9. A preventative action refers to a situation in which an SLSA volunteer surf lifesaver or paid lifeguard intervenes in order to prevent the need for a potential rescue. For example, surf lifesavers or lifeguards may advise swimmers not to enter the water if conditions are unfavourable, or they may advise swimmers to leave the water if a shark is spotted in the area.
10. The Public Safety Training Package is developed by Australian Industry Standards. Training packages are designed to specify the skills and knowledge required to perform effectively in the workplace through units of competency. They also describe how these units can be packaged into nationally recognised qualifications aligned to the Australian Qualifications Framework and industry recognised skill sets.
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32. For some entities, operating cost data was unavailable for selected years. Where this was the case, the average of operating expenses incurred by the entity in other years was used.
33. Historic operating costs have been adjusted to 2020 dollars.
34. Similar to operating costs, historic capital costs have been adjusted to 2020 dollars.
35. Similar to operating costs, for some entities capital cost data was unavailable for selected years. Where this was the case, the average of capital expenditure incurred by the entity in other years was used.
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**ITEM-9**      **Attachment B:**      Coastal Management Plan 2018

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# Newcastle Coastal Zone Management Plan 2018



Newcastle City Council acknowledges the traditional country of the Awabakal and Worimi peoples.

We recognise and respect their cultural heritage, beliefs and continuing relationship with the land, and that they are the proud survivors of more than two hundred years of dispossession.

Council reiterates its commitment to addressing disadvantages and attaining justice for Aboriginal and Torres Strait Islander peoples of this community.

## Background

The coastal area of the City of Newcastle extends approximately 13km from Glenrock Lagoon in the south to the northern end of the suburb of Stockton. The Newcastle coastline is bisected by the Hunter River resulting in two distinct coastal environments. The coastline to the south of the Hunter River is characterised by sandy pocket beaches between rocky headlands and cliffs while Stockton Beach, north of the Hunter River, forms the southern end of a long continuous sandy beach known as Stockton Bight. The Hunter River provides shipping access to the Port of Newcastle, which is the largest port on the east coast of Australia and the world's leading coal export port.

The areas north and south of the harbour present different management challenges to maintain and enhance the coastal environment. A key management challenge along the Newcastle coastline is coastal hazards, particularly coastal erosion and shoreline recession at Stockton Beach. To reflect the management challenges in the two distinct coastal environments the Newcastle Coastal Zone Management Plan 2018 has been completed in two parts; Part A - Stockton and Part B - Coastline South of the Harbour.

Stockton Beach has been the subject of a number of studies to assess coastal processes. However, further investigation is required to be undertaken to identify an appropriate option for management of coastal hazards on the Stockton coastline. Part A - Stockton addresses coastal management actions for the short (1-2 year) and medium (1-5 year) term while further investigation of management options for coastal hazards is completed.

Part B - Coastline South of the Harbour includes management actions to maintain and enhance the coastline to the south of the Hunter River.

The Newcastle Coastal Zone Management Plan 2018 will repeal the previous Newcastle Coastal Management Plan 2016 adopted by Council in November 2016, and is prepared to enable submission to the Office of Environment and Heritage for certification under the *Coastal Protection Act 1979*.

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# Part A - Stockton

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# Foreword

The Newcastle Coastal Zone Management Plan - Part A Stockton forms the first part of the on-going assessment and management of coastal hazards and community use of the coastal environment at Stockton Beach. The Newcastle Coastal Zone Management Plan will be submitted to the Office of Environment and Heritage for certification under the savings provisions of the *Coastal Protection Act 1979* (now repealed) and will address coastal management actions for the short (1-2 year) and medium (1-5 years) term. Certification under the *Coastal Protection Act 1979* is required to be undertaken by 3 October 2018 due to legislative reform. Under provisions of the *Coastal Management Act 2016*, this plan will cease on 31 December 2021.

The commencement of the *Coastal Management Act 2016* requires Council to prepare a Coastal Management Program for the coastal zone in the Newcastle local government area. The Coastal Management Program forms the second part of the coastal management process under the State Government framework, due to legislative reform, and is to be submitted to and certified by the State Government by the end of 2021. The Coastal Management Program will address long-term options for management of coastal hazards. Key management actions included within the Newcastle Coastal Zone Management Plan will be rolled forward and consolidated in the Coastal Management Program.

The community and Stockton Community Liaison Group have identified sand replenishment/nourishment as the preferred option to address coastal hazards in the consultation process for the Newcastle Coastal Zone Management Plan - Part A Stockton. Investigation of sand replenishment/nourishment will be undertaken as part of the preparation of the Coastal Management Program and will be included in the assessment of options for long-term management of the coastal zone.



# 1.0 Introduction

Stockton Bight is located to the north of the Hunter River and stretches from the Stockton breakwall, constructed at the entrance to the Hunter River, to Birubi Point. Forming the largest Holocene coastal dune system in New South Wales, Stockton Bight extends for a distance of 32km and across the local government boundaries of Newcastle City Council and Port Stephens Council.

The northern section of Stockton Bight, within Port Stephens local government area, is mainly managed by the local Worimi traditional owners in partnership with the NSW National Parks and Wildlife Service, while the southern section forms the coastline of the suburb of Stockton within the Newcastle City Council local government area (Newcastle LGA).

## 1.1 Newcastle Coastal Zone Management Plan Part A -Stockton study area

The suburb of Stockton is located on a peninsula at the southern tip of Stockton Bight. The suburb is within the Newcastle LGA with the boundary of the local government area north of the Stockton Centre located at 342 Fullerton Street, Stockton.

The subject of the Newcastle Coastal Zone Management Plan - Part A Stockton (Part A - Stockton) is the coastal zone of Stockton. It includes the open coastline in the south to the local government boundary. The coastal zone incorporates the coastal foreshore in public ownership and lands affected by coastal hazards. The immediate offshore environment is also included. The Stockton study area is shown in **Figure 1**.

Part A - Stockton is limited to the coastal zone north of the Hunter River, while the remainder of the coastal zone within the Newcastle LGA is addressed in the Newcastle Coastal Zone Management Plan Part B - Coastline South of the Harbour. The coastal zone within the Hunter River estuary, which borders the western and southern parts of Stockton, is addressed in the Hunter Estuary Coastal Zone Management Plan (BMT WBM, 2017).



**Figure 1:** Newcastle Coastal Zone Management Plan - Part A Stockton study area

## 2.0 Planning Context

The *Coastal Protection Act 1979* provides the statutory framework for coastal zone management in New South Wales. While coastal zone management plans are not a mandatory requirement for local councils under the *Coastal Protection Act 1979* the preparation of a coastal zone management plan is required to be undertaken in accordance with guidelines issued under Section 55D of the *Coastal Protection Act 1979*. Part A - Stockton has been prepared in accordance with 'Guidelines for Preparing Coastal Zone Management Plans' (OEH, 2013), the issued guideline under the *Coastal Protection Act 1979*.

The 'Guidelines for Preparing Coastal Zone Management Plans' (OEH, 2013) require coastal zone management plans address how the 10 coastal management principles outlined in the guideline are considered in the preparation of the plan. **Tables 1 and 2** outline how Part A - Stockton addresses the coastal management principles.

**Table 1: Coastal Management Principle 1**

**Principle 1: Consider the objects of the *Coastal Protection Act 1979* and the goals, objectives and principles of the NSW Coastal Policy 1997.**

Objects of the <i>Coastal Protection Act 1979</i>	Where object is addressed in the plan
(a) To protect, enhance, maintain and restore the environment of the coastal region, its associated ecosystems, ecological processes and biological diversity, and its water quality	Section 7
(b) To encourage, promote and secure the orderly and balanced utilisation and conservation of the coastal region and its natural and man-made resources, having regard to the principles of ecologically sustainable development	Section 6
(c) To recognise and foster the significant social and economic benefits to the State that result from a sustainable coastal environment, including:	
(i) benefits to the environment, and	Section 7
(ii) benefits to urban communities, fisheries, industry and recreation, and	Section 9, 10
(iii) benefits to culture and heritage, and	Section 11
(iv) benefits to the Aboriginal people in relation to their spiritual, social, customary and economic use of land and water, and	Section 11
(d) To promote public pedestrian access to the coastal region and recognise the public's right to access, and	Section 8
(e) To provide for the acquisition of land in the coastal region to promote the protection, enhancement, maintenance and restoration of the environment of the coastal region, and	Section 6
(f) To recognise the role of the community, as a partner with government, in resolving issues relating to the protection of the coastal environment, and	Section 3
(g) To ensure co-ordination of the policies and activities of the Government and public authorities relating to the coastal region and to facilitate the proper integration of their management activities, and	Section 6-11
(h) To encourage and promote plans and strategies for adaptation in response to coastal climate change impacts, including projected sea level rise, and	Section 6
(i) To promote beach amenity.	Section 9

Goals of the NSW Coastal Policy 1997	Where goal is addressed in the plan
(a) To protect, rehabilitate and improve the natural environment	Section 7
(b) To recognise and accommodate natural processes and climate change	Section 6
(c) To protect and enhance the aesthetic qualities of the coastal zone	Section 9
(d) To protect and conserve cultural heritage	Section 11
(e) To promote ecologically sustainable development and use of resources	Section 6
(f) To provide for ecologically sustainable human settlement	Section 6
(g) To provide for appropriate public access and use	Section 8
(h) To provide information to enable effective management	Section 6-11
(i) To provide for integrated planning and management	Section 6-11

**Note:** Appendix A provides a detailed summary of how Part A - Stockton addresses the objectives and principles of the NSW Coastal Policy 1997 (DUAP, 1997).

**Table 2: Coastal Management Principles 2-10**

Coastal Management Principle	Where Principle is addressed in the plan
2. Optimise links between plans relating to the management of the coastal zone.	Section 6-11
3. Involve the community in decision-making and make coastal information publicly available.	Section 3, 12
4. Base decisions on the best available information and reasonable practice; acknowledge the interrelationship between catchment, estuarine and coastal processes; adopt a continuous improvement management approach.	Section 6-11
5. The priority for public expenditure is public benefit; public expenditure should cost-effectively achieve the best practical long-term outcomes.	Section 6-11
6. Adopt a risk management approach to managing risks to public safety and assets; adopt a risk management hierarchy involving avoiding risks where feasible and mitigation where risks cannot be reasonably avoided; adopt interim actions to manage high risks while long-term options are implemented.	Section 6
7. Adopt an adaptive risk management approach if risks are expected to increase over time, or to accommodate uncertainty in risk predictions.	Section 6
8. Maintain the condition of high value coastal ecosystems; rehabilitate priority degraded ecosystems.	Section 7
9. Maintain and improve safe public access to beaches and headlands consistent with the goals of the NSW Coastal Policy	Section 8
10. Support recreational activities consistent with the goals of the NSW Coastal Policy.	Section 10

The management of the coast interacts with various other legislative acts, planning instruments and environmental management strategies and initiatives implemented by both Council and other stakeholders. The relationship between Part A - Stockton and other legislative acts, strategies and plans is shown in **Figure 2**.





**Figure 2:** Relationship between legislation and strategies and the Newcastle Coastal Zone Management Plan



## 3.0 Community Consultation

Community consultation has been undertaken over a number of years regarding the management of the coastal zone in Stockton. A consultation timeline has been provided below:

- Community workshop was held in 2008 during the preparation of the Stockton Coastline Management Study (DHI Water and Environment Pty Ltd, 2009);
- The Newcastle Coastal Technical Working Group was consulted during the preparation of the Newcastle Coastal Zone Hazards Study (BMT WBM, 2014(a)) and the Newcastle Coastal Zone Management Study (BMT WBM, 2014(b)). Members of the group included Office of Environment and Heritage, Department of Industry - Lands and Water (Crown Lands), Hunter Central Rivers Catchment Management Authority (now Local Land Services), Newcastle Port Corporation and community representatives;
- Community workshops were held in October 2016 during the preparation of the Newcastle Coastal Zone Management Plan 2016; and
- Public exhibition of the Newcastle Coastal Zone Management Plan 2016 was undertaken in November 2016.

Consultation for Part A - Stockton includes:

- Formation of the Stockton Community Liaison Group (Stockton CLG) comprising ten community representatives. Five meetings were held between March and May 2018;
- Formation of the Stockton Inter-agency Advisory Committee. Members of the committee are from various government stakeholders including Office of Environment and Heritage, Hunter Water Corporation, Department of Industry - Lands and Water (Crown Lands), Department of Premier and Cabinet and the Environment Protection Authority;
- Community workshop on Thursday 14 June 2018; and
- Public exhibition of Part A - Stockton from Wednesday 6 June to Thursday 28 June 2018.

Council's response to submissions received during the public exhibition period can be found in **Appendix E**.

Specific issues raised by the Stockton CLG during community consultation included:

- Replenishment of sand on Stockton Beach to address beach erosion events and shoreline recession;
- Identification of sand sources for beach replenishment;
- Recognition of on-going maintenance sand replenishment after capital sand replenishment;
- Management of the former land fill site at 310 Fullerton Street, Stockton and Crown Reserve 79066;
- Long term plan for relocation of childcare centre operating at former North Stockton Surf Life Saving Club;
- Repair and remediation of beach access and beach amenity; and
- Funding for management actions to be provided by Newcastle City Council, State Government or other alternative sources.

## 4.0 Objectives

Part A - Stockton reflects the community's aspirations, as described in the *Newcastle 2030 Community Strategic Plan* (NCC, 2013(a)) for a:

### 'Protected and enhanced environment'

Part A - Stockton will support the objectives of the *Newcastle Environmental Management Strategy 2013* (NCC, 2013(b)) and provide a platform for maintenance and enhancement of Stockton's coastal environment while providing understanding and management of climate change risks.

Part A - Stockton is supported by a series of studies undertaken over a number of years. The objectives of Part A - Stockton are supported by the most recent studies:

- The Newcastle Coastal Zone Hazards Study (BMT WBM, 2014(a))
- Newcastle Coastal Zone Management Study (BMT WBM, 2014(b))

The purpose of Part A - Stockton is to outline proposed actions that will be implemented to address coastal management issues. The supporting studies and community consultation undertaken have revealed the priority coastal management objectives for the Stockton study area are:

1. Coastal hazards.
2. Coastal environment.
3. Beach access.
4. Beach amenity.
5. Recreational use of the coastal zone.
6. Culture and heritage.

The management of these priority objectives are outlined in Sections 6-11 of Part A - Stockton.





# 5.0 Management Actions

## 5.1 Management action timeframe

The *Coastal Protection Act 1979* was replaced by the *Coastal Management Act 2016* on 3 April 2018. The *Coastal Management Act 2016* includes the requirement for a Coastal Management Program to address long-term management of the coastal zone. Council intends on undertaking a Coastal Management Program for the Newcastle coastal zone, including the Stockton study area, in the future.

Part A - Stockton will be submitted under the savings provisions of the *Coastal Management Act 1979* and will address coastal management actions for the short (1-2 year) and medium (1-5 year) term.

Investigation and assessment of long-term coastal management actions to address coastal hazards within the Stockton study area will be undertaken in accordance with the NSW Coastal Management Manual to facilitate the preparation of a Coastal Management Program. Investigation of the feasibility of management actions such as sand nourishment or engineered structures to address beach erosion and shoreline recession will be conducted as part of future studies.

The Stockton CLG has identified sand replenishment or nourishment as a preferred long-term option to address coastal hazards and improve beach amenity. Investigation of sand replenishment/nourishment will be conducted as part of future studies, but to ensure studies are appropriately identified and undertaken a working party will be established. The working party will include relevant government stakeholders, community representatives and interest groups and is included as a priority management action. The working party will form an integral part of the future Coastal Management Program to be submitted under the *Coastal Management Act 2016*.

Stakeholder endorsed long-term coastal management actions will be included in the future Coastal Management Program.

## 5.2 Management action approvals and considerations

Coastal management actions in Part A - Stockton will potentially require approvals or authorisation from relevant land owners or stakeholders with interest in the land where the management action is proposed. These approvals or authorisations may potentially be required under various legislative instruments and will be obtained prior to commencement of the management action.

There are areas of Crown land along the open coastline of the Stockton study area that are currently managed by Council under a Reserve Trust arrangement (Rawson Park Reserve Trust 79066 with Reserve purpose of public recreation, port facilities and services; Gazetted 9 November 1956). Where management actions are proposed on Crown land relevant authorisations and approvals may need to be obtained under the *Crown Land Management Act 2016* (e.g. management actions CH5, CH6). Management actions undertaken on Crown land will also need to consider Aboriginal Land Claims lodged under the *Aboriginal Land Rights Act 1983*. Any works as a result of management actions will need to be compliant with the *Native Title Act 1993 (Cwlth)*.

## 5.3 Funding sources

Sustainable funding and financing arrangements for management actions will be established in consultation with key stakeholders. Funding for management actions may be gained from various sources, including Council's internal funds and State or Federal Government grant programs.

### 5.3.1 Council funding mechanism

Council may fund management actions outlined in Part A - Stockton from revenue generated by ordinary rate income. The Integrated Planning and Reporting framework requires the preparation of a four year Delivery Program and annual Operational Plan. Management actions from Part A - Stockton will be incorporated into these strategic documents for funding through Council's working funds. Management actions may also be included into Council's asset management plans for allocation of funding.



### 5.3.2 State Government funding mechanism

A number of State Government funding mechanisms are currently available to support the management actions in Part A - Stockton. Funding mechanisms currently available include:

- Grants under the NSW Coastal Management Program administered by Office of Environment and Heritage;
- Crown Reserves Improvement Fund administered by the Department of Industry - Lands and Water (Crown Lands);
- NSW Environment Trust grants administered by the Office of Environment and Heritage; and
- Environmental Education Grants administered by the Office of Environment and Heritage.

Storm recovery funds may also be sought through:

- NSW Natural Disaster Assistance Scheme; and
- Natural Disaster Relief and Recovery Arrangements (Federal Government).

### 5.3.3 Federal Government funding mechanism

Federal Government funding mechanisms are available to support the management actions in Part A - Stockton including

- Building Better Regions Fund administered by the Department of Infrastructure, Regional Development and Cities.

Funding programs are regularly changing and Council will maintain an awareness of appropriate funding opportunities as they arise.

## 5.4 Management action zones

The Stockton study area has been divided into seven zones to enable identification of the location of management actions within the study area. The seven zones are located from south to north along the Stockton coastline and include:

- Zone 1 - Little Beach, including Stockton breakwall, to the seawall east of the Stockton Surf Life Saving Club;
- Zone 2 - Seawall east of Stockton Surf Life Saving Club to the southern end of Mitchell Street seawall;
- Zone 3 - Mitchell Street seawall extent;
- Zone 4 - Northern end of Mitchell Street seawall to Meredith Street;
- Zone 5 - Meredith Street to the northern boundary of Corroba Oval;
- Zone 6 - Northern boundary of Corroba Oval to southern boundary of Fort Wallace (main land ownership by Hunter Water Corporation);
- Zone 7 - Southern boundary of Fort Wallace to Newcastle City Council local government boundary (main land ownership by Defence Housing Australia and Family and Community Services).

The management action zones are shown in **Figure 3**.



**Figure 3:** Management action zones for Stockton study area.



# 6.0 Coastal Hazards

## 6.1 Background

The Stockton coastal zone has been the subject of a number of studies to assess coastal processes. An outline of the information from these studies is provided below and has informed the preparation of Part A - Stockton.

### Stockton Beach Coastal Engineering Advice - Public Works Department (1985)

Historical photogrammetric analysis was undertaken to determine shoreline fluctuations at Stockton Beach with an assessment of potential coastal hazards conducted. Based on the information at the time, analysis found a 500m section of Mitchell Street, north of Pembroke Street, was at immediate threat from storm damage. The position of the dune escarpment suggested a recessional trend in this area. Little change in the beach profile adjacent to Mitchell Street was indicated, but recession of the dune escarpment in the northern part of Stockton Beach was noted.

### Stockton Beach Coastal Engineering Advice Addendum - Public Works Department (1987)

Additional information was examined and short-term fluctuations of the beach profile were determined to be associated with storm events. Long-term assessment of the beach concluded a slight accretional trend between the Stockton breakwall and Hereford Street and a slight recessional trend between Hereford Street and the Hunter Water sewage treatment ponds (now decommissioned) at 310 Fullerton Street. The results also suggested longer term erosion at two locations which had a history of storm damage; between Stone Street and Griffith Avenue, and at the Hunter Water sewage treatment ponds.

In 1989, the Mitchell Street seawall was constructed.

### Stockton Beach Coastline Hazard Study - Department of Land and Water Conservation (1995)

Further photogrammetric analysis of the coastal zone was undertaken and concluded realignment of Stockton Beach had occurred due to the construction of the Stockton breakwall. The analysis also determined the shoreline fluctuated significantly in the short-term, but no long-term recessional trend of the shoreline was evident based on historical analysis.

### Newcastle Coastline Hazard Definition Study - WBM Oceanics Australia (1998)

This study carried out a review of the available data for long-term events based on beach profile analysis and hydrographic survey analysis. Stockton Beach was separated into two compartments, north and south of the Mitchell Street seawall. Analysis showed south of the seawall had periods of accretion and erosion, but little change in the shoreline over the long term. However, progressive recession of the shoreline north of the Mitchell Street seawall was concluded.

### Shifting sands at Stockton Beach - Umwelt Pty Ltd and SMEC Pty Ltd (2002)

Further analysis of long-term variations using bathymetric and historic hydro survey information was undertaken. While variability in the data was present, the study concluded sand loss from Stockton Beach was occurring resulting in a sediment deficit in the offshore environment. Potential loss of sand was identified as a result of changes to the mouth of the Hunter River, including dredging programs, over the last century. The study concluded the sand loss was progressive rather than cyclic and contributing to recession of Stockton Beach.

### Stockton Beach Coastal Processes Study Stage 1 - Sediment Transport Analysis and Description of On-going Processes - DHI Water and Environment (2006)

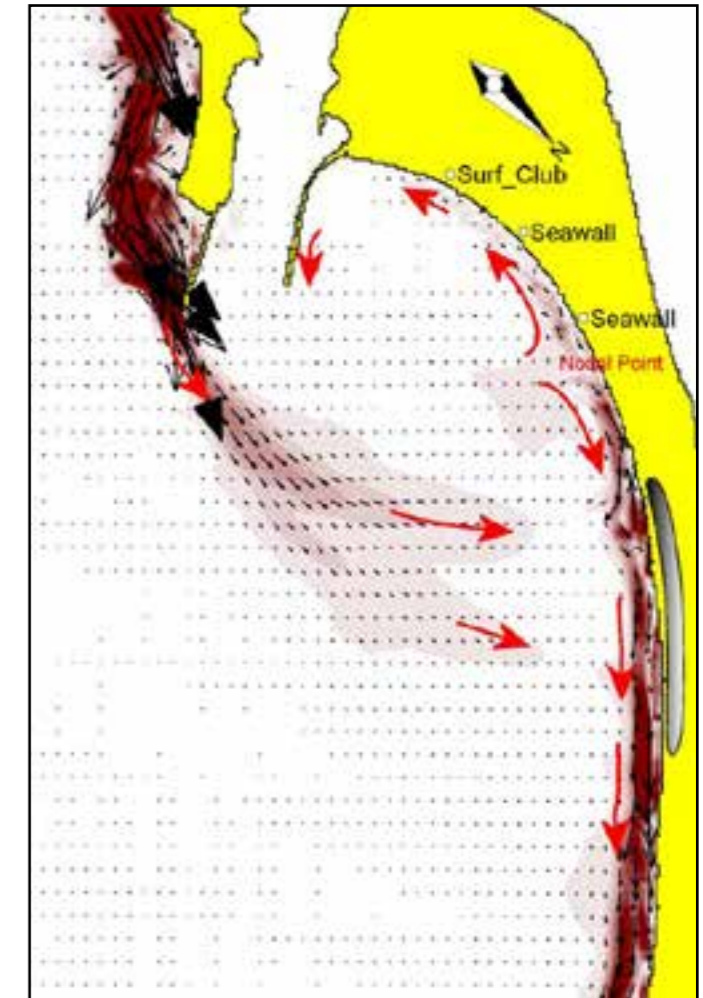
A detailed analysis of the sediment transport conditions at Stockton Beach was undertaken to determine the on-going coastal processes at a short and long-term scale.

A dune erosion model and modelled wave conditions were applied to the most severe storm events observed in the Newcastle area to analyse short-term processes. Modelling showed an increase in dune erosion risk from south to north along Stockton Beach during storm events with waves from the south-east. During wave action from the east and north-east dune erosion was still severe, but was more evenly distributed along the beach. Modelling of the impacts of nearshore deepening showed dune recession was increased with further deepening of the nearshore and offshore areas.

Analysis of the long-term littoral transport process of sediment was undertaken and showed longshore transport is the most significant sediment transport mechanism. The following conclusions regarding long-term sediment transport were:

- Stockton Beach experienced a net northward transport of sediment of approximately 20,000 to 30,000m<sup>3</sup>/year;
- A complex sediment transport mechanism (see **Figure 4**) occurs within the area including:
  - The breakwalls at the entrance to the Hunter River redirect sediment transport from the south into deep offshore areas;
  - A nodal or neutral point is predicted at the northern end of the Mitchell Street seawall. Sediment transport splits at the nodal point into two directions; north and south. The nodal point is the most significant erosion stretch on Stockton Beach;
  - Increased northward sediment transport occurs north of the Mitchell Street seawall;
  - Slight accretion occurs south of the Mitchell Street seawall as waves from the south-east refract around the river entrance breakwall resulting in an anti-clockwise eddy; and
  - East and north-east waves produce uniform longshore sediment transport resulting in sediment accumulation north of the Stockton breakwall;
- The Mitchell Street seawall imposes a physical limitation to sediment transport and induces local steepening of the beach profile;
- The Hunter River is not a significant source of sediment in the Stockton area;
- The Hunter River southern breakwall reduces sediment bypassing across the river with most sediment deposited into the river navigation channel or the southern areas of the river entrance (Horseshoe Beach);
- The area north of Fern Bay (outside of Part A - Stockton study area) was expected to be in equilibrium.

Modelling was undertaken to determine erosion hazard lines for the short (immediate), medium (20 years) and long-term (50 years) for the Stockton study area.



**Figure 4:** Predicted sediment transport path at mouth of Hunter River and Stockton study area (DHI Water and Environment Pty Ltd, 2006).

## 6.2 Assessment of coastal hazards

The Newcastle Coastal Zone Hazard Study (BMT WBM, 2014(a)) provides an outline of the coastal processes affecting the Stockton study area. The coastal hazards identified as a result of coastal processes within the study area include:

- Beach erosion and shoreline recession; and
- Coastal inundation.

### 6.2.1 Beach erosion and shoreline recession

Beach erosion can be defined as the offshore movement of sand from the sub-aerial beach during a storm event while shoreline recession is the landward movement of the shoreline over time due to a net loss of sediment (OEH, 2013). To assess the nature and extent of beach erosion and shoreline recession within the study area, hazard lines were modelled in the Stockton Beach Coastal Processes Study Stage 1 - Sediment and Transport Analysis and Description of On-going Processes (DHI, 2006). The beach erosion and shoreline hazard lines were modelled for the short (immediate), medium (20 years) and long-term (50 years) time periods.

The beach erosion and shoreline recession hazard lines were remodelled to account for potential impacts from climate change and sea level rise in the Stockton Beach Coastal Processes Study - Addendum (DHI, 2011). Council adopted a sea level rise benchmark of 0.4m by 2050 and 0.9m by 2100, above the 1990 mean sea level, in accordance with the NSW Sea Level Rise Policy Statement 2009 (DECCW, 2009) (now repealed). The adopted sea level rise benchmarks are widely accepted by competent scientific opinion.

Beach erosion and shoreline recession hazard lines were completed in the Newcastle Coastal Hazards Study (BMT WBM, 2014(a)). The Newcastle Coastal Hazards Study (BMT WBM, 2014(a)) adopted the previous beach erosion and shoreline recession hazard line methodology from the Stockton Beach Coastal Processes Study Stage 1 (DHI, 2006) and Stockton Beach Coastal Processes Study - Addendum (DHI, 2011). However, due to uncertainty when modelling areas that are potentially impacted by coastal hazards the Newcastle Coastal Hazards Study (BMT WBM, 2014(a)) adopted risk probability areas. The areas represent different probabilities/ likelihood that the coastal hazard will occur and range from almost certain to rare (see **Table 3**). The risk probability areas were modelled across three timeframes (immediate, 2050 and 2100).

**Table 3: Risk probability areas**

Probability	Description
Almost certain	There is a high possibility the event will occur as there is a history of frequent occurrence.
Likely	It is likely the event will occur as there is a history of casual occurrence.
Unlikely	There is a low possibility that the event will occur, however, there is a history of infrequent or isolated occurrence.
Rare	It is highly unlikely that the event will occur, except in extreme/ exceptional circumstances, which has not been recorded historically.

Source: BMT WBM (2014)(a) p40

**Appendix B** includes maps showing the modelled beach erosion and shoreline recession hazards within the Stockton study area.

### 6.2.2 Coastal inundation

Coastal inundation is the storm-related flooding of coastal lands by ocean waters due to elevated water levels (storm surge) and wave run-up (OEH, 2013). The approach for assessment of coastal inundation is summarised in **Table 4** and risk probability areas were defined as per **Table 3**.

The risk probability areas were modelled across three timeframes (immediate, 2050 and 2100).

**Appendix C** includes maps showing the modelled coastal inundation within the Stockton study area.

**Table 4: Approach for calculation of coastal inundation in Stockton study area**

Probability	Immediate	2050	2100
Almost certain	1 in 20 year storm surge and wave set up.	As per immediate	As per immediate
Likely	NM <sup>1</sup>	NM <sup>1</sup>	NM <sup>1</sup>
Unlikely	1 in 100 year storm surge and wave set up AND wave run up and overtopping <sup>2</sup> .	1 in 100 year storm surge and wave set up + 0.4m SLR and change in storm surge AND indicative areas of potential overtopping <sup>2</sup> including 0.4m SLR.	1 in 100 year storm surge and wave set up + 0.9m SLR and change in storm surge AND indicative areas of potential overtopping <sup>2</sup> including 0.9m SLR.
Rare	1 in 100 year storm surge and wave set up + extreme climatic conditions (eg. Tropical cyclone, 1 in 1000 year east coast low).	Worse case of either: • 1 in 100 year storm surge and wave set up + Extreme climatic conditions + 0.4m SLR and climate change conditions <sup>3</sup> , OR • 1 in 100 year storm surge and wave set up + 0.7m SLR and climate change impacts.	Worse case of either: • 1 in 100 year storm surge and wave set up + Extreme climatic conditions + 0.9m SLR and climate change impact <sup>3</sup> , OR • 1 in 100 year storm surge and wave set up + 1.4m SLR and climate change impacts

Source: BMT WBM (2014)(a) p61

<sup>1</sup>NM= not mapped.

<sup>2</sup>Only applies at open coast barriers. Wave run up and overtopping are calculated using 1 in 100 year storm surge + 1 in 100 year 6 hour duration.

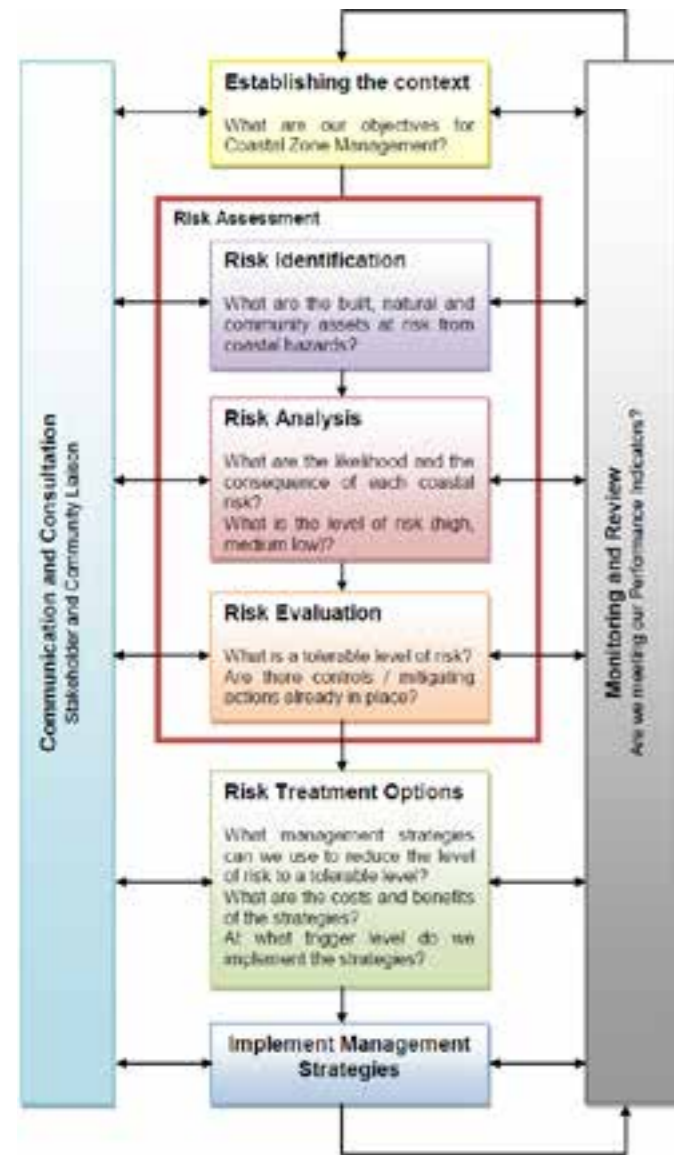
<sup>3</sup>Includes increase in set up levels associated with 5% and 10% increase in storm wave heights by 2050 and 2100 respectively.



## 6.3 Management of coastal hazards

### 6.3.1 Risk management

The Newcastle Coastal Zone Management Study (BMT WBM, 2014(b)) utilised a risk management approach to identify appropriate options for managing risks from coastal hazards. The Newcastle Coastal Zone Management Study (BMT WBM, 2014(b)) adapted the Australian Standard Risk Management Principles and Guidelines (AS/NZS ISO 31000:2009). A summary of the risk management approach is outlined in **Figure 5**.



**Figure 5:** Risk management framework adapted to coastal zone management (BMT WBM, 2014(b) p36)

Risk identification for the Stockton study area was undertaken during the preparation of the Newcastle Coastal Zone Management Study (BMT WBM, 2014(b)). The key coastal risks identified for the Stockton coastal zone were beach erosion, shoreline recession and coastal inundation. Risk analysis included the consideration of the likelihood and consequence of the identified risks to determine an overall risk level.

Risk evaluation involved the identification of risks that were considered acceptable and risks that required action. Risks requiring action, and potential risk treatment options, were identified in the Newcastle Coastal Zone Management Study (BMT WBM, 2014(b)). High priority risks were determined through the evaluation process and are associated with assets that are exposed to current or frequent coastal hazards and/or assets that have significant consequences if their environmental, social or economic value is substantially compromised.

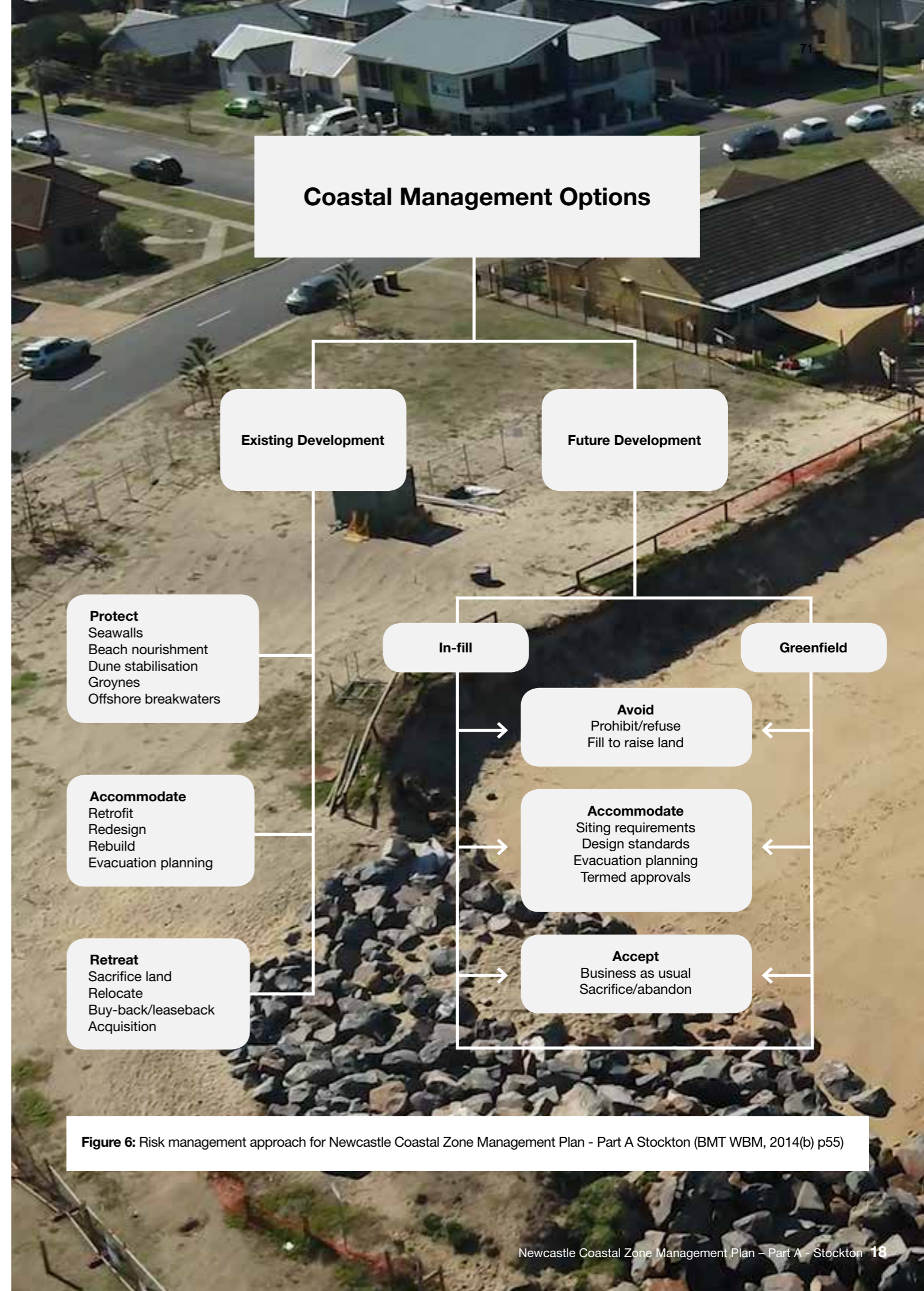
**Figure 6** provides an overview of the management approach for addressing coastal hazards. Management is separated into approaches for both existing development and future development.

The options for managing risk to existing development include:

- Protect existing development from coastal hazards. This may be in the form of hard defence structures e.g. revetments, or soft engineering measures e.g. sand nourishment. Some protection works can cause impacts to adjacent areas and a decision to implement a 'protect' option must consider these potential impacts;
- Accommodate the risk. Aims to redevelop or retrofit existing structures in a manner that minimises losses from potential hazards e.g. stronger foundations, through careful redesign; and
- Planned retreat from the risk. Aims to allow natural processes to occur largely uninhibited by development. For existing development it is useful to identify trigger points and thresholds for future actions.

The options for managing risk to future development include:

- Avoid the risk by not permitting vulnerable developments within high-risk areas (considered over the full design life of the development);
- Accommodate the risk by including provisions that reduce the consequences of the impact e.g. minimum floor levels to reduce property damage resulting from coastal inundation; and
- Accept the risk where appropriate.



**Figure 6:** Risk management approach for Newcastle Coastal Zone Management Plan - Part A Stockton (BMT WBM, 2014(b) p55)



### 6.3.2 Management action identification and prioritisation

The process for identification of management actions to address coastal hazards and risk to development, both existing and future, is detailed in the Newcastle Coastal Zone Management Study (BMT WBM, 2014(b)). The management action identification process undertaken in the Newcastle Coastal Zone Management Study (BMT WBM, 2014(b)) included rapid analysis assessment of the following factors

- Capital and recurrent costs
- Environmental or social impacts
- Community acceptability
- Reversibility/adaptability in the future
- Effectiveness of the management action over time
- Legal issues and approvals required
- Ease of implementation

The management action identification process within the Newcastle Coastal Zone Management Study (BMT WBM, 2014(b)) included assessment of short, medium and long-term management actions to address coastal hazards within the Newcastle coastal zone. The rapid analysis assessment combined with risk evaluation for assets within the coastal zone resulted in a risk register and recommended management actions.

However, many of the management actions identified in the Newcastle Coastal Zone Management Study (BMT WBM, 2014(b)) for the Stockton study area are focused on long-term actions to address beach erosion and shoreline recession. Part A - Stockton is to be submitted under the savings provisions of the *Coastal Management Act 1979* due to changing legislation and management actions contained in Part A - Stockton are restricted to the short (1-2 year) and medium (1-5 year) term only. Long-term actions will be included in a future Coastal Management Program under the *Coastal Management Act 2016*.

Using the risk register and recommended options from the Newcastle Coastal Zone Management Study (BMT WBM, 2014(b)) for immediate extreme, high and medium risks from coastal hazards in the Stockton study area Council has prioritised the following issues:

- Coastal erosion threat to the former North Stockton Surf Life Saving Club building at Barrie Crescent. The building is currently leased to Mission Australia and operates as a childcare facility.
- The Mitchell Street seawall requires maintenance after exposure to coastal hazards since its construction. Outflanking of the seawall has also resulted in coastal erosion, particularly at the northern end of the seawall near the intersection of Barrie Crescent, Mitchell Street and Stone Street.
- Replenishment of sand to the Stockton study area has been identified as a high priority by the community. Port of Newcastle currently places suitable sand from maintenance dredging activities undertaken for navigational safety at the harbour entrance. Suitable dredged sand is placed offshore of Stockton Beach in accordance with a concurrence issued by the Office of Environment and Heritage under the *Coastal Protection Act 1979*. While the Coastal Management Program is being developed, Port of Newcastle will continue this placement of dredged sand in accordance with the concurrence issued by Office of Environment and Heritage.

Since the completion of the Newcastle Coastal Zone Management Study (BMT WBM, 2014(b)) a storm event in January 2018 resulted in coastal erosion at 310 Fullerton Street exposing a former landfill site. The former landfill also extends south of 310 Fullerton Street onto Crown reserve 79066. Material from the former landfill has been transported onto Stockton Beach with clean-up action undertaken. Management action to prevent further erosion and exposure of landfill material is prioritised within Part A - Stockton as a result of this recent storm event.

Beach erosion and shoreline recession are identified as coastal hazards in the Stockton study area. Long term coastal management actions to address beach erosion and shoreline recession within the Stockton study area will be investigated and assessed as part of future studies in accordance with the NSW Coastal Management Manual. These investigations will be undertaken to facilitate the preparation of a Coastal Management Program under the *Coastal Management Act 2016* and have been included as a management action for the short to medium term. Investigations into options for the future management of the Stockton coastline will need to consider the on-going impacts from coastal hazards on the former landfill area and will be analysed within the Coastal Management Program. While these investigations are being conducted as part of the Coastal Management Program the former landfill will continue to be managed by the various land managers in accordance with their statutory responsibilities.

The Stockton CLG has identified sand replenishment/nourishment as the preferred option to address coastal hazards and improve beach amenity. Investigation of potential sand replenishment/nourishment will be undertaken as part of the Coastal Management Program as detailed above. However, studies to investigate sand replenishment/nourishment as a potential option will be required to be appropriately identified and undertaken. Potential tasks may include:

- Understanding large-scale movements of sand along Stockton Bight and how it affects the southern portions of the embayment over the longer-term;
- Sand tracing studies and modelling to better understand the movement and longevity of sand placed offshore of Stockton Beach. Studies will aid in determining a sediment budget for the Stockton study area;
- Detailed appraisal of potential sand source sites (both onshore and offshore) for sand replenishment/nourishment. Appraisal will include understanding of the limits of available resources, delivery mechanisms of sourced sand to Stockton Beach, environmental considerations, and detailed costings for delivery of sand to Stockton Beach.
- Assessment of potential impacts on source sites and beach placement areas;
- Consultation with relevant and affected land owners at each of the identified source sites;
- Identification of relevant approvals associated with sand replenishment/nourishment activities.
- Evaluation of potential management options and cost benefit analysis of identified options.

To ensure studies are appropriately identified and undertaken a working party including Council, key government stakeholders, community representatives and interest groups will be formed to facilitate the above task. This will be included as a priority management action.

### 6.3.3 Management actions

The management actions outlined in **Table 5** for coastal hazards are restricted to short (1-2 year) and medium (1-5 year) actions. The management actions are listed in priority order. Long-term management actions will be part of a future Coastal Management Program submitted under the *Coastal Management Act 2016*.

**Table 5: Coastal hazards management actions**

#	Approach	Zone	Management Action	Primary responsibility	Supporting partners <sup>1</sup>	Cost estimate (Funding source)	Evaluation method	Timeframe
CH1	Risk assessment	4	Lease for the operation of a childcare centre at the former North Stockton Surf Life Saving Club not to be renewed once expired.	Mission Australia	Council	Minimal	Operation of childcare centre in building ceases.	Short-medium
CH2	On-ground works	4	Former North Stockton Surf Life Saving Club building demolished.	Council		\$50,000 (Council)	Demolition of building.	Medium
CH3	Planning, on-ground works	6	Appropriate temporary coastal protection works undertaken at former landfill at 310 Fullerton Street (Lot 202 DP 1150470). Temporary coastal protection works will include geofabric container wall/structure designed by appropriately qualified coastal engineer with duration of 5-7 years.	Hunter Water Corporation	Department of Industry - Lands and Water (Crown Lands) Council	\$1,500,000 (To be determined)	Temporary coastal protection works completed.	Short-medium
CH4	Planning, on-ground works	6	Investigate the extent of the former landfill to the south of 310 Fullerton Street (Lot 202 DP 1150470) on to part of Crown reserve 79066 Appropriate works on the Crown reserve will be subject to further negotiation between Department of Industry - Lands and Water (Crown Lands), Council and Hunter Water Corporation	Department of Industry - Lands and Water (Crown Lands) Council	Hunter Water Corporation	To be determined based on extent of landfill	Extent of former landfill on Crown reserve identified. Identified agreed works implemented	Short
CH5	Planning	3,4	Identify appropriate coastal protection works or repairs at northern end of Mitchell Street seawall. Planning to include how works will connect with future coastal protection works to the north.	Council	Department of Industry - Lands and Water (Crown Lands)	\$40,000 (Council)	Appropriate design/repairs for northern end of Mitchell Street seawall completed.	Short
CH6	On-ground works	3,4	Identified coastal protection works or repairs at northern end of Mitchell Street constructed.	Council	Department of Industry - Lands and Water (Crown Lands)	\$200,000 - \$700,000 \$20,000-\$70,000/annum maintenance (Council, State Government)	Identified works/repairs to northern end of Mitchell Street seawall completed.	Short-medium
CH7	On-ground works		Port of Newcastle to place suitable sand from maintenance dredging activities from harbour entrance offshore of Stockton Beach in accordance with concurrence issued by Office of Environment and Heritage.	Port of Newcastle	Office of Environment and Heritage Roads and Maritime Services Department of Industry - Lands and Water (Crown Lands)	Minimal. Maintenance dredging for navigational safety currently conducted by Port of Newcastle.	Placement of sand after dredging campaigns.	Short, medium
CH8	Planning		Coastal Management Program process for certification under the <i>Coastal Management Act 2016</i> commenced. Scoping study under Coastal Management Program process will include actions contained in Part A - Stockton.	Council	Office of Environment and Heritage	Minimal	Coastal Management Program process commenced.	Short
CH9	Planning	1-7	Undertake detailed investigations and other required studies, including scoping study and assessment of sand replenishment sources, to be undertaken to facilitate certification of a Coastal Management Program under the <i>Coastal Management Act 2016</i> .	Council		\$250,000 (Council, State Government)	Detailed studies completed and Coastal Management Program prepared and certified.	Short-medium
CH10	Planning		Establish a working group to identify required investigations or studies, including potential studies to progress sand replenishment option, for development of Coastal Management Program. Working group will include Councils, key government stakeholders, community and interest groups.	Council		Minimal	Working group established	Short
CH11	Planning	1-7	Assess potential options for long-term management of coastal hazards in the Stockton study area through the development of a Coastal Management Program in accordance with the <i>Coastal Management Act 2016</i> and the NSW Coastal Management Manual.	Council		\$100 000 (Council, State Government)	Coastal Management Program prepared and certified.	Medium
CH12	Monitoring		Monitor opportunities under grant programs and ensure grant applications are best positioned to deliver funding for Stockton study area projects.	Council		Internal Council resources	Funding applications submitted.	Short-medium
CH13	Monitoring		Alternative funding methods to be investigated and considered for Stockton study area projects. Funding methods to be advocated for in consultation with key stakeholders.	Council		Minimal	Alternative funding sources investigated and advocated for.	Short, medium
CH14	Monitoring	3	Undertake condition assessment/scope of works for maintenance to Mitchell Street seawall.	Council		\$10,000 (Council)	Condition assessment/scope of works completed.	Short-medium
CH15	On-ground works	3	Undertake maintenance to Mitchell Street seawall identified in condition assessment report	Council	Department of Industry - Lands and Water (Crown Lands)	\$2,750,000 capital. \$200 000 per annum maintenance. (Council, State Government)	Identified repairs to Mitchell Street seawall completed.	Short-medium
CH16	On-ground works	1,2	Conduct beach management works, such as beach scraping and beach grooming, in areas south of the Mitchell Street seawall to increase dune volume. Required approvals for beach scraping will be obtained.	Council	Department of Industry - Lands and Water (Crown Lands)	\$50,000 per annum (Council, State Government)	Identified beach scraping activities completed as conditions permit.	Short, medium
CH17	On-ground works	4,5	Conduct beach management works, such as beach scraping and beach grooming, in areas north of the Mitchell Street seawall to increase dune volume. Required approvals for beach scraping will be obtained.	Council	Department of Industry - Lands and Water (Crown Lands)	\$75,000 per annum (Council, State Government)	Identified beach scraping activities completed as conditions permit.	Short, medium



#	Approach	Zone	Management Action	Primary responsibility	Supporting partners <sup>1</sup>	Cost estimate (Funding source)	Evaluation method	Timeframe
CH18	On-ground works	1,2	Continue dune maintenance in areas south of the Mitchell Street seawall.	Council	Department of Industry - Lands and Water (Crown Lands) Landcare	\$15,000 (Council, State Government)	Dune maintenance in identified areas undertaken.	Short, medium
CH19	On-ground works	4,5	Continue dune maintenance in areas north of the Mitchell Street seawall.	Council	Department of Industry - Lands and Water (Crown Lands) Landcare	\$15,000 (Council, State Government)	Dune maintenance in identified areas undertaken.	Short, medium
CH20	Planning	1	Undertake annual inspection of Stockton breakwall and assess potential issues from coastal hazards	Port of Newcastle	Roads and Maritime Services	As required (Port of Newcastle)	Visual inspection of rock armour, public pathway and ancillary infrastructure	Short (annual basis)
CH21	Planning, on-ground works	1-5	Continue beach and seawall monitoring program with cross section sites within the Stockton study area.	Council		\$10,000- \$15,000 per annum (Council)	Beach and seawall monitoring program, cross sections completed. Innovation in methodology undertaken.	Short-medium
CH22	Planning	7	Identify coastal hazards at Stockton Centre (342 Fullerton Street) as part of Fern Bay and North Stockton Land Use Strategy.	Council	Port Stephens Council Family and Community Services	Minimal	Coastal hazards identified as part of Fern Bay and North Stockton Land Use Strategy.	Short
CH23	Planning	7	Identify coastal hazards at Defence Housing Australia site (338 Fullerton Street) as part of Fern Bay and North Stockton Land Use Strategy and rezoning proposal.	Council	Port Stephens Council Defence Housing Australia	Minimal	Coastal hazards identified as part of Fern Bay and North Stockton Land Use Strategy.	Short
CH24	Development controls		Review planning certificates to ensure properties potentially affected by coastal hazards contain an appropriate notation and reflect ability (or not) for complying development to be carried out on the land.	Council		Minimal	Planning certificate notification reviewed.	Short
CH25	Development controls		New subdivisions or greenfield development to be located landward of coastal hazards 2100 unlikely line.	Council		Minimal	Design of subdivisions or development landward of 2100 unlikely coastal hazard line.	Short-medium
CH26	Planning	1-3	When the opportunity arises, Plans of Management, public domain plans and other master plan documents within the Stockton study area will be prepared or amended in consideration of the coastal hazards outlined in the Newcastle Coastal Zone Hazards Study (BMT WBM, 2014(a)).	Council	As required	Minimal	Coastal hazards incorporated into relevant plans	Short-medium
CH27	Planning	1-5	Consider impacts of coastal hazards when renewing or constructing public assets within the Stockton study area. The design of assets should consider the coastal hazards outlined in the Newcastle Coastal Zone Hazards Study (BMT WBM, 2014(a)). Asset life, purpose/service and location are to be considered along with the potential impacts from climate change.	Council		Varied due to project undertaken, costing within project budget (Council)	Incorporation of coastal hazards into project design documents.	Short-medium
CH28	Planning, on-ground works		Incorporation of coastal hazards into Council's service asset plans and implement service asset plans.	Council		\$20,000 (Council)	Coastal hazard analysis included in service asset plans.	Short-medium
CH29	On-ground works	1-5	Undertake emergency works, if appropriate, to manage beach erosion during storm events in accordance with the Emergency Action Subplan contained in <b>Appendix D</b> .	Council		Varied based on extent of emergency works (Council, State Government, Federal Government)	Emergency works in accordance with Subplan completed as required.	Short-medium
CH30	Planning, monitoring, on-ground works	6	Undertake a monitoring and response procedure for the former landfill at 310 Fullerton Street ((Lot 202 DP 1150470) and part of Crown reserve 79066. Procedure will include management of former waste material in erosion events.	Hunter Water Corporation Council	Department of Industry - Lands and Water (Crown Lands)	Minimal	Monitoring of former landfill after erosion events completed	Short, medium
CH31	Partnerships		Continue to consult with Port of Newcastle and capital dredging proponents to request excess suitable sand from capital dredging projects is placed offshore of Stockton Beach.	Council	Port of Newcastle Roads and Maritime Services	Minimal	Excess suitable sand from capital dredging placed offshore of Stockton Beach.	Short-medium (project based)
CH32	Engagement		Conduct community engagement and education programs focusing on the Stockton study area environment and coastal processes.	Council		\$5,000 per annum for coastal education program (Council)	Education programs developed and presented to community.	Short-medium
CH33	Engagement		Update and enhance Council's website with information about coastal processes, management of the coastal environment. Provide more information about coastal activities.	Council		Minimal	Council website updated.	Short-medium
CH34	Planning, on-ground works	1-5	Prepare and implement post storm asset condition monitoring plan	Council		\$5,000 per annum (Council)	Post storm asset monitoring plan developed and implemented.	Short-medium

<sup>1</sup> Supporting partners are government agencies or stakeholders with ownership of land or an interest in the proposed management action and will be consulted at the time of project management. Generally, supporting partners will not be financial contributors to the management action.



# 7.0 Coastal Environment

## 7.1 Overview

The Stockton study area is located at the southern end of the large sandy embayment known as Stockton Bight. The coastal environment has been heavily modified within the Stockton study area by historical activities and construction of infrastructure. However, dune systems remain along the coastline within the northern section of the study area. The dune systems to the north of the former Hunter Water sewerage treatment plant at 310 Fullerton Street mainly comprise sand scrub vegetation including Coast Banksia (*Banksia integrifolia*), Coast Tea-tree (*Leptospermum laevigatum*) and Old Man Banksia (*Banksia serrata*). South of the former Hunter Water sewerage treatment plant the vegetation community is highly modified with urban parklands and open space dominated by exotic grasses and planted landscape species such as Norfolk Island Pine (*Araucaria heterophylla*). Dune system vegetation has been re-established east of the Stockton Beach Holiday Park and at Pitt Street Reserve at the back beach area of Little Beach.

Vegetation along the shoreline consists of strandline grassland community consisting mainly of Beach Spinifex (*Spinifex sericeus*). Vegetation communities within the Stockton study area are highly invaded by the introduced Bitou Bush (*Chrysanthemoides monilifera*) which was first recorded in Australia in the Stockton area (NPWS, 2006).

While habitat within the Stockton study area has been heavily modified the shoreline provides foraging and nesting habitat for migratory shorebirds such as the Little Tern (*Sternula albifrons*) and Pied Oyster Catcher (*Haematopus longirostris*).

## 7.2 Management actions

The management actions outlined in **Table 6** are restricted to short (1-2 year) and medium (1-5 year) actions to protect and enhance the coastal environment within the Stockton study area. Long-term management actions will be part of a future Coastal Management Program submitted under the *Coastal Management Act 2016*.





**Table 6: Coastal environment management actions**

#	Approach	Zone	Management Action	Primary responsibility	Supporting partners <sup>1</sup>	Cost estimate (Funding source)	Evaluation method	Timeframe
CE1	Monitoring	1-5	Continue to monitor coastal habitat and implement recommendations of monitoring program.	Council	Department of Industry - Lands and Water (Crown Lands)	\$5,000 (Council)	Monitoring program undertaken.	Short, medium
CE2	On-ground works	1-5	Undertake coastal revegetation works as outlined in Coast and Estuary Vegetation Management Plan (Umwelt, 2014). Options to control Bitou Bush and other invasive plant species included in revegetation works.	Council	Department of Industry - Lands and Water (Crown Lands)	\$10,000 per annum (Council)	Coastal revegetation works completed.	Medium
CE3	Planning	1-3	Public domain works along the coastal section of the Stockton study area to include landscaping with native provenance species	Council		\$10,000 (Council)	Public domain plan completed.	Short, medium
CE4	On-ground works	1-5	Implement beach stormwater outlet maintenance program to manage dunes and remove stormwater ponding, particularly after rain events	Council		\$10 000-\$15 000 per annum (Council)	Stormwater outlet areas on beach maintained.	Short, medium
CE5	Planning	1-5	Water Sensitive Urban Design (WSUD) principles to be included in Public Domain Plans (or other masterplan documents) within the Stockton study area	Council	Department of Industry - Lands and Water (Crown Lands)	Minimal		Short, medium
CE6	On-ground works	1-7	Provide support and assistance to Landcare/volunteers when revegetation activities are undertaken in Stockton study area	Council		Minimal	Assistance to Landcare provided.	On-going
CE7	Monitoring, Partnerships		Build capacity for community volunteers to undertake citizen science environmental monitoring	Council		Minimal	Community environmental program established.	Medium

<sup>1</sup> Supporting partners are government agencies or stakeholders with ownership of land or an interest in the proposed management action and will be consulted at the time of project management. Generally, supporting partners will not be financial contributors to the management action.



# 8.0 Beach Access

## 8.1 Current access

The open coastline to the south of Corroba Oval at Meredith Street, Stockton is under the ownership or management of Newcastle City Council. There are areas of Crown land along the open coastline that are currently managed by Council under a Reserve Trust arrangement (Rawson Park Reserve Trust 79066 with Reserve purpose of public recreation, port facilities and services; Gazetted 9 November 1956). The management arrangement will change in 2019 following the commencement of the *Crown Land Management Act 2016* when Council will manage this Reserve under the *Local Government Act 1993*.

The coastline to the north of Corroba Oval to the local government boundary is owned by various stakeholders including Hunter Water Corporation, Defence Housing Australia and Family and Community Services.

Land below the Mean High Water Mark on the coastline is generally designated 'Crown waterway', subject to clarification of land status and the Mean High Water Mark boundary.

Access to the beach within Newcastle City Council's management area is provided by 26 separate access points. These access points are outlined in **Table 7**.

**Table 7: Public beach access points in Stockton study area**

Access point number	Location	Access surface method
1	Southern end of Little Beach	Sand only
2	Little Beach - from Pitt Street Reserve	Minimal grass cover, mainly sand
3	Little Beach - from Pitt Street Reserve	Woodchip and sand
4	Little Beach - from carpark area	Sand only
5	Little Beach - from breakwater entrance	Board and chain
6	Stockton Beach - from breakwater entrance	Board and chain
7	Stockton Beach - southern end of caravan park	Sand only
8	Stockton Beach - middle of caravan park	Sand only
9	Stockton Beach - northern end of caravan park	Board and chain
10	Stockton Beach - near cafe	Board and chain
11	Stockton Beach - near pavilion	Board and chain
12	Stockton Beach - south of surf lifesaving club	Board and chain
13	Stockton Beach - north of surf lifesaving club	Board and chain
14	Stockton Beach - northern end of Dalby Oval	Sand only
15	Stockton Beach - entrance to monument	Board and chain
16	Stockton Beach - north of monument	Sand only
17	Stockton Beach - opposite 203 Mitchell Street	Sand only
18	Stockton beach - Mitchell Street seawall south	Stairs
19	Stockton Beach - Mitchell Street seawall middle	Stairs
20	Stockton Beach - Mitchell Street seawall north	Stairs
21	Stockton Beach - south of childcare centre	Sand only
22	Stockton Beach - Corner of Griffith Avenue and Barrie Crescent	Sand only
23	Stockton Beach - opposite Beeston Road	Rubber mat
24	Stockton Beach - corner of Meredith Street and Eames Avenue	Rubber mat
25	Stockton Beach - Corroba Oval	Sand only
26	Stockton Beach - Corroba Oval north	Sand only

## 8.2 Identified access issues

Beach access points in the northern parts of the coastline within Council's management area (access points 21, 22, 25 and 26) have been impacted by coastal erosion and have required intervention to prevent public access due to safety concerns. These access points and other access points within the northern part of Council's management area are likely to be subject to on-going beach erosion and shoreline recession.

The community has identified the stairways across the Mitchell Street seawall (access points 18-20) do not provide adequate access to the beach. The construction of the Mitchell Street seawall has resulted in reduced beachfront seaward of the revetment structure and access via the stairways is not possible at all times.

## 8.3 Management actions

The management actions outlined in **Table 8** are restricted to short (1-2 year) and medium (1-5 year) actions to address access to Stockton Beach. Long-term management actions will be part of a future Coastal Management Program submitted under the *Coastal Management Act 2016*.

**Table 8: Beach access management actions**

#	Approach	Zone	Management Action	Primary responsibility	Supporting partners <sup>1</sup>	Cost estimate (Funding source)	Evaluation method	Timeframe
BA1	Risk assessment	1-5	Undertake an audit of beach access points to assess public safety issues and erosion potential. Access point data to be available in Council GIS program.	Council	Department of Industry - Lands and Water (Crown Lands)	\$5,000 (Council)	Audit undertaken.	Short
BA2	Monitoring	1-5	Identify beach access points for closure and/or replacement in consultation relevant stakeholders and the community.	Council	Department of Industry - Lands and Water (Crown Lands)	Minimal	Access points identified for closure and/or replacement.	Short
BA3	Planning	1-5	Design of new fencing and beach access points are undertaken in accordance with the Coastal Dune Management Manual (Department of Land and Water Conservation, 2001). Design will need to include maintenance plan for beach access points.	Council	Department of Industry - Lands and Water (Crown Lands)	\$10,000 (Council)	Design drawings completed with reference to Coastal Dune Management Manual.	Short, medium

<sup>1</sup> Supporting partners are government agencies or stakeholders with ownership of land or an interest in the proposed management action and will be consulted at the time of project management. Generally, supporting partners will not be financial contributors to the management action.



# 9.0 Beach Amenity

## 9.1 Overview

The Stockton coastal area provides a setting that the local community strongly connects with and creates a sense of local identity. This connection to the coastal area generates both tangible and intangible community benefits and results in high value being placed on Stockton Beach by local residents and visitors.

While level of amenity can be subjective the Newcastle Coastal Revitalisation Strategy Master Plan (Urbis Pty Ltd, 2010) aims to enhance the amenity of the coastal zone within the Stockton study area by providing improved facilities and public spaces. A section of the southern part of the Stockton study area was included within the South Stockton Reserves Public Domain Plan (JILA and Hill Thalys, 2012) while a public domain plan is proposed for North Stockton (NCC, 2015).

Beach maintenance programs are routinely undertaken to remove rubbish and maintain the aesthetic value of a sandy beach environment.

Recent storm events have resulted in erosion of land at 310 Fullerton Street, Stockton and exposed a former landfill site. The former landfill extends south of 310 Fullerton Street on to Crown reserve 79066. Material from the former landfill has been transported onto Stockton Beach with clean-up action undertaken. The local community have raised concern regarding on-going transport of waste material onto Stockton Beach and into the ocean. Concern was also raised regarding on-going impacts of coastal erosion on the former landfill site and the associated reduction in beach amenity and potential environmental impacts. Management action is proposed to be undertaken to address erosion impacts and containment of landfill material at 310 Fullerton Street in **Section 6.0**.

The local community have highlighted the value of a sandy beach environment. The maintenance of this community value is intrinsically involved with the coastal hazards of beach erosion and shoreline recession. While short-term and medium term management actions are outlined in **Section 6.0** long-term actions to address beach amenity and sand nourishment will be addressed as part of the future Coastal Management Program to be submitted under the *Coastal Management Act 2016*.





## 9.2 Management actions

Table 9 outlines the management actions proposed to ensure beach amenity in the study area is maintained or improved.

**Table 9: Beach amenity management actions**

#	Approach	Zone	Management Action	Primary responsibility	Supporting partners <sup>1</sup>	Cost estimate (Funding source)	Evaluation method	Timeframe
B1	Planning	1-3	Investigate opportunities for landscaping within the Stockton study area as part of public domain plans.	Council	Department of Industry - Lands and Water (Crown Lands)	Minimal	Appropriate landscaping included within public domain plan.	Medium
B2	On-ground works	1-5	Undertake beach maintenance program and continue dune rehabilitation works. This includes dune fencing, access controls, invasive species control and replanting native colonising species.	Council	Department of Industry - Lands and Water (Crown Lands)	\$150,000 per annum (Council)	Beach maintenance program undertaken.	Short
B3	Planning, risk assessment	1-5	Undertake audit of stormwater discharge points onto Stockton coastline and assess water quality and erosion potential	Council	Department of Industry - Lands and Water (Crown Lands)	Minimal	Stormwater audit undertaken.	Short-medium
B4	On-ground works	1-5	Undertake beach maintenance at stormwater discharge points on Stockton coastline after storm events to prevent additional erosion.	Council		\$5,000 per annum (Council)	Beach maintenance at stormwater discharge points undertaken where required.	Short-medium

<sup>1</sup> Supporting partners are government agencies or stakeholders with ownership of land or an interest in the proposed management action and will be consulted at the time of project management. Generally, supporting partners will not be financial contributors to the management action.



# 10.0 Recreational Use of the Coastal Zone

## 10.1 Overview

The recreational use of the coastal zone within the Stockton study area has been identified as a priority by the community. The identified key recreational uses include:

- Surfing;
- Fishing; and
- Swimming.

### Surfing

The community have identified the wave action within the Stockton study area has been altered by coastal processes, particularly the loss of offshore and nearshore sediment as identified in *Shifting Sands at Stockton Beach* (Umwelt Pty Ltd and SMEC Pty Ltd, 2002) and *Stockton Beach Coastal Processes Study Stage 1 - Sediment and Transport Analysis and Description of On-going Processes* (DHI, 2006), resulting in changed or reduced surfing conditions. Additional analysis of coastal processes and potential options for sand replenishment to address impacts on wave action for surfing will be addressed as part of the future Coastal Management Program to be submitted under the *Coastal Management Act 2016*.

### Fishing

The community have identified impacts on recreational fishing due to the loss of offshore and nearshore sediment as identified in *Shifting Sands at Stockton Beach* (Umwelt Pty Ltd and SMEC Pty Ltd, 2002) and *Stockton Beach Coastal Processes Study Stage 1 - Sediment and Transport Analysis and Description of On-going Processes* (DHI, 2006). Part A - Stockton will address potential short and medium term actions and opportunities to improve the recreational fishing experience within the Stockton study area. However, impacts of coastal processes on fishing stock and catch are beyond the scope of Part A - Stockton.

### Swimming

Patrolled swimming areas are currently provided by Council at the southern end of Stockton Beach during the summer surfing season (September-April). Swimming outside of the patrolled areas and times should be undertaken with caution as Stockton Beach is rated as moderately hazardous on the Australian Beach Safety and Management Program (Surf Life Saving NSW, 2016).





## 10.2 Management actions

**Table 10** outlines the management actions proposed to ensure the recreational use of the coastal zone in the study area is maintained or improved.

**Table 10: Recreational use of the coastal zone management actions**

#	Approach	Zone	Management Action	Primary responsibility	Supporting partners <sup>1</sup>	Cost estimate (Funding source)	Evaluation method	Timeframe
<b>RU1</b>	Planning	1-3	Prepare public domain plan for the Stockton coastal zone study area in consultation with relevant land managers and stakeholders. Public domain plan will build upon the adopted Newcastle Revitalisation Strategy Master Plan.	Council	Department of Industry - Lands and Water (Crown Lands)	Minimal	Public domain plan prepared.	Medium
<b>RU2</b>	Planning	1-5	Enhance opportunities for recreational fishing and identify areas for facilities such as fish cleaning tables.	Council	NSW Fisheries	TBA (Council, State Government)	Opportunities identified in public domain plan.	Medium
<b>RU3</b>	Planning	1-5	Public domain plan for Stockton coastal zone study area will consider footpath/cycleway along Mitchell Street.	Council		Minimal	Footpath/cycleway investigated in public domain plan.	Medium

<sup>1</sup> Supporting partners are government agencies or stakeholders with ownership of land or an interest in the proposed management action and will be consulted at the time of project management. Generally, supporting partners will not be financial contributors to the management action.

# 11.0 Culture and Heritage

## 11.1 Aboriginal history

The Stockton study area is located within the traditional lands of the Worimi people. Traditionally, the Worimi people travelled between the northern and southern areas of Stockton Bight utilising marine and estuary resources. The local environment was an extremely rich resource zone and provided a variety of seasonal food resources (HLA-Envirosciences Pty Ltd, 1995). The coastal area provided food resources such as fish and many types of shellfish including pippis, mussels and oysters, while many flora species were also valued as food sources (Australian Museum Business Services, 2005).

A series of archaeological investigations within the Stockton Bight have established the high archaeological sensitivity and significance of the area (Australian Museum Business Services, 2005). A number of archaeological sites are known to occur within the dune systems within the north of the study area. These sites include surface scatters of midden materials including shell, bone and stone artefacts.

## 11.2 European history

The first Europeans known to have sighted Stockton Bight were the crew of the Endeavour on Captain James Cook's first voyage into the Pacific Ocean in 1770 (Turner, 1994). Europeans did not return to Stockton Bight until 1797 when Lieutenant John Shortland arrived at the Hunter River in search of escaped convicts from the settlement of Sydney.

In 1800 the 25 tonne grain boat *Norfolk* was seized by convicts while enroute from Windsor to Sydney. While headed north the *Norfolk* was wrecked off Stockton Beach with the incident giving the name 'Pirate's Point' to the southern tip of the Stockton peninsula (Turner, 1994).

In 1801 Governor King sent a small party under Lieutenant Governor Colonel William Paterson to explore the Hunter Region. The party described the Stockton peninsula as a series of flats with gullies of deep water between. The party also described large banks of shells, in some places three feet thick, on the shoreline with abundant oysters.

After the expedition Newcastle was established as a convict settlement in late 1801. The settlement was abandoned in 1802, but a second convict settlement commenced in 1804. Newcastle remained a convict settlement until 1822 and a government monopoly of economic activity in the area occurred. Limeburning was the principal industry on the Stockton peninsula with timber extraction including cedar, flooded gum and mangroves also conducted (Turner, 1994).

The first land grants at Stockton were awarded to Thomas Potter McQueen, Alexander Walker Scott and Dr James Mitchell in the 1830s. Scott and Mitchell established industries along the Hunter River including a salt works, tweed mill and iron foundry. By 1849 Mitchell had obtained the land holdings of McQueen and Scott and the land south of Clyde Street became the "Quigley Estate", named after W.B Quigley Dr Mitchell's son-in-law. All contracts at the Quigley estate were on a leasehold basis and the area was generally known as the 'Private Township of Stockton' (Stockton Historical Society Inc, 2018).

Further industry developed within the Quigley Estate including an iron works, chemical plant, coal mining and prominently, shipbuilding. Shipbuilders, with many builders operating sawmills, became the major industry in the Stockton area with the first slipway established in 1858 and the Patent Slipway opening in 1860 (Heritas, 2005).

Attempts to establish a coal mining industry in Stockton began in 1863 with a series of test bores carried out in the southern part of the peninsula. In 1882, the Stockton Coal Company was formed and the Stockton Colliery commenced production in 1885 and yielded over three million tonnes of coal before closure in 1907 (Tonks, 1984).

A dangerous shoal on the Stockton side of the mouth of the Hunter River, known as the Oyster Bank, prompted the construction of infrastructure for shipping into Newcastle Harbour. The Oyster Bank is believed to have claimed at least fifty ships including the paddle steamer *Cawarra* in 1866. The development of Newcastle Harbour during the 19<sup>th</sup> century included the southern parts of Stockton being rock lined by 1870. The continued development of the harbour included the commencement of the construction of the Stockton breakwall in 1884. The Oyster Bank claimed the *Adolphe* in 1904 when it tried to enter Newcastle Harbour during rough weather and struck the wrecks of the *Lindus* and *Colonist*. The rusted remains of the *Adolphe* can be presently viewed from the Stockton breakwall, which was completed in 1912 (Institute of Engineers Australia, 1989).

Due to the expanding port operations a quarantine station was constructed in 1900 at the present day site of the Stockton Centre (342 Fullerton Street). The Stockton Centre was converted into a psychiatric facility in 1910 and continues to provide health facilities to the present day.

Residential development within Stockton was mainly confined to the Quigley Estate in the 19<sup>th</sup> century, but in 1887 the State Government subdivided Crown Land to the north of Clyde Street. The area became known as the 'new township' and established the main current residential centre of Stockton (Stockton Historical Society Inc, 2018). The Quigley Estate remained in the ownership of the Quigley family until 1912 when it was sold and progressively subdivided.

In 1912 Fort Wallace (338 Fullerton Street) was constructed to provide a defence post north of the Hunter River. Fort Wallace operated as a defence force facility until its closure in 1993 (Urbis, 2017).



Newcastle Morning Herald Collection c1950  
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## 11.3 Management actions

Table 11 outlines the management actions proposed to conserve or improve interpretation of culture and heritage in the Stockton study area, both Aboriginal and European.

**Table 11: Culture and heritage management actions**

#	Approach	Zone	Management Action	Primary responsibility	Supporting partners <sup>1</sup>	Cost estimate (Funding source)	Evaluation method	Timeframe
H1	Planning	1-5	Incorporate Aboriginal cultural information into Council projects and works within the Stockton study area.	Council	Guraki Committee Worimi Aboriginal Land Council	Minimal	Aboriginal cultural information incorporated into Council projects	Short, medium
H2	Planning		Implement dual naming of sites within the Stockton study area where appropriate	Council	Guraki Committee Worimi Aboriginal Land Council	Minimal	Dual naming sites determined	Short, medium
H3	Planning	1-5	Ensure high quality interpretive treatments of heritage items or places that increase understanding of the heritage significance of these items or places in Council projects and works within the Stockton study area.	Council		Cost to be determined as part of individual project	Heritage treatment incorporated into Council projects	Short, medium
H4	Planning		Prepare Aboriginal Heritage Management Strategy to ensure due diligence processes are followed for Council projects and assessment of development applications	Council	Guraki Committee Worimi Aboriginal Land Council	\$30 000 (Council)	Aboriginal Heritage Management Strategy completed	Medium
H5	Planning	1-3	Interpretation of the history and heritage within the Stockton area is to be integrated into Public Domain Plans.	Council		Minimal	Heritage considerations included in Public Domain Plan.	Medium
H6	Planning	1-7	Investigate protection of heritage listed items on public lands from coastal hazards	Council		Minimal		Short, medium

<sup>1</sup> Supporting partners are government agencies or stakeholders with ownership of land or an interest in the proposed management action and will be consulted at the time of project management. Generally, supporting partners will not be financial contributors to the management action.

# 12.0 Review

Part A - Stockton identifies coastal management actions for the short (1-2 year) and medium (1-5 years) term within the Stockton study area. A review of Part A - Stockton management actions will be undertaken as part of the future Coastal Management Program to be prepared under the *Coastal Management Act 2016*. This review will be conducted by the end of 2021.

The implementation of Part A - Stockton will be reported by Council through the Annual Report and End of Term Report under the Integrated Planning and Reporting framework. Updated information regarding management actions will also be placed on Council's website.

Part A - Stockton forms the first part of the on-going assessment and management of coastal hazards and community use of the coastal environment within the Stockton study area. Part A - Stockton will be submitted to the Office of Environment and Heritage for certification under the savings provisions of the *Coastal Protection Act 1979* (now repealed). Certification under the *Coastal Protection Act 1979* is required to be undertaken by 3 October 2018 due to legislative reform.

The commencement of the *Coastal Management Act 2016* requires Council to prepare a Coastal Management Program. The Coastal Management Program forms the second part of the coastal management process under the State Government framework and is to be submitted to and certified by the State Government by the end of 2021. The Coastal Management Program will address long-term options for management of coastal hazards.

The community and Stockton Community Liaison Group have identified sand replenishment/nourishment as the preferred option to address coastal hazards and beach amenity in the consultation process for the Part A - Stockton. Investigation of sand replenishment/nourishment will be undertaken as part of the preparation of the Coastal Management Program and will be included in the assessment of options for long-term management of the coastal zone.

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# Appendix A

## Principles, Goals and Objectives of the NSW Coastal Policy 1997 addressed in the Newcastle Coastal Zone Management Plan Part A - Stockton

### Principles of the NSW Coastal Policy 1997

- Natural Environment
- Natural Processes
- Aesthetic Qualities
- Cultural Heritage
- Ecologically Sustainable Development and Use of Resources
- Ecologically Sustainable Human Settlement
- Public Access and Use
- Information to Enable Effective Management
- Integrated Planning and Management

### Goals of the NSW Coastal Policy 1997

#### 1. To protect, rehabilitate and improve the natural environment

##### Objectives

- 1.1 To identify coastal lands and aquatic environments with conservation values and devise and implement acquisition policies, management strategies and controls to ensure those values are protected.

Not applicable to Stockton study area.

- 1.2 To conserve the diversity of all native plants and animal species and to protect and assist the recovery of threatened and endangered species.

Section 7 of Part A - Stockton aims to enhance the habitat value of coastal land within the Stockton study area. Improved habitat condition will assist in conserving threatened plant species while providing potential habitat for threatened terrestrial fauna.

- 1.3 To improve water quality in coastal and estuarine waters and coastal rivers where it is currently unsatisfactory and to maintain water quality where it is satisfactory.

Section 7 provides management actions for improving water quality from a predominantly urban coastal environment by the implementation of Water Sensitive Urban Design.

- 1.4 To manage the coastline and estuarine environments in the public interest to ensure their health and vitality.

The management actions within Part A - Stockton aim to provide effective management of the coastal environment while providing recreational opportunities and access to Stockton Beach.

- 1.5 To foster new initiatives and facilitate the continued involvement of the community in programs aimed at the restoration and rehabilitation of degraded coastal areas.

Section 7 and 9 provide management actions to promote and engage the community in dune and habitat restoration activities. Stockton currently has community groups undertaking restoration activities to degraded dune systems and Council will seek to promote and engage additional members to these activities.

#### 2. To recognise and accommodate natural processes and climate change

##### Objectives

- 2.1 To give the impacts of natural processes and hazards a high priority in the planning and management of coastal areas.

Section 6 of Part A - Stockton provides an overview of the natural coastal processes within the Stockton study area and the risk management framework to determine the threat level from these processes. Section 6 also includes management actions to accommodate natural processes in the planning of development within the Stockton study area and allow sustainable management of the coastal area.

- 2.2 To recognise and consider the potential effects of climate change in the planning and management of coastal development.

Modelling conducted as part of the Newcastle Coastal Zone Hazards Study (BMT WBM, 2014(a)) has utilised best scientific opinion for the projection of sea level rise within the Stockton study area and the resultant determination of coastal hazard areas. These hazard areas will be utilised in Council's planning processes for the coastal area and for assessment of development applications.

#### 3. To protect and enhance the aesthetic qualities of the coastal zone

- 3.1 To identify and protect areas of high natural or built aesthetic quality.

Section 7 of Part A - Stockton has identified the coastal environment within the Stockton study area as significant to the local community and proposes management actions to protect and enhance the value of this environment. Section 9 also seeks to enhance the amenity of the coastal environment through appropriate planning of public areas and built structures within these areas.

**3.2 To design and locate development to complement the surrounding environment and to recognise good aesthetic qualities.**

Section 7 and 9 identifies public domain planning within the Stockton study area as an opportunity to undertake appropriate development within the coastal area. Public domain plans will be undertaken with a design aesthetic that will complement the coastal environment.

**3.3 To encourage towns to reinforce or establish their particular identifies in a form which enhances the natural beauty of the coastal zone.**

The Stockton community have identified a strong affinity with the coastal environment as part of their local identity. The management actions within Part A - Stockton will conserve and enhance the qualities of the existing coastal environment to provide a continuing connection between the natural environment and local residents.

**4. To protect and conserve cultural heritage**

**4.1 To effectively manage and conserve cultural heritage places, items and landscapes.**

Section 10 of Part A - Stockton provides management actions to protect and conserve both indigenous and European heritage within the Stockton study area.

**4.2 To recognise the rights and needs of indigenous people and to ensure inputs by Aboriginal communities prior to making decisions affecting indigenous communities.**

Section 10 of Part A - Stockton aims to involve the local traditional owners, Worimi people, within planning processes of the Council. This will facilitate recognition of the rights and needs of the Worimi people as the traditional custodians of the Stockton study area.

**5. To promote ecologically sustainable development and use of resources**

**5.1 To identify and facilitate opportunities for the sustainable development and use of resources.**

The Stockton study area is primarily an urban environment and opportunities for resource development are limited or have been depleted during historical activities such as coal mining. Part A - Stockton aims to manage the development of the coastal zone for recreational activities and use by the community.

**5.2 To develop land use and management plans which ensure the sustainable development and use of resources.**

The Stockton study area is primarily an urban environment and opportunities for resource development are limited.

**5.3 To develop and implement “best practice” approaches to achieving sustainable resource management**

See Objective 5.2.

**6. To provide for ecologically sustainable human settlement**

**6.1 To ensure the future expansion or redevelopment of urban and residential areas, including the provision of infrastructure, avoids or minimises impacts on environmentally sensitive areas and cultural heritage.**

Part A - Stockton aligns with the draft North Stockton and Fern Bay Landuse Strategy to ensure appropriate development of the northern part of the Stockton study area. Future development will be guided by the information in Part A - Stockton and will consider coastal hazards as part of the planning process.

**6.2 To promote compact and contained planned urban development in order to avoid ribbon development, unrelated cluster development and continuous urban areas on the coast.**

The Stockton study area is primarily an existing urban environment, but Part A - Stockton combined with the draft North Stockton and Fern Bay Landuse Strategy will guide future development in the northern part of the Stockton study area.

**6.3 To ensure rural residential developments are located in areas where impacts on the natural environment or valuable agricultural resources are minimised.**

The Stockton study area is primarily urban and Objective 6.3 is not applicable.

**6.4 To provide for choice in both housing and lifestyles.**

While Part A - Stockton does not address housing stock or design Section 9 provides management actions to address beach amenity that coincides with the lifestyle of Stockton as a seaside suburb.

**7. To provide for appropriate public access and use**

**7.1 To increase public access to foreshores when feasible and environmentally sustainable options are available.**

Section 8 of Part A - Stockton addresses access to Stockton Beach and Council's intended management actions to provide and maintain access.

**7.2 To ensure risks to human safety from the use of coastal resources is minimised.**

Section 6 of Part A - Stockton address coastal hazards within the Stockton study area and provides appropriate management actions to address the short and medium term risk for these hazards.

**8. To provide information to enable effective management**

**8.1 To coordinate and integrate data and information collection with management programs to ensure that it meets the needs of management.**

Council will ensure data obtained through the coastal planning process is appropriately stored and distributed to enable integration with other Council programs.

**8.2 To develop compatible databases for coastal resource information.**

Council will maintain a coastal information database and will provide information as required.

**8.3 To ensure that coastal information is made more accessible across all levels of government, the private sector and the community.**

Council information will be provided as requested.

**8.4 To develop adequate formal and informal education and awareness programs addressing coastal management issues.**

Section 6 provides management actions to increase education programs regarding coastal processes. Information will also be provided on Council's website.

**9. To provide for integrated planning and management**

**9.1 To facilitate consistent and complementary decision making which recognises the three spheres of government.**

The preparation of Part A - Stockton follows State Government guidelines and is consistent with other coastal zone management plans within NSW.

**9.2 To ensure Government agencies efficiently and effectively implement the Coastal policy in a co-ordinated and collaborative manner.**

Part A - Stockton is consistent with the objectives of the NSW Coastal Policy 1997.

**9.3 To ensure local government coastal policy and management is integrated and involves community participation and information exchange.**

Section 3 of Part A - Stockton outlines the community consultation undertaken in the preparation of Part A - Stockton

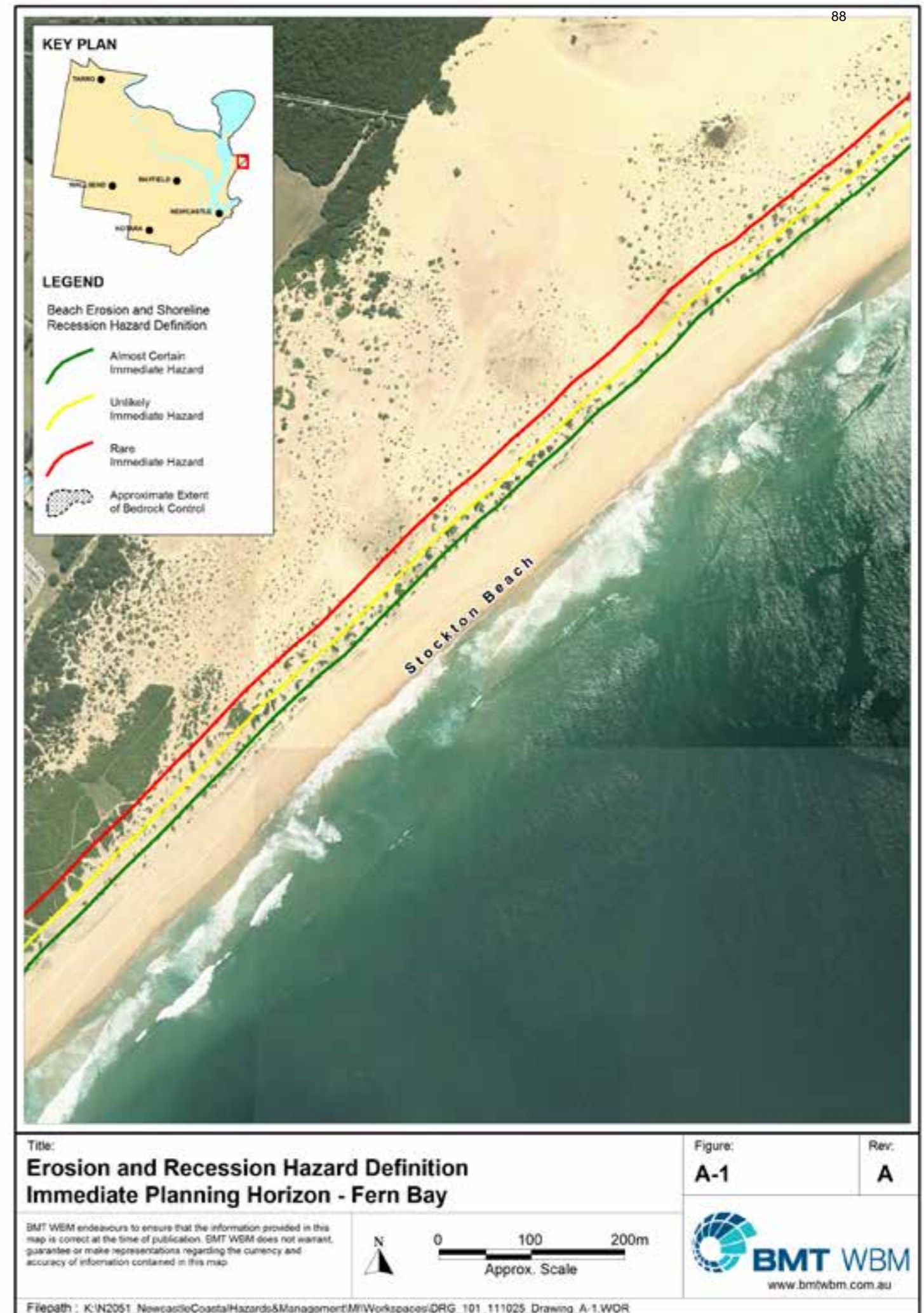
**9.4 To give consideration to the development of a national coastal zone management strategy.**

Council supports the development of a national coastal zone management strategy.

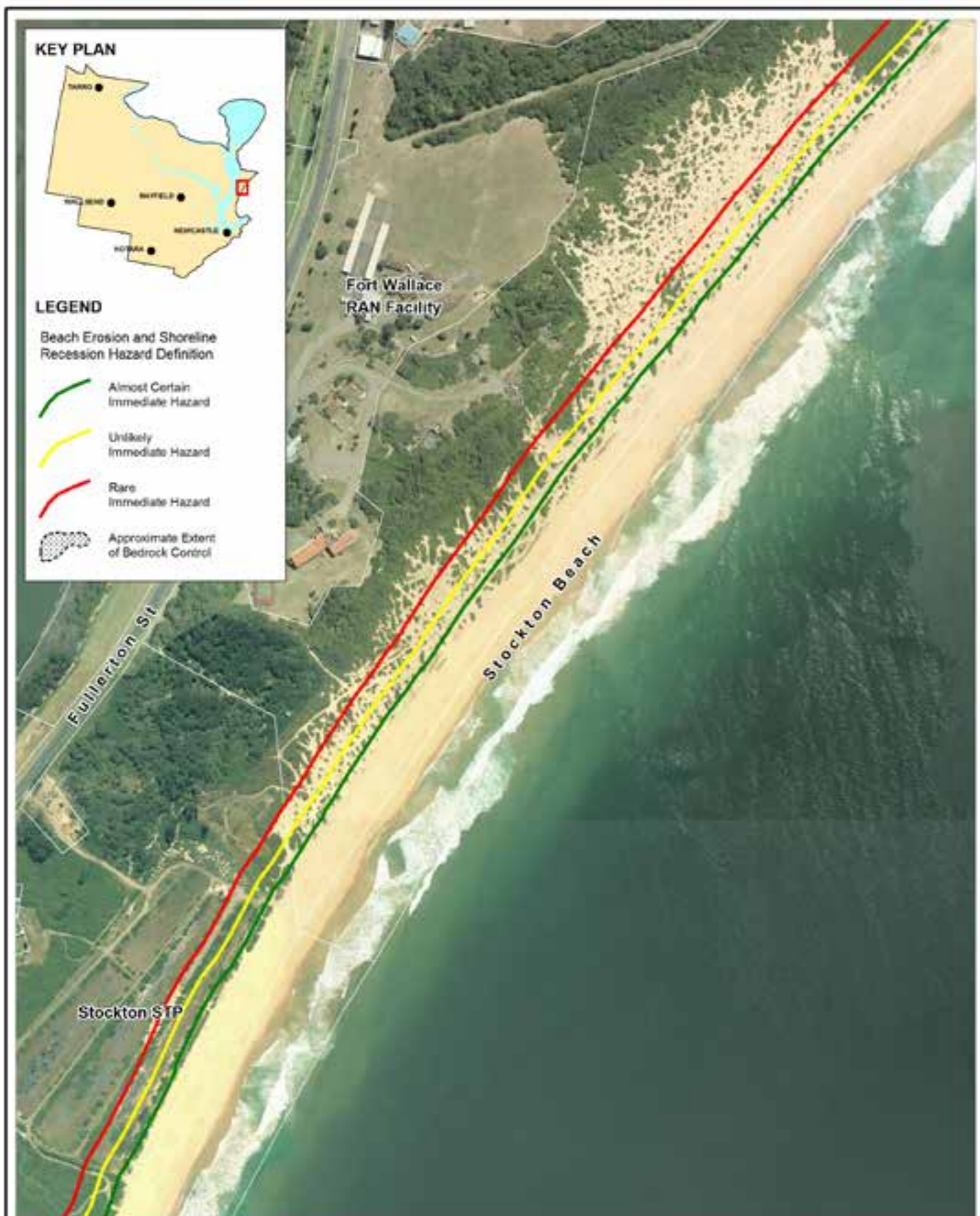


# Appendix B

Modelled beach erosion and shoreline recession hazard areas within Stockton study area.







<p>Title: <b>Erosion and Recession Hazard Definition Immediate Planning Horizon - Fort Wallace</b></p>	<p>Figure: <b>A-2</b></p>	<p>Rev: <b>A</b></p>
<p><small>BMT WEM endeavours to ensure that the information provided in this map is correct at the time of publication. BMT WEM does not warrant, guarantee or make representations regarding the currency and accuracy of information contained in this map.</small></p>	<p>Approx. Scale</p>	<p>www.bmtwbm.com.au</p>
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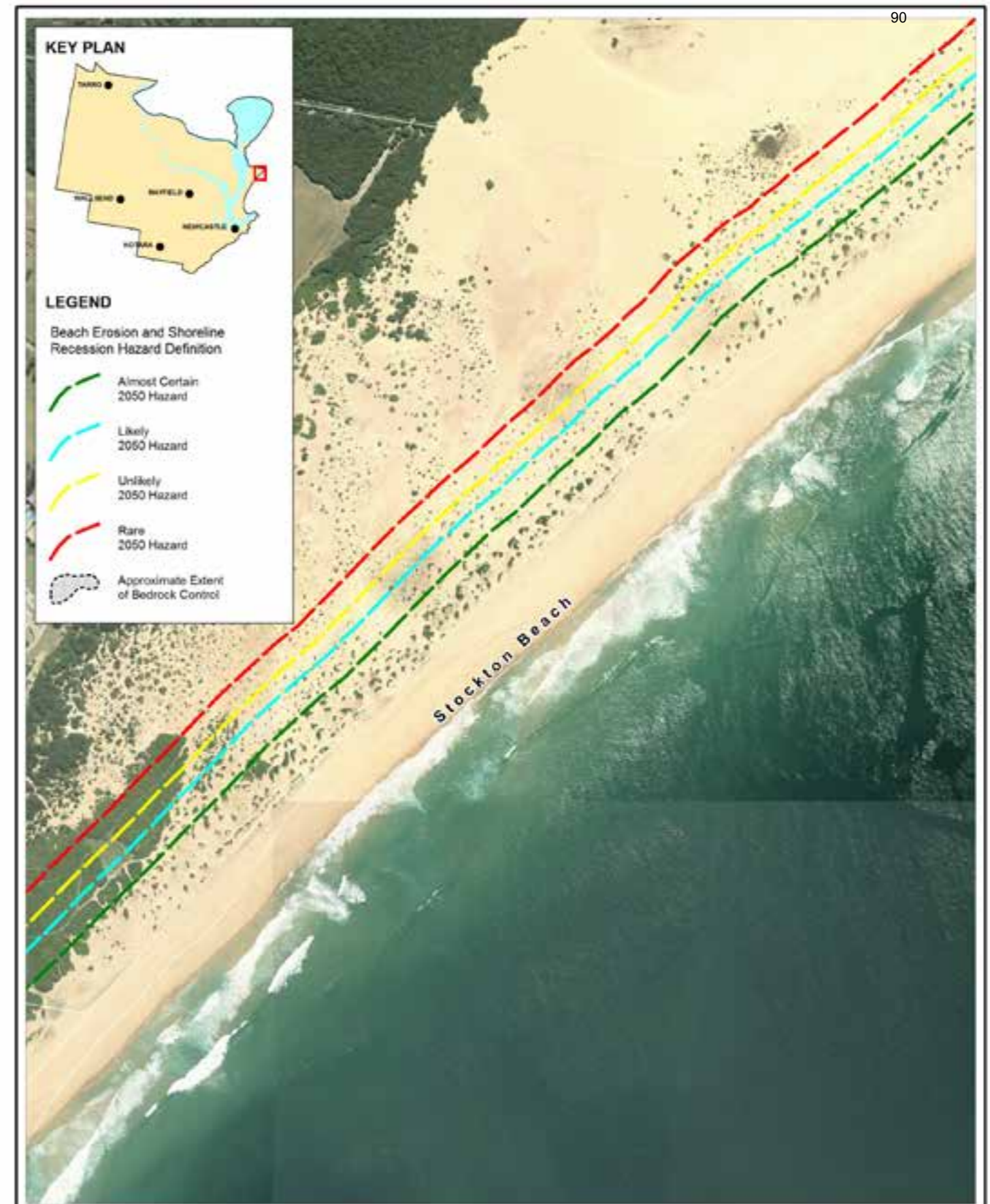


<p>Title: <b>Erosion and Recession Hazard Definition Immediate Planning Horizon - Stockton North</b></p>	<p>Figure: <b>A-3</b></p>	<p>Rev: <b>A</b></p>
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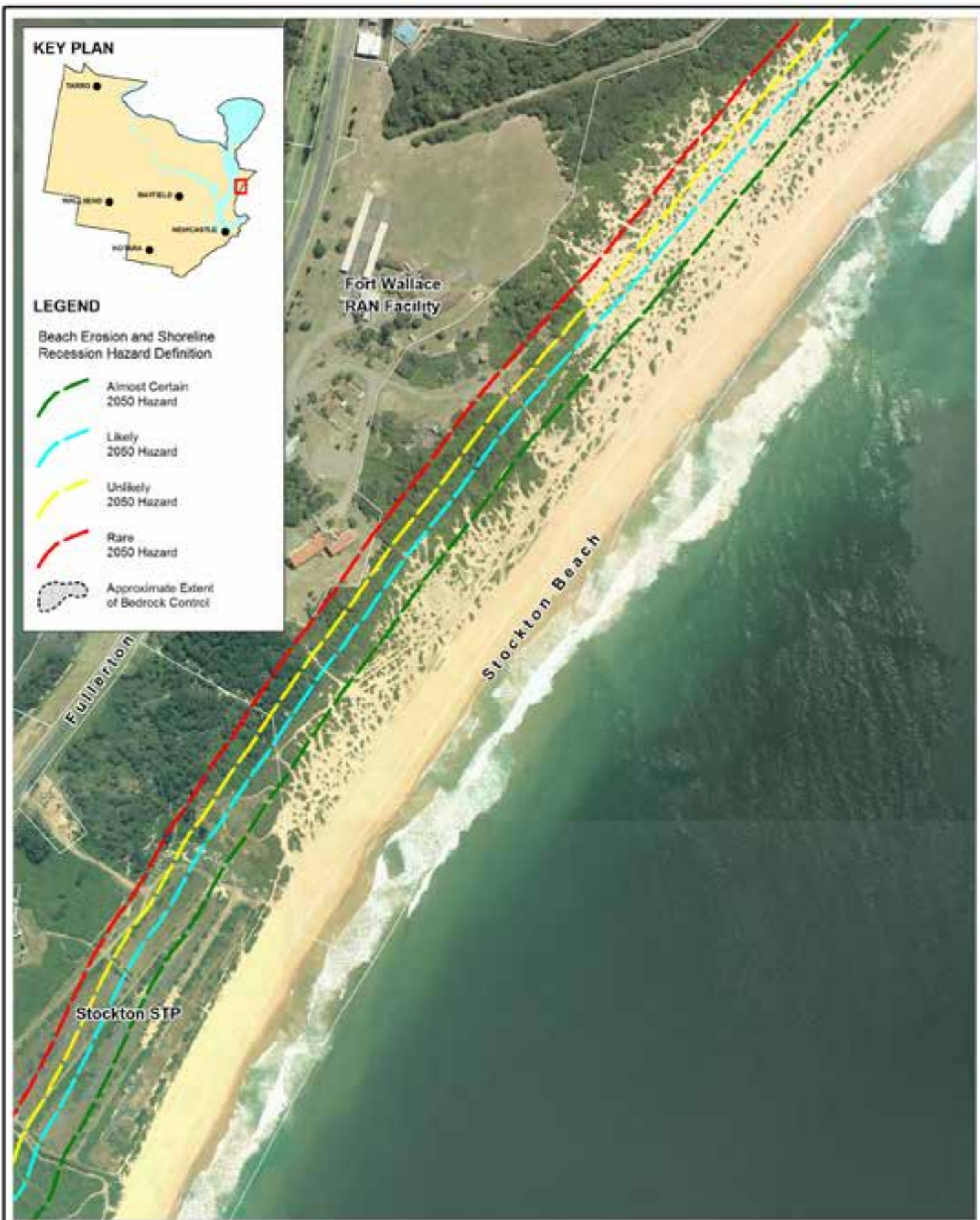


<p>Title: <b>Erosion and Recession Hazard Definition Immediate Planning Horizon - Stockton South</b></p>	<p>Figure: <b>A-4</b></p>	<p>Rev: <b>A</b></p>
<p>BMT WEM endeavours to ensure that the information provided in this map is correct at the time of publication. BMT WEM does not warrant, guarantee or make representations regarding the currency and accuracy of information contained in this map.</p> <div style="display: flex; justify-content: space-between; align-items: center;"> <div data-bbox="563 1848 1009 1953"> <p>Approx. Scale</p> </div> <div data-bbox="1038 1837 1389 1990"> <p>www.bmtwbm.com.au</p> </div> </div> <p>Filepath : K:\N2051_NewcastleCoastalHazards&amp;Management\MI\Workspaces\DRG_104_111025_Drawing_A-4.WDR</p>		



<p>Title: <b>Erosion and Recession Hazard Definition 2050 Planning Horizon - Fern Bay</b></p>	<p>Figure: <b>B-1</b></p>	<p>Rev: <b>A</b></p>
<p>BMT WEM endeavours to ensure that the information provided in this map is correct at the time of publication. BMT WEM does not warrant, guarantee or make representations regarding the currency and accuracy of information contained in this map.</p> <div style="display: flex; justify-content: space-between; align-items: center;"> <div data-bbox="2047 1848 2493 1953"> <p>Approx. Scale</p> </div> <div data-bbox="2522 1837 2902 1990"> <p>www.bmtwbm.com.au</p> </div> </div> <p>Filepath : K:\N2051_NewcastleCoastalHazards&amp;Management\MI\Workspaces\DRG_201_111025_Drawing_B-1.WDR</p>		





<b>Title:</b> <b>Erosion and Recession Hazard Definition</b> <b>2050 Planning Horizon - Fort Wallace</b>		<b>Figure:</b> <b>B-2</b>	<b>Rev:</b> <b>A</b>
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<b>Title:</b> <b>Erosion and Recession Hazard Definition</b> <b>2050 Planning Horizon - Stockton North</b>		<b>Figure:</b> <b>B-3</b>	<b>Rev:</b> <b>A</b>
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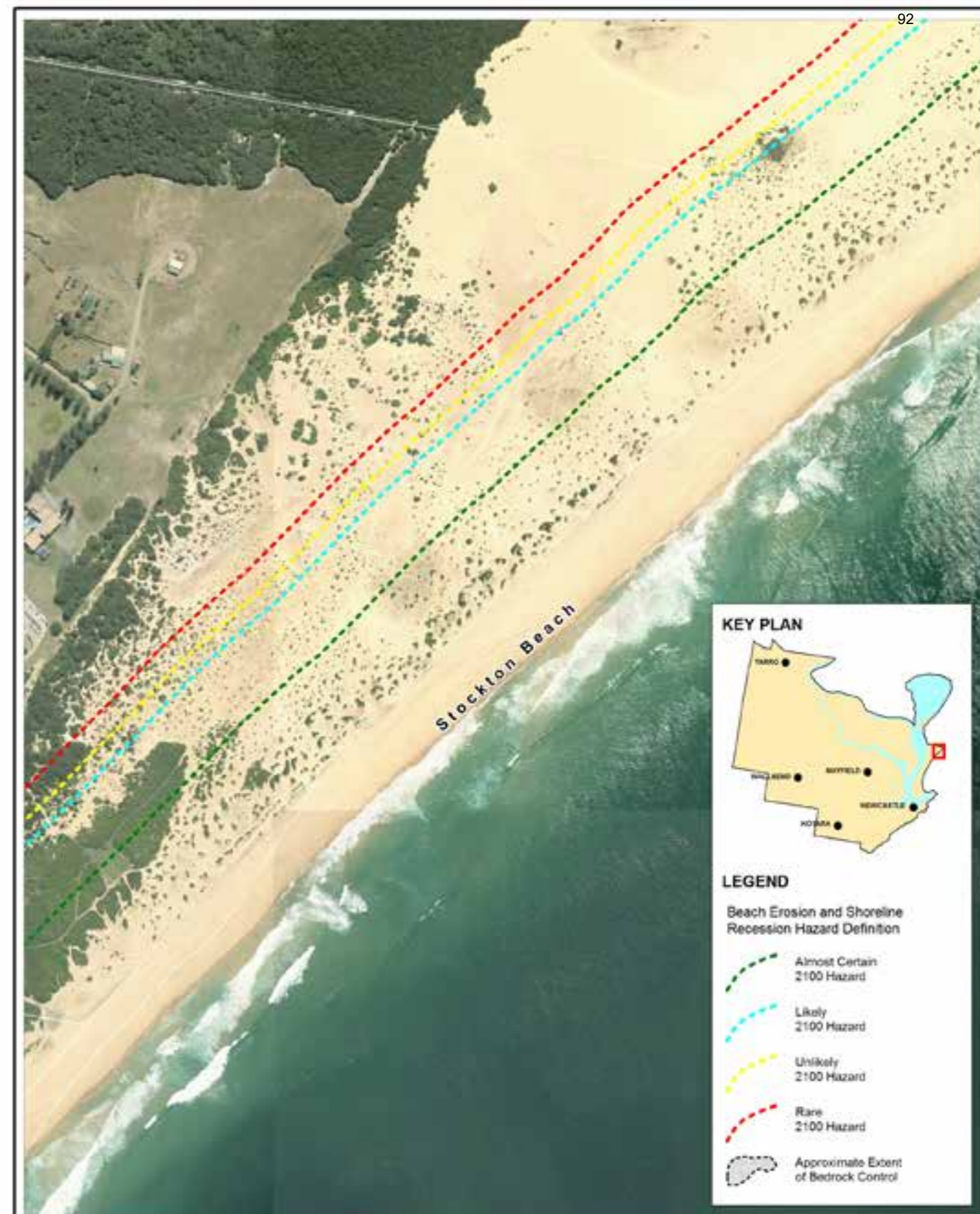
Figure: **B-4** Rev: **A**

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Title: **Erosion and Recession Hazard Definition 2100 Planning Horizon - Fern Bay**

Figure: **C-1** Rev: **A**

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<b>Title:</b> <b>Erosion and Recession Hazard Definition</b> <b>2100 Planning Horizon - Fort Wallace</b>		<b>Figure:</b> <b>C-2</b>	<b>Rev:</b> <b>A</b>
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<b>Title:</b> <b>Erosion and Recession Hazard Definition</b> <b>2100 Planning Horizon - Stockton North</b>		<b>Figure:</b> <b>C-3</b>	<b>Rev:</b> <b>A</b>
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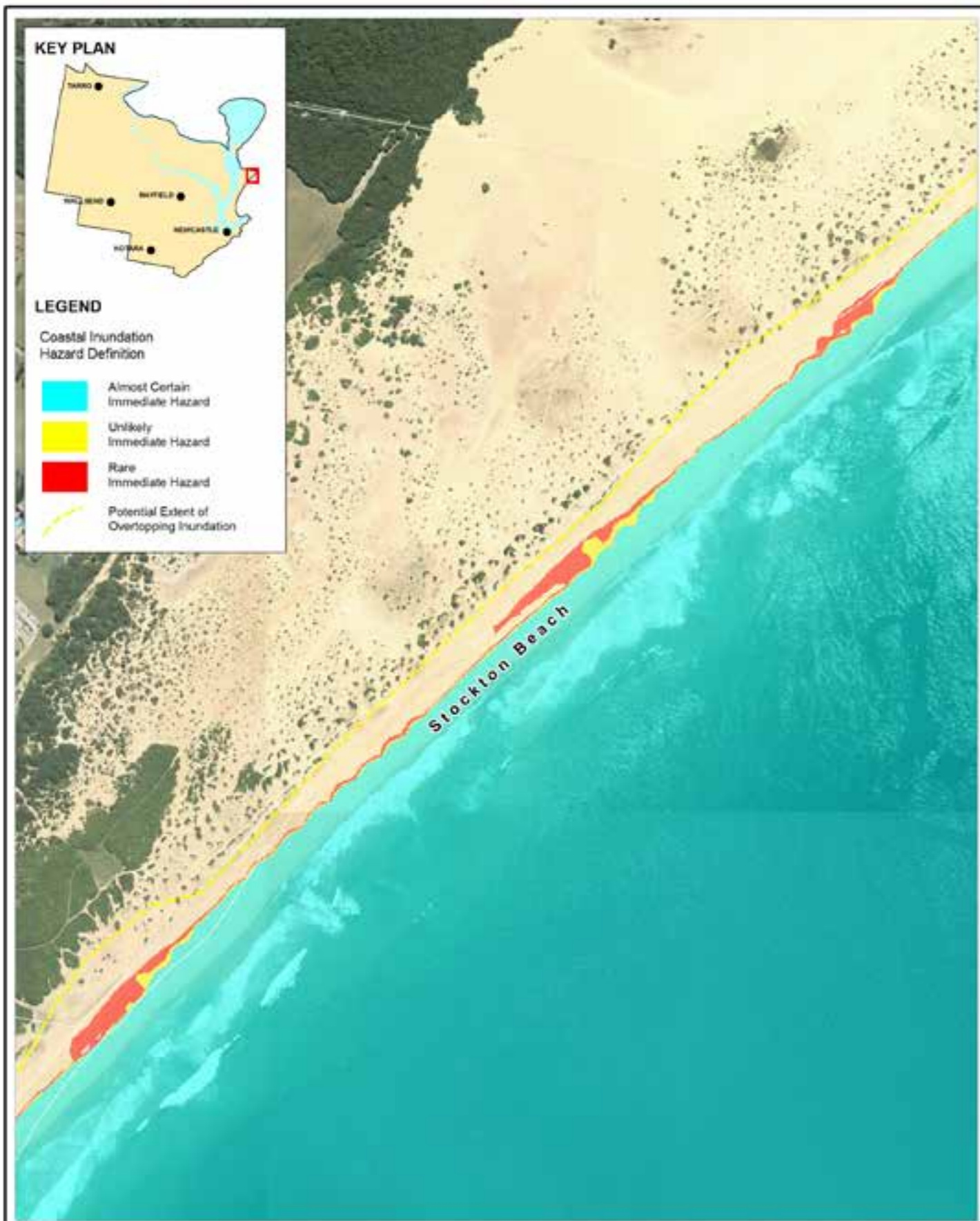
# Appendix C

## Modelled coastal inundation hazard areas within Stockton study area



<p>Title: <b>Erosion and Recession Hazard Definition 2100 Planning Horizon - Stockton South</b></p>	<p>Figure: <b>C-4</b></p>	<p>Rev: <b>A</b></p>
<p><small>BMT WBM endeavours to ensure that the information provided in this map is correct at the time of publication. BMT WBM does not warrant, guarantee or make representations regarding the currency and accuracy of information contained in this map.</small></p>	<p>N 0 100 200m Approx. Scale</p>	 <p><b>BMT WBM</b> www.bmtwbm.com.au</p>
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Title: **Coastal Inundation Hazard Definition  
Immediate Planning Horizon - Fern Bay**

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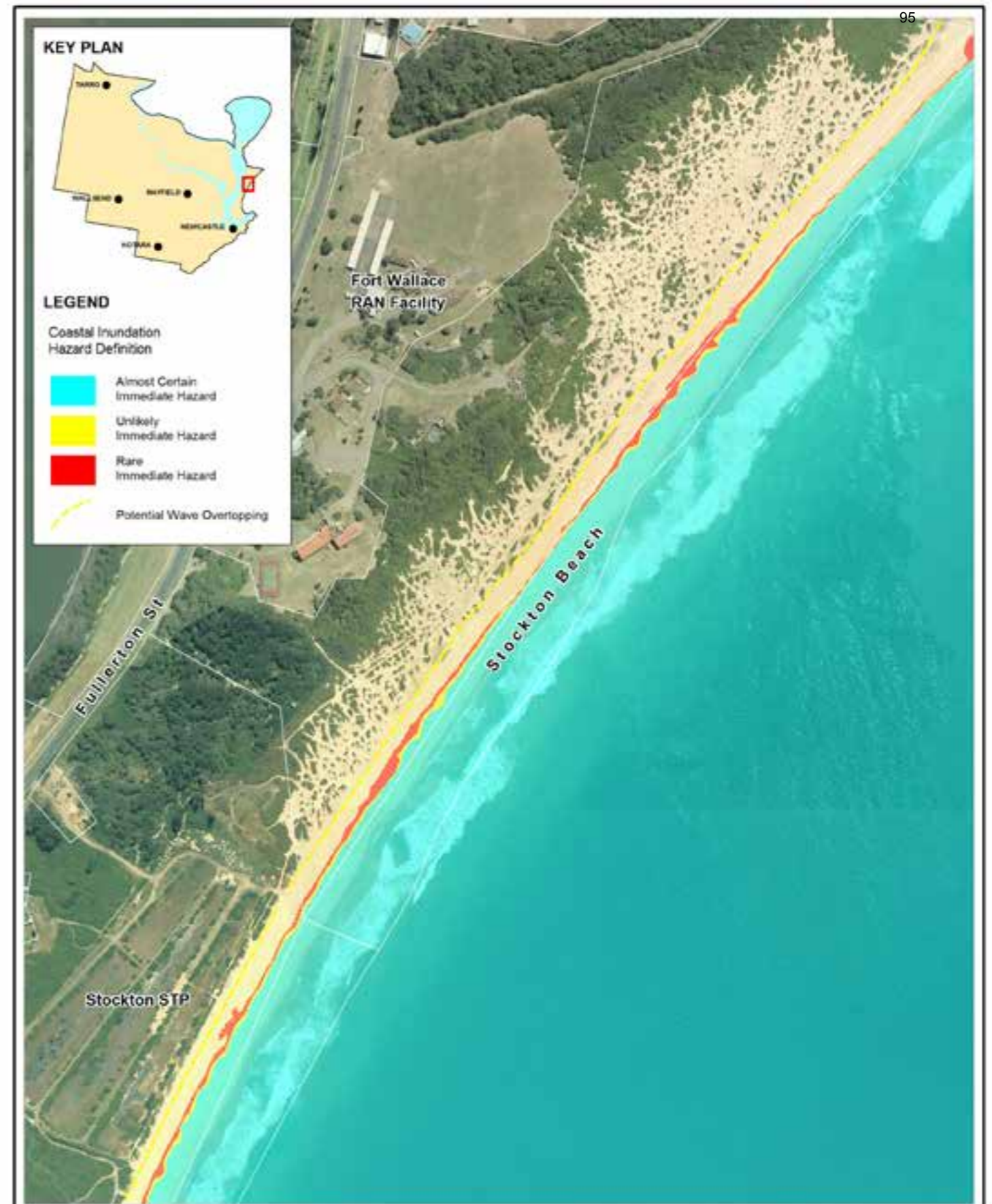
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Title: **Coastal Inundation Hazard Definition  
Immediate Planning Horizon - Fort Wallace**

Figure: **D-2** Rev: **A**

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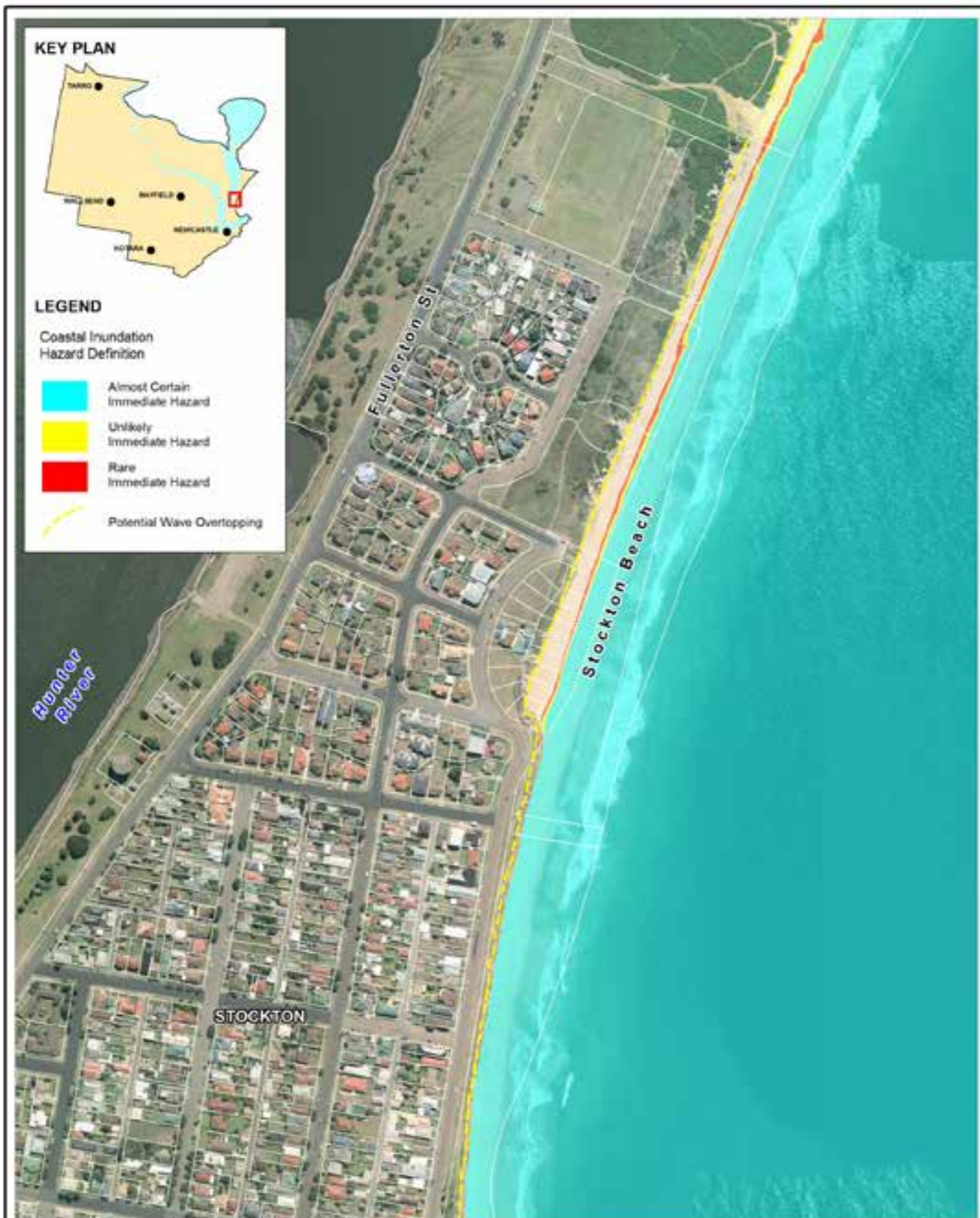
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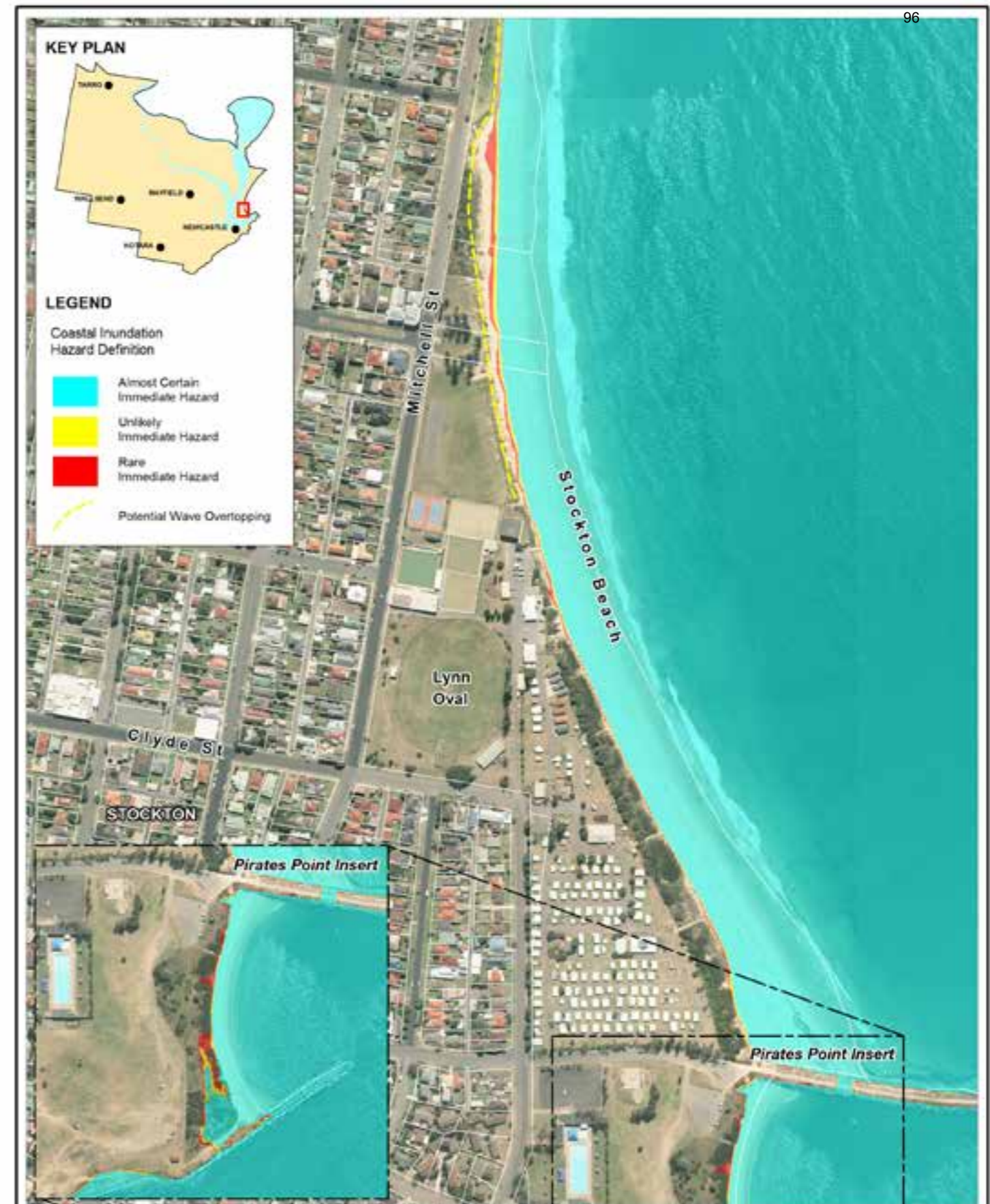
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Title: **Coastal Inundation Hazard Definition Immediate Planning Horizon - Stockton South**

Figure: **D-4** Rev: **A**

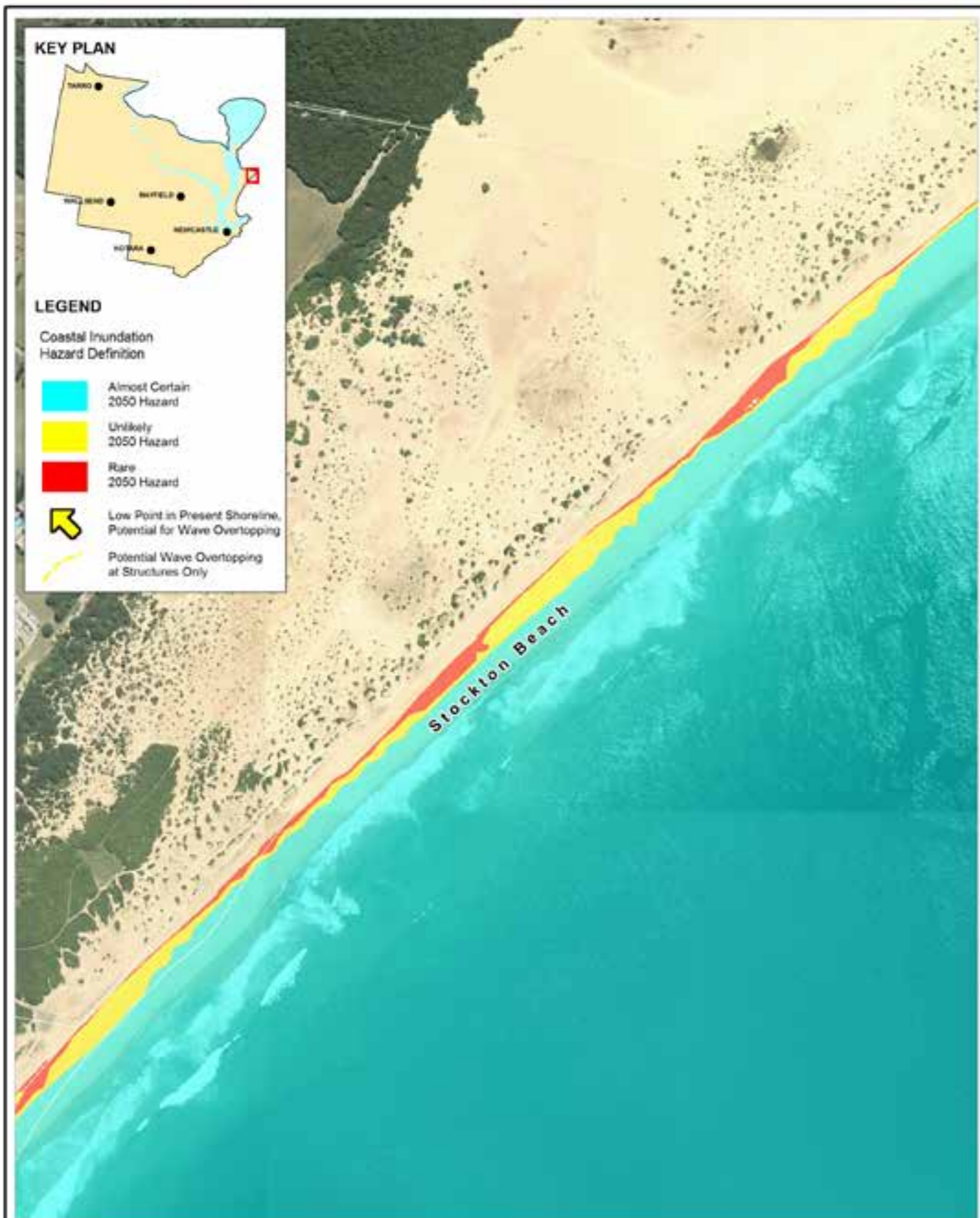
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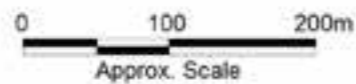


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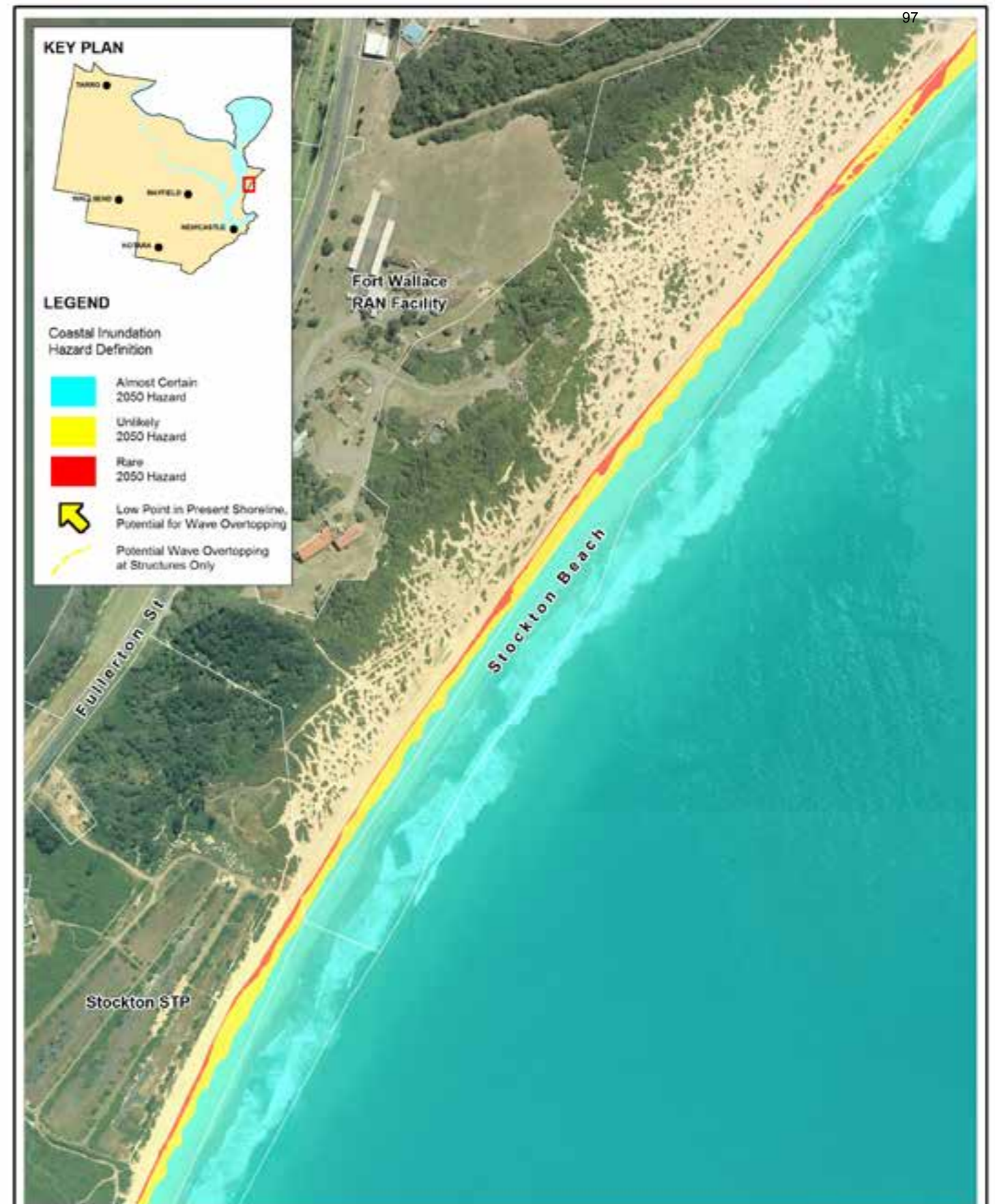
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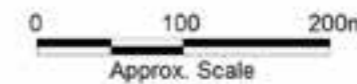


Title:  
**Coastal Inundation Hazard Definition  
2050 Planning Horizon - Fort Wallace**

Figure:  
**E-2**

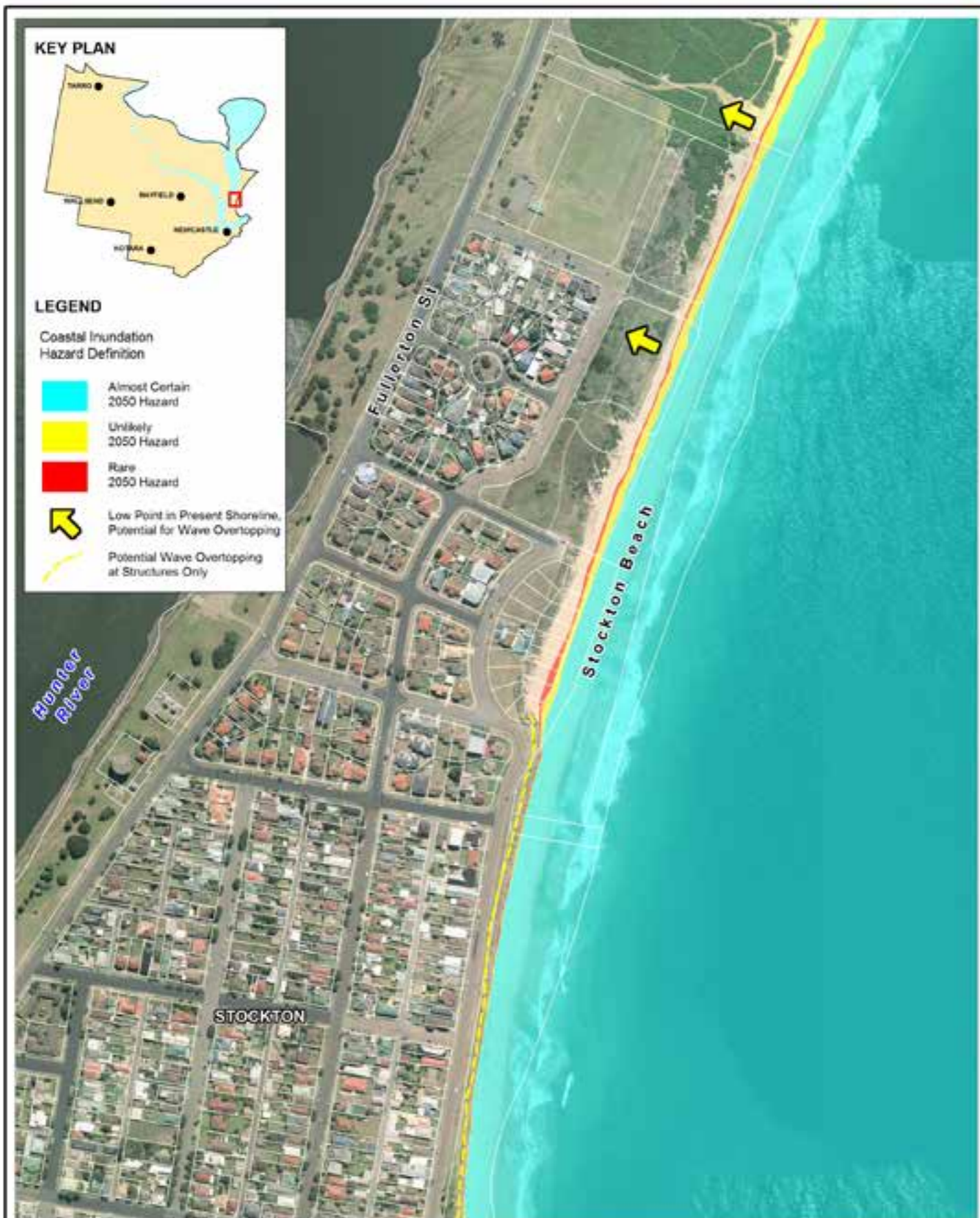
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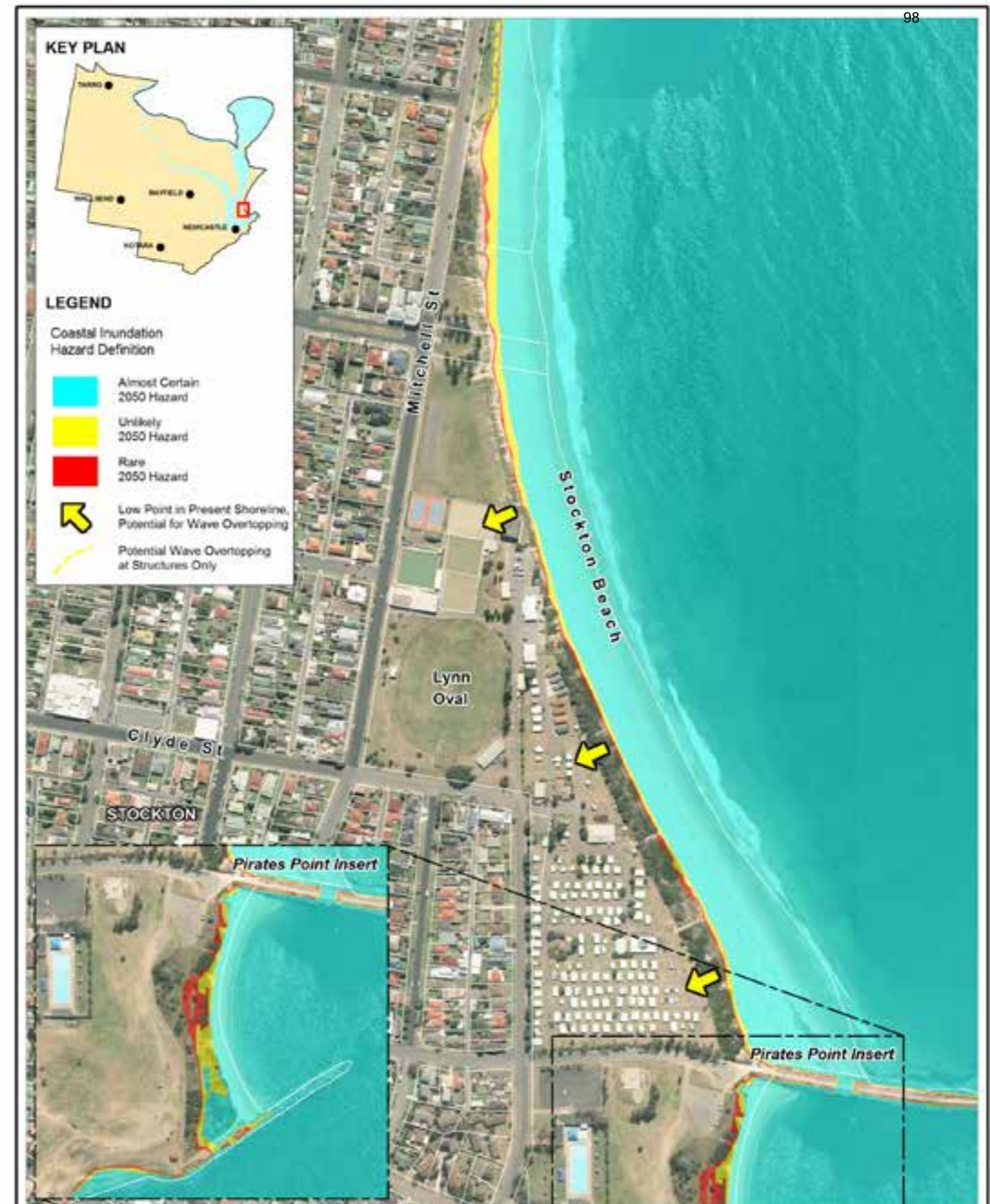
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Title: Coastal Inundation Hazard Definition 2050 Planning Horizon - Stockton South

Figure: E-4 Rev: A

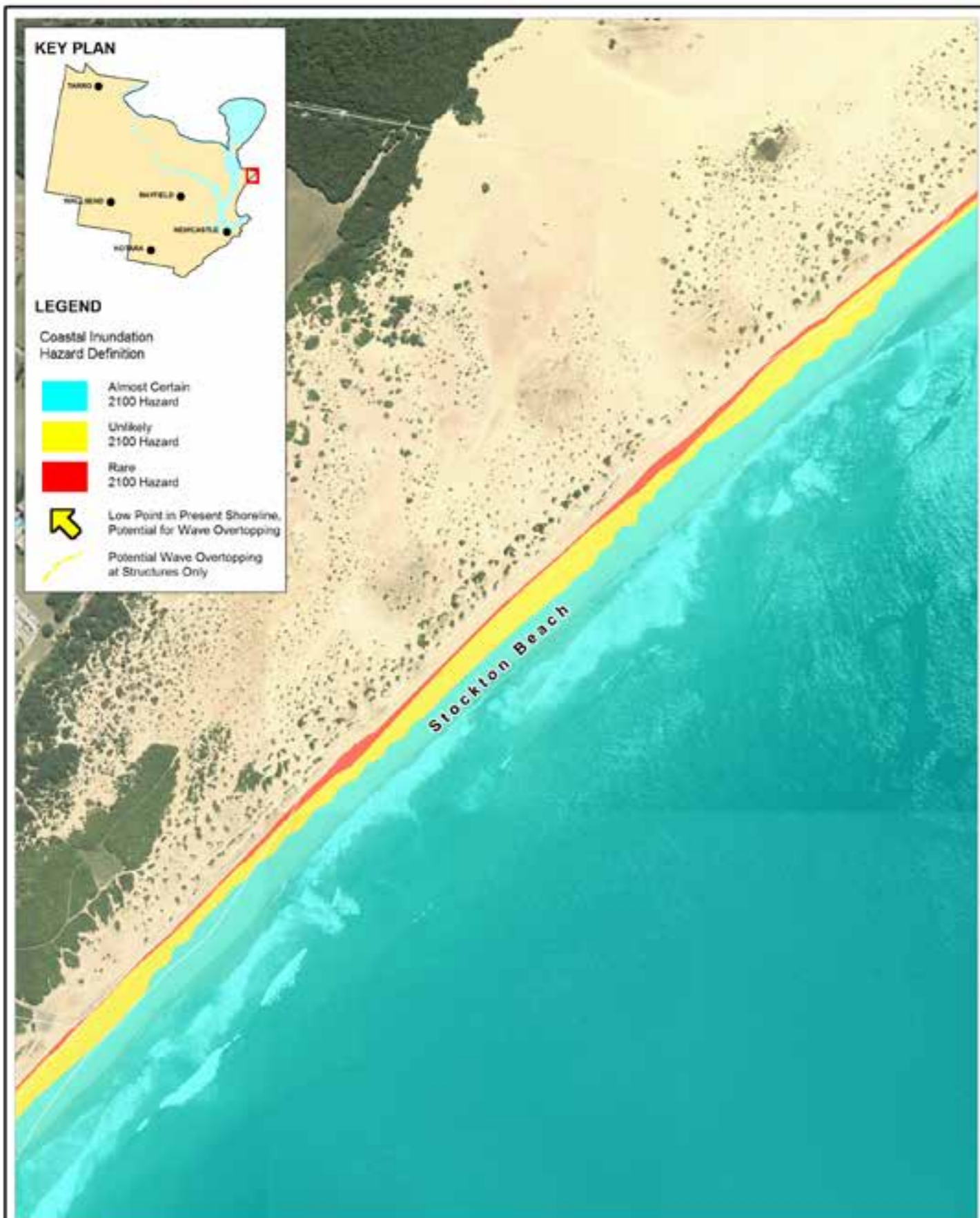
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Title: Coastal Inundation Hazard Definition 2100 Planning Horizon - Fern Bay

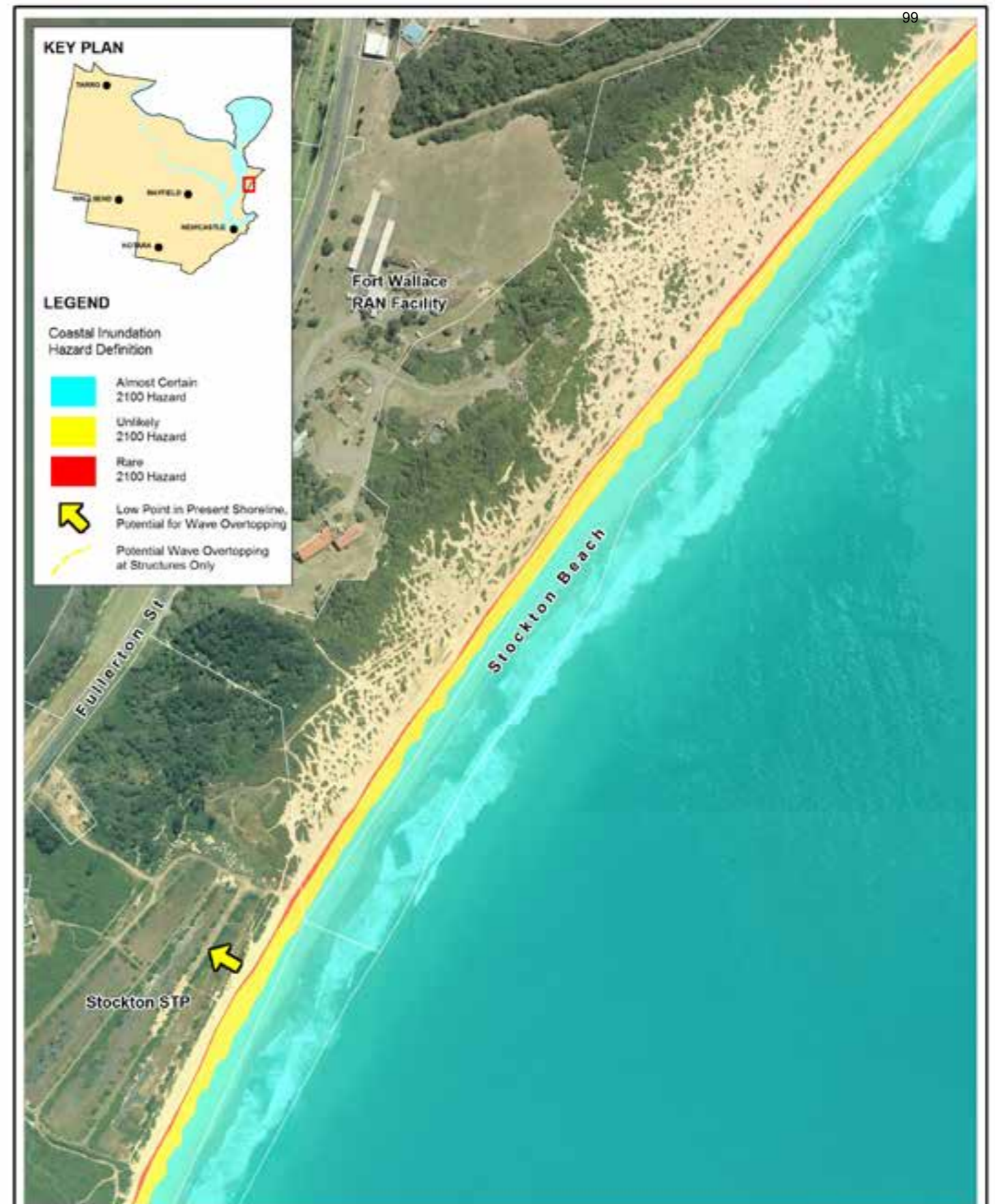
Figure: F-1 Rev: A

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Title: Coastal Inundation Hazard Definition 2100 Planning Horizon - Fort Wallace

Figure: F-2 Rev: A

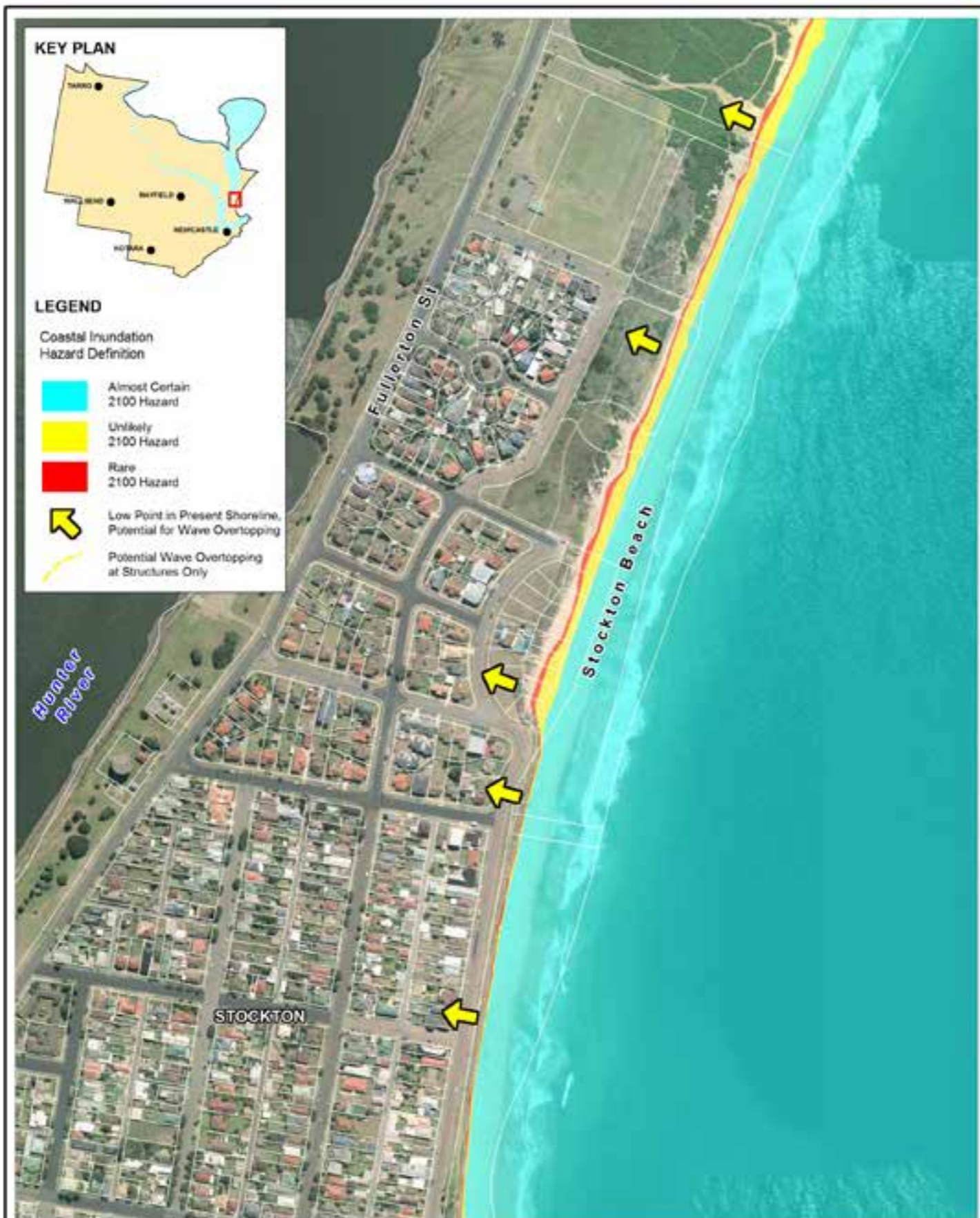
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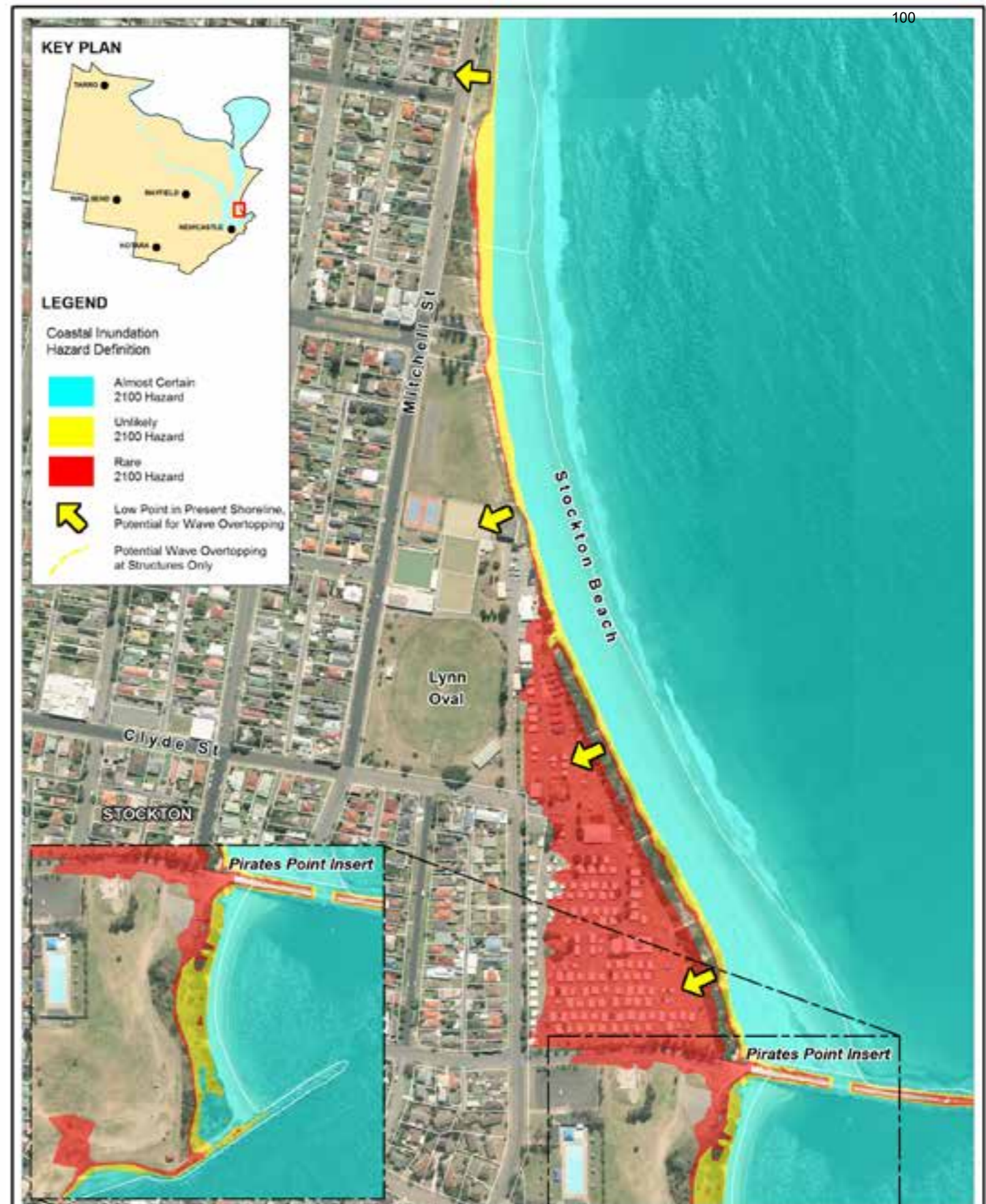
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Title: **Coastal Inundation Hazard Definition 2100 Planning Horizon - Stockton South**

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# Appendix D

## Stockton Coastal Erosion Emergency Action Subplan

Subplan

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2012

# Stockton Coastal Erosion Emergency Action Subplan



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## 1.0 Introduction

The purpose of the Stockton Coastal Erosion Emergency Action Subplan (Stockton CEEAS) is to outline the emergency coastal protection actions that Council will implement during periods of beach erosion along the Stockton coastline. The Stockton CEEAS is an accompanying document to the City of Newcastle Flood Emergency Subplan (NLEMC, 2013) (the Flood Subplan), which outlines the measures to prepare for, respond to, and recover from, flooding and coastal erosion

in the Newcastle local government area (LGA). During a storm event, Council will respond in accordance with the requirements of the Flood Subplan (as the priority) and the Stockton CEEAS for the Stockton area.

The Stockton CEEAS has been prepared in accordance with the requirements of the *Coastal Protection Act 1979* and the *Guidelines for Preparing Coastal Zone Management Plans* (OEH, 2013).

## 2.0 Planning Context

An 'emergency' is defined in the *State Emergency and Rescue Management Act 1989* and the NSW State Emergency Management Plan (EMPLAN) (SEMC, 2012) as:

*"an emergency due to an actual or imminent occurrence (such as fire, flood, storm, earthquake, explosion, terrorist act, accident, epidemic or warlike action) which:*

- endangers, or threatens to endanger, the safety or health of persons or animals in the State; or*
- destroys or damages, or threatens to destroy or damage, any property in the State being an emergency which requires a significant and co-ordinated response.*

For the purposes of the definition of emergency, property in the State includes any part of the environment of the State. Accordingly, a reference in the Act to:

- threats or danger to property includes a reference to threats or danger to the environment, and
- the protection of the property includes a reference to the protection of the environment".

### 2.1 State Emergency and Rescue Management Act 1989

The Newcastle Local Disaster Plan (DISPLAN) (NLEMC, 2012) and the Flood Subplan (NLEMC, 2013) are regional supporting documents to the EMPLAN and have been prepared in accordance with the requirements of the *State Emergency and Rescue Management Act 1989*. The DISPLAN (NLEMC, 2012) and Flood Subplan (NLEMC, 2013) designates the NSW State Emergency Service (SES) as the combat agency for damage control from storms (including coastal erosion). Council's role in preparing for, responding to, and recovering from, a storm event is defined in the Flood Subplan (NLEMC 2013).

Section 3.1.2 of the Flood Subplan (NLEMC, 2013) outlines the NSW SES's role includes *'damage control for coastal erosion and inundation from storm activity, specifically the protection of life and the coordination of the protection of readily moveable household goods and commercial stock and equipment. The NSW SES is not responsible for planning or conduct of emergency beach protection works or other physical mitigation works'*.

Council is responsible for the *'construction of physical mitigation works for protection of coastal property on land under its care and control'* (Section 2.1 of Newcastle DISPLAN).

### 2.2 Coastal Protection Act 1979

Section 4.5.11 of the Flood Subplan (NLEMC, 2013) outlines that during periods of coastal erosion in a severe weather event Council will *'activate the Newcastle City Council Coastal Zone Management Plan - Emergency Action Plan'*.

The Flood Subplan (NLEMC, 2013) highlights the necessity for an emergency action plan to address coastal erosion, but the coastal erosion plan is required to be prepared in accordance with the *Coastal Protection Act 1979* (not the *State Emergency and Rescue Management Act 1989*). The Stockton CEEAS (this plan) will form part of the Newcastle City Council Coastal Zone Management Plan - Emergency Action plan referred to in Section 4.5.11 of the Flood Subplan (NLEMC, 2013).

Section 55C of the *Coastal Protection Act 1979* requires a coastal zone management plan include *'emergency actions carried out during periods of beach erosion, including the carrying out of related works, such as works for the protection of property affected or likely to be affected by beach erosion, where beach erosion occurs through storm activity or an extreme or irregular event'*. The section also outlines a coastal zone management plan must not include matters dealt with in any plan made under the *State Emergency and Rescue Management Act 1989* in relation to the response to emergencies.

The *Guidelines for Preparing Coastal Zone Management Plans* (OEH, 2013) require that an emergency action subplan describes:

- intended emergency actions to be carried out during periods of beach erosion such as coastal protection works for property or asset protection, other than matters dealt with in any plan made under the *State Emergency and Rescue Management Act 1989* relating to emergency response (sections 55C(b) and (g) of the *Coastal Protection Act 1979*);
- any site-specific requirements for landowner temporary coastal protection works; and
- consultation carried out with the owners of land affected by a subplan.

# 3.0 Roles and Responsibilities in Coastal Emergency Management

## 3.1 State Emergency Service

The role of the State Emergency Service (SES) in coastal erosion and inundation emergencies is warning and evacuation of residents at risk, and or lifting and/or relocating readily movable household goods and commercial stock and equipment. This role is reflected in Section 3.1.2 of the Flood Subplan (NLEMC, 2013).

SES is not authorised to undertake coastal emergency protective works (such as placement of rocks or sand filled geotextile containers) of any form.

SES uses the release of a “Severe Weather Warning for Damaging Surf” or “Severe Weather Warning for Storm Tides” from the Bureau of Meteorology (BoM) as a primary test of whether or not they should be involved in a potential coastal erosion (and/or inundation) event. If an emergency has developed and neither of these warnings have been issued it is expected that Council will contact SES for assistance with matters where SES has jurisdiction.

## 3.2 Newcastle City Council

Under the *Coastal Protection Act 1979* Newcastle City Council is the designated coastal authority with responsibility for care of public land within its care, control and management. The carrying out (or authorising and coordinating) of coastal emergency protective works to protect public assets from coastal erosion and inundation is the role of Newcastle City Council, if measures are elected to be undertaken.

Council may choose to undertake physical erosion protection measures to protect public assets from coastal erosion and inundation if considered appropriate (assuming appropriate environmental assessment and approval has been obtained).

Private landholders are responsible for their own land parcels and Council does not have a positive obligation to take particular action to protect private property from erosion events. However, Council has a statutory obligation to consider development applications for erosion protection works lodged by property owners.

If a “Severe Weather Warning for Damaging Surf” or “Severe Weather Warning for Storm Tides” has been released or SES was mobilised in some other manner Council would assist SES as required or as resources permit.

If SES are not mobilised (eg. Neither of above warnings are released by BoM), Council may undertake some of the activities that would otherwise be conducted by SES (where resources allow though not obligated), but Council cannot order evacuation. If required, Council could request SES take on a combat agency role if an emergency is occurring.

Typical tasks that Council may undertake (where required) before, during and after a coastal erosion/inundation event (besides considering the need for and potentially implementing protective works on public land) would be as outlined in Section 6.

## 3.3 Office of Environment and Heritage

The Office of Environment and Heritage (OEH) is the NSW government authority responsible for advising on coastal zone management.

## 3.4 Bureau of Meteorology

The release of “Severe Weather Warning for Damaging Surf” or “Severe Weather Warning for Storm Tides” by the Bureau of Meteorology (BoM) is a key trigger adopted by SES for involvement in a coastal erosion/inundation event.

A “Severe Weather Warning for Damaging Surf” is issued if waves in the nearshore zone are forecast to exceed a significant wave height of 5m (irrespective of wave period) in the next 24 hours. A “Severe Weather Warning for Storm Tides” is included if storm surge, wave setup and/or outflow from river flooding is expected to raise ocean water levels significantly above highest astronomical tide.

## 3.5 NSW Police

The NSW Police Force is the agency responsible for:

- Law enforcement and search and rescue,
- Controlling and coordinating the evacuation of victims from the area affected by the emergency in conjunction with the combat agency, and
- Being the combat agency for terrorist acts.

Some members of the NSW Police may also be appointed as Emergency Operations Controllers. Police would typically become involved in a coastal erosion event as follows:

- Assisting SES where required (eg. controlling and coordinating evacuation) when SES was acting in its combat agency role; or
- If SES was not mobilised, Police may undertake or coordinate activities such as evacuation, barricading, removal of the contents of buildings and the like.

In either case (if SES was or was not the combat agency) it is possible that Police may act according to their statutory powers to protect life and property including authorising emergency protective works. However, it is expected that in making such a decision, Police would need to recognise the combat agency’s authority (if applicable), ensure appropriate approvals are in place for any proposed works, and seek proper advice prior to acting.



### 3.6 Fire and Rescue NSW

Fire and Rescue NSW has a Mutual Aid Agreement with the SES and would have a support role assisting the SES during a coastal emergency. In particular, Fire and Rescue NSW would become involved during a coastal emergency in the following ways:

- Assist the SES in monitoring/reconnaissance of areas potentially damaged by storms;
- Provide storm damage response teams to assist the SES, including strike teams when requested, to assist the SES;
- Assist with the evacuation of at-risk communities; and
- Provide staff to support a spatial information group established by the SES.

### 3.7 DISPLAN and Non-DISPLAN events

Events that may potentially result in coastal erosion can be divided into two categories in regards to potential emergency action. These are DISPLAN and Non-DISPLAN events.

#### 3.7.1 DISPLAN event

DISPLAN events may be triggered by the BoM issuing a “Severe Weather Warning for Damaging Surf” or “Severe Weather Warning for Storm Tides”. Issuing of the severe weather warning triggers involvement of the SES as the combat agency. Natural hazards, which are relevant to coastal management, that may trigger a DISPLAN event include:

- Cyclone,
- Flood,
- Severe storm including wind, rain, hail, electricity,
- Storm surge or heavy swell, and
- Tsunami.

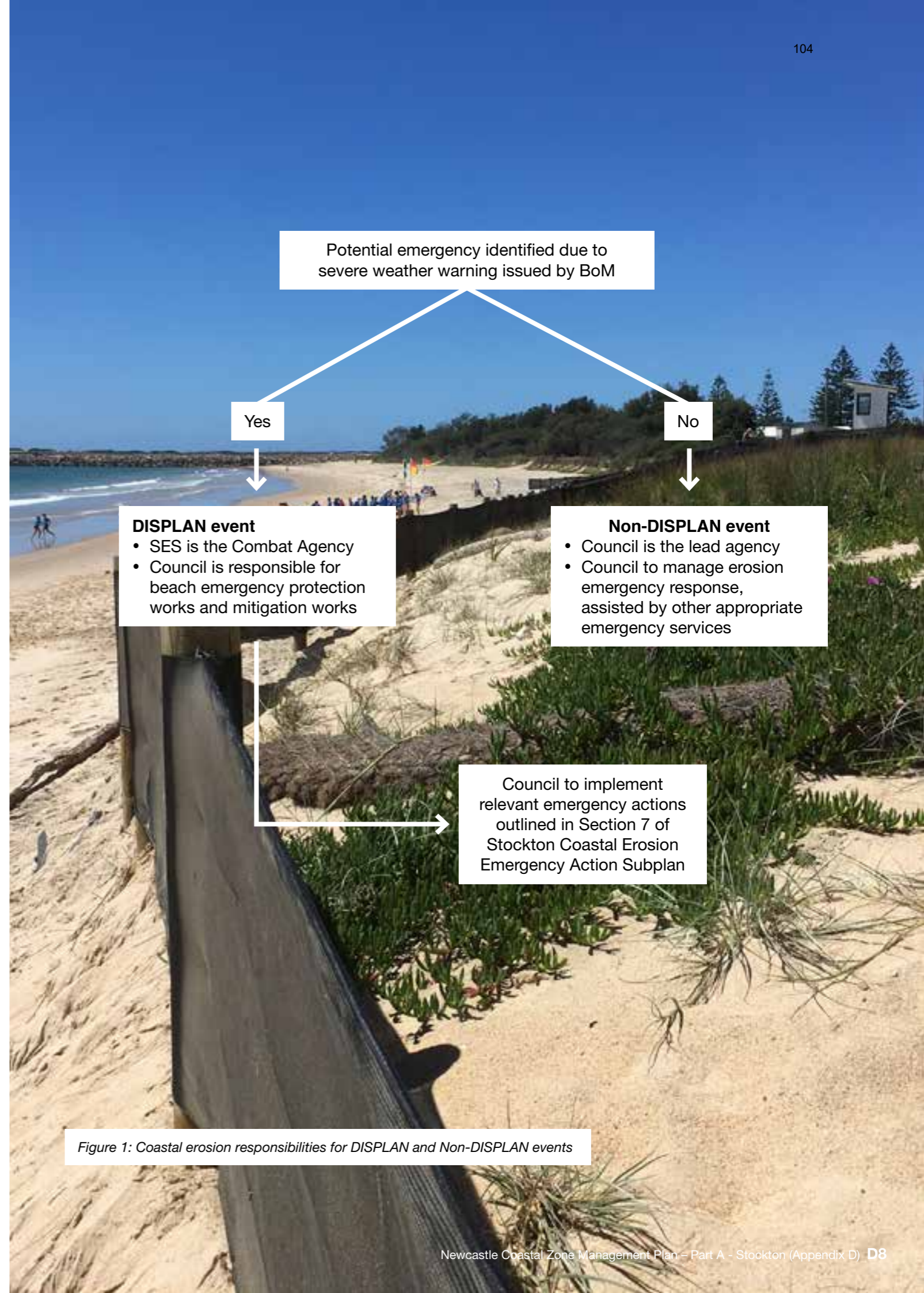
#### 3.7.2 Non-DISPLAN event

In the absence of a severe weather warning issued by BoM there are four possible scenarios under which an emergency may occur. In these situations there is no designated combat agency, but Council would be the lead agency to manage the emergency. **Table 1** outlines the four possible scenarios in which coastal erosion may occur without a severe weather warning being issued.

**Table 1: Coastal erosion scenarios without a severe weather warning being issued**

Scenario	Description
Heavy swell	Swell formed at a distance from the coast may impact on coastline with little or no warning. May result in damaging surf producing large scale erosion and/or inundation. Long-range swell may erode the dune system resulting in landward recession of the erosion escarpment.
Depleted beach profile	Following beach erosion events the local beach profile may be depleted such that a low or moderate swell coinciding with a high tide may erode the dune system resulting in landward recession of the erosion escarpment.
Slumping of erosion escarpment	Following erosion of the dune system a sheer and rear vertical erosion escarpment may remain. As the sand dries the escarpment will slump to a more stable slope. Natural processes may further flatten the escarpment.
Slumping of coastal protection works	Large coastal erosion events may undermine the structural stability of coastal protection works. Slumping of works may occur some time after the event has passed and may result in landward recession of the erosion escarpment.

**Figure 1** provides a simplified diagram establishing the combat or lead agency during DISPLAN or Non-DISPLAN events for coastal erosion events.



*Figure 1: Coastal erosion responsibilities for DISPLAN and Non-DISPLAN events*



## 4.0 Area Covered by the Erosion Subplan

While the Flood Subplan (NLEMC, 2013) applies to the entirety of the Newcastle LGA, the Stockton CEEAS will apply to the coastal area of the suburb of Stockton within the LGA. The Stockton CEEAS applies to the area shown in **Figure 2**.



Figure 2: Stockton Coastal Erosion Emergency Action Subplan area

## 5.0 Coastal Hazards at Stockton

Typical coastal hazards relevant to the Stockton area include:

- Unstable vertical dune erosion escarpments that can collapse after erosion events;
- Public safety in areas of wave overtopping/coastal inundation;
- Unsafe beach access points due to beach erosion;
- Vegetation destabilised by erosion; and
- Submerged objects.

The Newcastle Coastal Zone Hazards Study (BMT WBM, 2014) identified built assets and infrastructure that are within the Unlikely Immediate Hazard Zone for beach erosion and coastal inundation. **Table 2** provides an overview of the main emergency hazards within the Unlikely Immediate Hazard Zone.

**Table 2: Emergency hazards along Stockton coastline**

Location	Emergency hazard
Dune system east of Stockton Beach Holiday Park.	Dune erosion.
Stockton Beach Holiday Park.	Coastal inundation.
Stockton Surf Life Saving Club seawall - southern end.	Erosion, outflanking of seawall, threat to existing café.
Stockton Surf Life Saving Club seawall.	Overtopping of seawall, inundation of carpark.
Stockton Surf Life Saving Club seawall - northern end.	Erosion, outflanking of seawall, threat to Surf Life Saving Club.
Dune system between Stockton Surf Life Saving Club and Mitchell Street seawall.	Dune erosion, threat to monument and carpark at 21 Pitt Street.
Mitchell Street seawall - southern end.	Erosion, outflanking of seawall, threat to Mitchell Street roadway.
Mitchell Street seawall.	Overtopping of seawall, threat to Mitchell Street roadway.
Mitchell Street seawall - northern end.	Erosion, outflanking of seawall, threat to Barrie Crescent roadway.
Former North Stockton Surf Life Saving Club.	Erosion of dune, potential destabilisation of building.
Griffiths Street carpark.	Erosion of dune, threat to roadway
Hunter Water Corporation land (310 Fullerton Street).	Erosion and exposure of former landfill site.
Stockton beach access points (multiple locations).	Erosion.

Coastline hazard zones are expected to translate landward in the future due to long-term shoreline recession caused by sea level rise and/or net sediment loss from the system. However, this has not been considered in the Stockton CEEAS due to the short-term focus of emergency actions.



# 6.0 Approvals required for implementation of emergency coastal protection works

## 6.1 Emergency coastal protection works

*State Environmental Planning Policy (SEPP) (Coastal Management) 2018* outlines emergency coastal protection works that may be undertaken by a public authority as exempt development. Coastal emergency protection works that may be undertaken as exempt development are:

- Placement of sand or beach nourishment, including beach scraping activities, and
- Placement of sandbags for a period of not more than 90 days.

These activities are to be undertaken on a beach, or a sand dune area adjacent to a beach to mitigate the effects of coastal hazards on land

## 6.2 Coastal protection works

*SEPP (Coastal Management) 2018* outlines the approvals required by a public authority to undertake coastal protection works within the coastal zone. Coastal protection works may be undertaken without development consent (under Part 5 of the *Environmental Planning and Assessment Act 1979*) for the following:

- Coastal protection works identified in a coastal management program (the certified Newcastle Coastal Zone Management Plan is considered a coastal management program under the transition provisions of the *Coastal Management Act 2016*);
- Beach nourishment activities;
- Placement of sandbags for a period of not more than 90 days; and
- Routine maintenance works or repairs to existing coastal protection works.

The coastal protection works listed above will require the preparation of a Review of Environmental Factors in accordance with Part 5 of the *Environmental Planning and Assessment Act 1979*.

Coastal protection works outside of the listed works above require development consent under Part 4 of the *Environmental Planning and Assessment Act 1979*.

# 7.0 Emergency actions

The implementation of Council's emergency actions detailed in Tables 1-4 are dependent on a number of factors including ensuring the WH&S requirements of personnel, available resources, obtaining necessary agreements and approvals, budget and time constraints. All factors will be taken into account in determining whether the emergency actions will be reasonable and feasible to implement. Detailed information regarding actions outlined in Tables 1-4 will be included within Council's operational documentation.

**Table 1: Prevention Emergency Actions**

Trigger	Action
Pre-planning for prevention of damage from possible storm event	Identify a facility located landward of the immediate hazard line to be used as temporary refuge/accommodation in event of evacuation.
	Develop WH&S procedures for storm debris containing hazardous materials and sandbag installation.
	Compile contact details of relevant stakeholders in case of storm event
	Liaise with SES regarding sand storage location/sand source for sand bags.
	Undertake web-based monitoring and reporting of weather, wave forecasts and beach conditions.
	Develop pro-forma for media advice regarding different phases of emergency management
	Ensure rigid barriers and closure signs are stored locally.

**Table 2: Preparedness emergency actions (Pre-storm)**

Trigger	Action
BOM issues a "Severe Weather Warning for Damaging Surf" OR "Severe Weather Warning for Storm Tides"	Undertake regular (minimum 4 hour) web-based monitoring and reporting of weather, wave forecasts and beach conditions
	Undertake regular on-ground monitoring of environmental conditions and beach behaviour.
	Ensure contact details for delegated staff who co-ordinate emergency actions and external contacts eg. SES are updated.
	Notify relevant internal staff that coastal erosion event is likely.
	Relevant staff to undertake preliminary planning for event response.
	Prepare communications strategy using media pro-forma to inform community of likelihood of an impending beach erosion emergency and Council's intended erosion emergency response. Consultation with other agencies eg. SES may be required.
	Identify areas where potential emergency coastal protection measures may be required and consider installation of measures (pre-emptive sandbag revetments in high risk areas).
	Undertake necessary environmental assessments and approvals for potential emergency coastal protection works.
	Confirm availability of labour, plant and equipment to install sandbag revetment(s).
	Ensure sufficient warning signage and barricades are available for use if required.

**Table 3: Response emergency actions (during storm)**

Trigger	Action
Significant erosion escarpment forms and predicted increase in storm threat <b>Note:</b> Actions as a result of this trigger are to be applied to all trigger responses below	Communications strategy to be implemented to inform community of beach erosion emergency and Council's intended erosion emergency response. Communications should include safety advice and information regarding dangers these conditions present.
	Increase frequency of web-based monitoring and keep records of any weather warnings/ reports of erosion
	Gather evidence of erosion escarpment including location and other appropriate information. Evidence to be provided to co-ordinator.
	Assess need for barriers and safety signage to be erected at damaged or potentially dangerous beach access points. Placement of barricades and safety signage as required.
	Assess need to remove existing signage, bins, dune fencing etc where items are threatened by coastal erosion. Removal of these items where safe to do so to prevent damage or asset loss.
Top of erosion escarpment within 18m of built asset with predicted increase in storm threat, OR Wave overtopping/coastal inundation is affecting private or public land, OR Predicted increase in storm threat by BoM (waves exceeding 7m and tides exceeding 1.6m or storm surge greater than 0.6m)	Notify all appropriate stakeholders and alert them for possibility of emergency meeting
Top of erosion escarpment within 15m of a built asset with a predicted increase in storm threat, OR Significant wave overtopping/ coastal inundation is affecting private or public land	Arrange emergency meeting with relevant stakeholders to determine whether evacuation measures should be implemented. Any evacuation should be undertaken under direction of the SES.
	Inform residents/occupants of the issue and commence evacuation of all persons from buildings at risk as assessed in emergency meeting.
	Gather evidence of erosion escarpment/inundation including location and other appropriate information. Evidence to be provided to emergency meeting stakeholders.
	Seek coastal and geotechnical engineering advice from suitably qualified person(s) where required
	Prepare to close streets and buildings if dune erosion threatens safety of road/building.
Decision is made during emergency meeting to implement emergency coastal protection works	Restrict public access to beach/foreshore where emergency coastal protection works are to be implemented.
	Transport all necessary erosion control materials, plant and equipment to where emergency coastal protection works will be placed.
	Implement emergency coastal protection works and record all actions taken. Placement of measures are to be undertaken in consultation with suitably qualified coastal or geotechnical engineer.
	Conduct investigation of other erosion risk areas and gather evidence of erosion issue.

**Table 4: Recovery emergency actions (After storm)**

Trigger	Action
Storm has abated and safe to conduct post-storm activities	Assess damage to assets, including property, roads and services etc
	Organise qualified person(s) to assess buildings in imminent danger of collapse due to proximity to eroded dune escarpment and reduced foundation capacity
	Clean-up and restoration works to remove any hazardous or unsafe materials from beach
	Co-ordinate return of evacuated people and belongings where buildings are structurally adequate.
	Monitor performance of emergency coastal protection works and take remedial action where required.
	Maintain communication strategy with warning of dangers of any persisting high, unstable or near vertical erosion escarpments drying out and collapsing without notice.
	Assess damaged beach access points. Assessment will include whether beach access points can be reinstated, measures will be required to rehabilitate access point or closure of access point
	Erect relevant warning signs where unstable dune escarpments present a public safety hazard
	Collapse erosion escarpment in high public use areas where appropriate.
	Undertake a survey of beach levels and other features eg) accessways, escarpments, blow-outs
	Restock emergency materials and supplies for future erosion events.
	Repair or replace damaged infrastructure, such as dune fencing and beach access points once dune system has sufficiently recovered.
	Assess damage to dune vegetation and rehabilitate damaged vegetation where appropriate.
	Undertake beach scraping and/or sand nourishment where appropriate.
	Review of emergency actions
Review and collate records of the storm event, actions taken during the storm event, issues identified and retain for reporting or future reference.	



## 8.0 Consultation

The *Coastal Protection Act 1979* does not specifically stipulate the requirement for public consultation in the development of a coastal erosion emergency action subplan. However, the Guidelines for Preparing Coastal Zone Management Plans (OEH, 2013) note direct consultation with landowners affected by the subplan is to be undertaken.

The draft Stockton CEEAS was publically exhibited from Wednesday the 6th June 2018 to Thursday 28th June 2018.

The draft Stockton CEEAS has also been provided to public landowners potentially affected by the plan. The draft Stockton CEEAS was provided to Department of Primary Industries - Lands and Water (Crown lands), Hunter Water Corporation, Defence Housing Australia and Family and Community Services.

## 9.0 Review

A review of the Stockton CEEAS will be undertaken as part of the future Coastal Management Program to be submitted under the *Coastal Management Act 2016*. In the interim, the Stockton CEEAS will be reviewed annually.

### References

Newcastle Local Emergency Management Committee (NLEMC) (2012). *Newcastle DISPLAN - Local Disaster Plan 2012*.

Newcastle Local Emergency Management Committee (NLEMC) (2013). *City of Newcastle Flood Emergency Subplan*.

Office of Environment and Heritage (OEH) (2013). *Guidelines for Preparing Coastal Zone Management Plans*.

State Emergency Management Committee (SEMC) (2012). *NSW State Emergency Management Plan*.

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# Appendix E

## Submissions Response Table

Part A - Stockton was publically exhibited from 6 June to 28 June 2018. Sixteen public submissions were received, including submissions from the Stockton Community Liaison Group and Stockton Community Action Group, and two Government agencies. An outline of the key issues raised in the public submissions, excluding the submissions by

Government agencies, and Council's response to the issues identified are outlined in Table 1 below. Table 2 includes Council's response to key issues raised by Hunter Water Corporation and Department of Industry - Lands and Water (Crown Lands).

**Table 1: Public submissions to Newcastle Coastal Zone Management Plan Part A - Stockton and Council response**

Issue Identified in Public Exhibition	Number of Submissions	Council Response	Change to Part A - Stockton
Sand replenishment is a preferred long-term solution.	5	Noted. Sand replenishment is included as the preferred option of the community and Stockton Community Liaison Group in Part A - Stockton. Investigation of sand replenishment will be undertaken as part of the future Coastal Management Program under the <i>Coastal Management Act 2016</i> .	No change required.
Management action timeframes should focus on the short-term.	3	Management actions within Part A- Stockton are limited to short to medium term management actions. Large projects such as capital sand replenishment etc. require further investigation which will be undertaken in the Coastal Management Program under the <i>Coastal Management Act 2016</i> .	No change required.
Construction of a groyne field required to address coastal erosion issues in Stockton.	3	Part A- Stockton is limited to short to medium term management actions, but investigation of groynes as a long-term option to address coastal erosion will be undertaken in a future Coastal Management Program under the <i>Coastal Management Act 2016</i> .	No change required.
Sand replenishment program should be included as a management action for the short-term.	2	Further investigation is required to understand the feasibility, including sourcing of sand, and impacts of a large capital replenishment program. These studies cannot be undertaken prior to the certification dissolution date of 3 October 2018 and will be undertaken as part of the Coastal Management Program.	No change required.
Sand scraping from depleted beach areas causes further erosion issues.	2	Sand scraping is undertaken as a maintenance activity when sand is available in the inter-tidal zone. Redistribution of sand to the dune area is to provide a protective buffer during storm events to try and limit coastal erosion during these events. Beach scraping does not address long-term recession or sand loss from the beach environment.	No change required.

Issue Identified in Public Exhibition	Number of Submissions	Council Response	Change to Part A - Stockton
Private sector and other funding mechanisms, such as levies, should be included to fund management solutions.	2	Section 5 of Part A - Stockton provides an overview of currently available Government funding programs. Addressed in management action CH13 in Table 5.	No change required.
Investigation of the effectiveness of the Port of Newcastle sand placement program should be undertaken.	2	Further investigations will be undertaken as part of the Coastal Management Program and may include studies to determine the transport of sand on Stockton Beach from dredging campaigns. Addressed in management action CH9 in Table 5.	No change required.
Extension of Mitchell Street seawall to protect community assets from coastal erosion.	1	Part A - Stockton is limited to short to medium term management actions, but investigation of seawalls as a long-term option to address coastal erosion will be undertaken in a future Coastal Management Program under the <i>Coastal Management Act 2016</i> .	No change required.
Promotion of Stockton for special events and eco-tourism.	1	Part A - Stockton contains management actions to improve beach amenity, including public domain planning and facilities, to potentially facilitate special events in the Stockton area.	No change required.
Sand replenishment from Stockton Bight sand dunes or off-shore sand resources.	1	Investigation of potential sand sources for sand replenishment will be investigated as part of future Coastal Management Program under the <i>Coastal Management Act 2016</i> .	No change required.
Further studies are not required and on-ground action is required.	1	Additional studies are required to be undertaken in a future Coastal Management Program to understand the impacts of management options on coastal processes within the Stockton area. Part A - Stockton includes management actions to provide on-ground works in the short to medium term.	No change required.
Reduce the length of the Hunter River breakwalls to allow sand transport to Stockton Beach.	1	The engineered breakwalls are constructed to facilitate the operation of Newcastle Harbour and reduction of length may have potential significant impacts. The proposed action is beyond the scope of Part A - Stockton.	No change required.
Corridor of local flora is required between beach and properties.	1	Table 6 of Part A - Stockton provides management actions for planting of dune systems, but not all areas between beach and properties eg. Zone 3, can be re-established as dune systems.	No change required.



Issue Identified in Public Exhibition	Number of Submissions	Council Response	Change to Part A - Stockton
Development in Stockton cease until coastal erosion issue mitigated.	1	Part A - Stockton provides management actions for development control in regards to coastal hazards.	No change required.
Access to the beach continues to be reduced.	1	Section 8 of Part A - Stockton includes management actions to assist in providing appropriate access to Stockton Beach.	No change required.
Timeframe for completion of Coastal Management Program should be reduced to short term (1-2 years).	1	The timeframe for completion of the Coastal Management Program will be dependent on the outcomes of future studies and cannot be accurately defined at this stage. The required completion date for a Coastal Management Program is 31 December 2021, but this does not preclude the Coastal Management Program being completed earlier than this date.	No change required.
Part A- Stockton does not identify the seriousness of the impacts of coastal erosion and the requirement for urgent action.	1	Section 6 of Part A- Stockton identifies coastal erosion as a coastal hazard and management actions are prioritised in the short and medium term. While a long-term solution is not identified options will be investigated in the Coastal Management Program to be submitted under the <i>Coastal Management Act 2016</i> .	No change required.
Part A - Stockton does not acknowledge the impacts of harbour channel dredging.	1	Section 6.1 of Part A - Stockton provides an overview of previous coastal process studies undertaken within the Stockton study area. Reference to man-made changes to the mouth of the Hunter River, including dredging, will be included in Section 6.1.	Sentence added to reflect conclusions of Shifting sands at Stockton Beach prepared by Umwelt (Australia) Pty Ltd dated June 2002 in regards to man-made alterations to Hunter River in Section 6.1.
No clear vision of what is considered success for Part A -Stockton.	1	Coastal hazards are a naturally occurring process and successful management can have varying objectives i.e. protection of property versus beach amenity/maintenance of natural environment. The management of coastal hazards is intrinsically tied to the overall sustainable management of a natural and man-made system and this will be further investigated in the Coastal Management Program under the <i>Coastal Management Act 2016</i> .	No change required.
Figure 1 should show the artificially deepened harbour channel.	1	Figure 1 provides a diagram of the applicable study area for Part A - Stockton. While the Hunter River and mouth of the harbour is shown the dredged harbour channel does not form part of the study area	No change required

Issue Identified in Public Exhibition	Number of Submissions	Council Response	Change to Part A - Stockton
Investigations for sand replenishment should be prioritised higher in Table 5.	1	Investigation for sand replenishment is listed as the ninth priority action in Table 5 of Part A - Stockton. Known risks from the risk register contained in the Newcastle Coastal Zone Management Study (BMT WBM, 2014(b) are listed above the sand replenishment investigations and are prioritised for action, but investigations will be prioritised as part of the Coastal Management Program process.	No change required.
On-going operation of a childcare centre in Stockton.	1	The operation of a childcare centre is outside the scope of the management actions for Part A - Stockton as the focus of the plan is regarding management of coastal hazards.	No change required.
Beach access points should be opened or closed in consultation with community.	1	Table 8 includes management actions for beach access. Management action BA2 in Table 8 will be amended to include community consultation.	Table 8 management action BA2 amended to include reference to consultation with key stakeholders and the community.
Monitoring of beach access points.	1	Beach access points are currently monitored as part of Council on-going operations.	No change required.
Proactive protection works for beach access points prior to storm events. Works could include dumping of sand prior to storm events.	1	Council currently has an operating procedure to ensure a number of beach accesses can remain open after storm events. Dumping of sand prior to storm events can be difficult due to timing before event and ability to source sand.	No change required.
No business case is provided for funding.	1	Cost benefit analysis of long-term management options will be undertaken as part of Coastal Management Program. Part A - Stockton outlines funding programs and costs for management actions.	No change required.
Reference to medium term (1-5) years should be removed to reflect seriousness of issue.	1	The medium term action period has been included within Part A - Stockton to ensure the transfer of actions from the plan to a future Coastal Management Program.	No change required.
Table 9 should include action for sand replenishment to address beach amenity.	1	Section 9.1 of Part A - Stockton notes the relationship between beach amenity and value of a sandy environment. Section 9.1 notes sand replenishment is included as an action in Section 6 and will be investigated as part of a Coastal Management Program.	No change required.

**Table 2: Key public submission issues by Government agencies and Council response**

Government Agency	Issue Identified	Council Response	Change to Part A - Stockton
Hunter Water Corporation	Property where former landfill located on Hunter Water land to be accurately described.	Property identification will be updated to reflect Lot and Deposited Plan.	Table 5 management action CH3 updated to show Lot and Deposited Plan of Hunter Water owned land.
	Former landfill extends south onto Crown Reserve.	Evidence of former landfill extending onto Crown Reserve provided to Council. Action to manage former landfill on Crown Reserve included in Table 5.	Management action included in Table 5 (CH4) to address management of former landfill on Crown Reserve.
	Council should be identified in primary responsibility for implementation of coastal protection works at former landfill.	Temporary coastal protection works will be located on Hunter Water Corporation property. Council will remain as a supporting partner.	No change required.
	Council needs to acknowledge financial liability for management actions regarding former landfill and responsibility for on-going management of contamination risk from the former landfill.	Land management issues identified for former landfill are outside scope of Part A - Stockton.	No change required.
	Management action required to be included for on-going management of former landfill. Hunter Water Corporation, Department of Industry - Lands and Water (Crown Lands) and Council to be responsible organisations.	The former landfill is not considered a coastal hazard as defined by the <i>Coastal Protection Act 1979</i> and may be managed under other approval pathways such as SEPP 55. The long-term management of this section of coastline will need to consider coastal hazard impacts on the former landfill area in the Coastal Management program. Ongoing management by various land managers can continue to be undertaken under other statutory requirements.	No change required.
	Wording included in Section 6.3.2 to highlight consideration of former landfill site in Coastal Management Program.	Section 5 of Part A - Stockton provides an overview of currently available Government funding programs. Addressed in management action CH13 in Table 5.	No change required.

Government Agency	Issue Identified	Council Response	Change to Part A - Stockton
	On-going surveillance and management of the former landfill in response to storm events should be included as a management action.	Procedure for monitoring and response to erosion impacts on former landfill, particularly management of waste material on the beach, required.	Management action CH30 included in Table 5.
Department of Industry - Lands and Water (Crown Lands)	Former landfill extends south onto Crown reserve.	Evidence of former landfill extending onto Crown Reserve provided to Council. Action to manage former landfill on Crown Reserve included in Table 5.	Management action included in Table 5 (CH4) to address management of former landfill on Crown Reserve.
	Management action required to be included for on-going management for former landfill. Action to be responsibility of Hunter Water Corporation and Council.	The former landfill is not considered a coastal hazard as defined by the <i>Coastal Protection Act 1979</i> and may be managed under other approval pathways such as SEPP 55. The long-term management of this section of coastline will need to consider coastal hazard impacts on the former landfill area in the Coastal Management program.	Wording included in Section 6.3.2 to highlight consideration of former landfill site in Coastal Management Program.
	Clarification of extent of repairs or works to northern end of Mitchell Street seawall.	Extent of repairs or works to northern end of Mitchell Street seawall is not currently known, but is considered a priority action due to beach erosion. Coastal protection works will be appropriately designed and consultation undertaken.	No change required.



# Part B - Coastline South of the Harbour

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# 1.0 Introduction

Novocastrians love the coast, with over two million people visiting local beaches each year. Newcastle's coastal landscape is defined by a rich Aboriginal and European heritage, with the city retaining unique evidence of its penal, colonial and maritime heritage. A great diversity of environments can be found along the coastline, including tall coastal cliffs, and small pocket beaches. The Bathers Way, Merewether National Surfing Reserve and sandy stretches of beach provide a recreational playground for locals and visitors alike to enjoy. It is all of these values that have led the people of Newcastle to have a strong association with the coast.

As the coastline is so highly valued, it is important that it is protected into the future. The purpose of the Newcastle Coastal Zone Management Plan Part B - Coastline South of the Harbour (Part B - Coastline South of the Harbour) is to outline the proposed actions that will be implemented to address priority management issues affecting the coastline south of the Hunter River. For the purposes of Part B - Coastline South of the Harbour, the priority coastal management issues have been separated into three themes:

1. Coastal Hazards
2. Beach Environment and Heritage
3. Public Access and Amenity.

Whilst Part B - Coastline South of the Harbour does address all three priority coastal management issues, the focus is largely on how Council will manage coastal hazards. This approach is consistent with the Guidelines for Preparing Coastal Zone Management Plans (OEH, 2013), which Part B - Coastline South of the Harbour has been prepared in accordance with.

# 2.0 Study Area

The study area for the Plan extends approximately 6 kilometres from Hickson Street, Merewether in the south, to Nobby's Head in the north (see **Figure 2.1**). The area incorporates the coastal foreshore in public ownership and the lands affected by coastal hazards. The immediate offshore environment (including rock platforms) is also included. As shown in **Figure 2.1**, the study area includes:

- Merewether, Dixon Park, Bar, Newcastle, and Nobbys beaches
- All rock platforms between Hickson Street, Merewether and Nobbys Beach
- Coastal headlands and cliffs including Strzelecki, Shepherds Hill, King Edward Park and Fort Scratchley
- The Merewether and Newcastle Ocean Baths
- Nobbys breakwall (Hunter River southern breakwall)

The Newcastle coastline comprises two different types of beach. The beaches to the south of the Hunter River (the Southern Beaches) are characterised by sandy pocket beaches found between coastal cliffs (e.g. Shepherds Hill) and headlands (e.g. Fort Scratchley). These beaches contain bedrock at depth (below the sand). To the north of the Hunter River is Stockton Beach, which is the southernmost part of the largest sandy barrier in NSW (measuring over 32 kilometres in length).

Management of Stockton Beach is detailed in Part A of the Newcastle Coastal Zone Management Plan and as such is excluded from the study area.

Management actions relating to the Hunter River are excluded from Part B - Coastline South of the Harbour. These actions are outlined in the Hunter Estuary Coastal Zone Management Plan (BMT WBM, 2017).



**Figure 2.1** Newcastle Coastal Zone Management Plan - Part B - Coastline South of the Harbour study area



## 3.0 Objectives

Council considered the objectives of the *Coastal Protection Act 1979* and NSW Coastal Policy 1997 in determining the objectives of Part B - Coastline South of the Harbour. The objectives provide the context for what Council is trying to achieve by implementing Part B - Coastline South of the Harbour, and align with the three coastal themes described in **Section 1.0**.

The objectives of Part B - Coastline South of the Harbour are:

1. To manage current and future risks from coastal hazards, taking into account the effects of climate change
2. To protect and enhance the coastal environment
3. To acknowledge and enhance the Aboriginal and European heritage of the coast
4. To maintain and enhance public access, amenity and use of the coast.



# 4.0 Planning Context

Council worked through a three step process to develop Part B - Coastline South of the Harbour:

**Step 1.** Preparation of the Newcastle Coastal Zone Hazards Study (BMT WBM, 2014a) – identified and mapped the hazards that affect the Newcastle coastline.

**Step 2.** Preparation of the Newcastle Coastal Zone Management Study (BMT WBM, 2014b) – identified and assessed potential management options for addressing coastal hazards.

**Step 3.** Preparation of Part B Coastline South of the Harbour – identifies Council's preferred management actions for implementation.

A number of other studies were also considered during the development of the Plan, including the Newcastle Coastline Management Study and Plan (Umwelt 2003a and 2003b), and the Newcastle Coastal Plan of Management (NCC 2015).

Part B - Coastline South of the Harbour was prepared in accordance with the requirements of the *Coastal Protection Act 1979* and the Guidelines for Preparing Coastal Zone Management Plans (OEH 2013).

**Table 4.1** outlines how Part B - Coastline South of the Harbour meets the requirements of the Act and the guidelines.

## Plan Requirements

**Table 4.1. Coastal Protection Act 1979 Requirements**

Requirement of the Act	Where requirement is addressed in this Plan
A coastal zone management plan (CZMP) must make provision for:	
<ul style="list-style-type: none"> <li>Protecting and preserving beach environments and beach amenity, and</li> </ul>	Sections 6.2, 6.3 and 7.4
<ul style="list-style-type: none"> <li>Emergency actions carried out during periods of beach erosion, including the carrying out of related works, such as works for the protection of property affected or likely to be affected by beach erosion, where beach erosion occurs through storm activity or an extreme or irregular event, and</li> </ul>	Appendix D
<ul style="list-style-type: none"> <li>Ensuring continuing and undiminished public access to beaches, headlands and waterways, particularly where public access is threatened or affected by accretion, and</li> </ul>	Sections 6.3 and 7.4
<ul style="list-style-type: none"> <li>Where the plan relates to a part of the coastline, the management of risks arising from coastal hazards, and</li> </ul>	Sections 6.1 and 7.0
<ul style="list-style-type: none"> <li>Where the plan relates to an estuary, the management of estuary health and any risks to the estuary arising from coastal hazards, and</li> </ul>	N/A
<ul style="list-style-type: none"> <li>The impacts from climate change on risks arising from coastal hazards and on estuary health, as appropriate, and</li> </ul>	Sections 6.1 and 7.0

Requirement of the Act	Where requirement is addressed in this Plan
<ul style="list-style-type: none"> <li>Where the plan proposes the construction of coastal protection works (other than emergency coastal protection works) that are to be funded by the council or a private landowner or both, the proposed arrangements for the adequate maintenance of the works and for managing associated impacts of such works (such as changed or increased beach erosion elsewhere or a restriction of public access to beaches or headlands).</li> </ul>	Section 7.0
A coastal zone management plan must not include the following:	
<ul style="list-style-type: none"> <li>Matters dealt with in any plan made under the <i>State Emergency and Rescue Management Act 1989</i> in relation to the response to emergencies,</li> </ul>	No matters have been included
<ul style="list-style-type: none"> <li>Proposed actions or activities to be carried out by any public authority or relating to any land or other assets owned or managed by a public authority, unless the public authority has agreed to the inclusion of those proposed actions or activities in the plan.</li> </ul>	Council will have primary responsibility for all management actions contained within Part B - Coastline South of the Harbour. Consultation has been undertaken with all agencies with tenure within the study area.

## Requirements of Guidelines for Preparing Coastal Zone Management Plans

Requirement of the Guidelines	Where requirement is addressed in this Plan
A coastal zone management plan must include a description of:	
<ul style="list-style-type: none"> <li>How the relevant Coastal Management Principles have been considered in preparing the plan</li> </ul>	See Coastal Management Principles section of table on principles below
<ul style="list-style-type: none"> <li>The community and stakeholder consultation process, the key issues raised and how they have been considered</li> </ul>	Section 5.0
<ul style="list-style-type: none"> <li>How the proposed management options were identified, the process followed to evaluate management options, and the outcomes of the process</li> </ul>	Section 7.1



Requirement of the Guidelines	Where requirement is addressed in this Plan
<b>Proposed management actions over the CZMP's implementation period in a prioritised implementation schedule which contains:</b>	
<ul style="list-style-type: none"> <li>Proposed funding arrangements for all actions, including any private sector funding</li> </ul>	Section 8.0
<ul style="list-style-type: none"> <li>Actions to be implemented through other statutory plans and processes.</li> </ul>	Section 7.4
<ul style="list-style-type: none"> <li>Actions to be carried out by a public authority or relating to land or other assets it owns or manages, where the authority has agreed to these actions (section 55C(2) (b) of the <i>Coastal Protection Act 1979</i>).</li> </ul>	Section 7.4
<ul style="list-style-type: none"> <li>Proposed actions to monitor and report to the community on the plan's implementation, and a review timetable.</li> </ul>	Section 8.0
<b>CZMPs are to be prepared using a process that includes:</b>	
<ul style="list-style-type: none"> <li>Evaluating potential management options by considering social, economic and environmental factors, to identify realistic and affordable actions.</li> </ul>	Section 7.0
<ul style="list-style-type: none"> <li>Consulting with the local community and other relevant stakeholders. The minimum consultation requirement is to publicly exhibit a draft plan for not less than 21 days, with notice of the exhibition arrangements included in a local newspaper (section 55E of the <i>Coastal Protection Act 1979</i>).</li> </ul>	Section 5.0
<ul style="list-style-type: none"> <li>Considering all submissions made during the consultation period. The draft plan may be amended as a result of these submissions (section 55F of the <i>Coastal Protection Act 1979</i>).</li> </ul>	Appendix E
<b>CZMPs are to achieve a reasonable balance between any potentially conflicting uses of the coastal zone.</b>	
A description of:	
<ul style="list-style-type: none"> <li>Coastal processes within the plan's area, to a level of detail sufficient to inform decision-making.</li> </ul>	Section 6.1
<ul style="list-style-type: none"> <li>The nature and extent of risks to public safety and built assets from coastal hazards.</li> </ul>	Section 6.1
<ul style="list-style-type: none"> <li>Projected climate change impacts on risks from coastal hazards (section 55C(f) of the <i>Coastal Protection Act 1979</i>).</li> </ul>	Section 6.1
<ul style="list-style-type: none"> <li>Suitable locations where landowners could construct coastal protection works (provided they pay for the maintenance of the works and manage any offsite impacts), subject to the requirements of the <i>Environmental Planning and Assessment Act 1979</i>, and</li> </ul>	Section 7.0 (only works by public authorities proposed at this stage)
<ul style="list-style-type: none"> <li>Property risk and response categories for all properties located in coastal hazard areas.</li> </ul>	Sections 6.1 and 7.0

Requirement of the Guidelines	Where requirement is addressed in this Plan
Proposed actions in the implementation schedule to manage current and projected future risks from coastal hazards, including risks in an estuary from coastal hazards. Actions are to focus on managing the highest risks (section 55C(d) and (e) of the <i>Coastal Protection Act 1979</i> ).	Section 7.0
Where the plan proposes the construction of coastal protection works (other than emergency coastal protection works) that are to be funded by the council or a private landowner or both, the proposed arrangements for the adequate maintenance of the works and for managing associated impacts of such works (section 55C(g) of the <i>Coastal Protection Act 1979</i> ), and	Section 7.0
<b>An emergency action subplan, which is to describe:</b>	
<ul style="list-style-type: none"> <li>Intended emergency actions to be carried out during periods of beach erosion such as coastal protection works for property or asset protection, other than matters dealt with in any plan made under <i>State Emergency and Rescue Management Act 1989</i> relating to emergency response (sections 55C(b) and (g) of the <i>Coastal Protection Act 1979</i>),</li> </ul>	Appendix D
<ul style="list-style-type: none"> <li>Any site-specific requirements for landowner emergency coastal protection works, and</li> </ul>	Appendix D
<ul style="list-style-type: none"> <li>Consultation carried out with owners of land affected by a subplan.</li> </ul>	Appendix D
<ul style="list-style-type: none"> <li>Proposed actions in the implementation schedule that protect and preserve beach environments and beach amenity, and ensure continuing and undiminished public access to beaches, headlands and waterways, particularly where public access is threatened or affected by accretion (section 55C(c) of the <i>Coastal Protection Act 1979</i>).</li> </ul>	Section 7.4
<b>A description of:</b>	
<ul style="list-style-type: none"> <li>The current access arrangements to beaches, headlands and waterways in the plan's area, their adequacy and any associated environmental impacts.</li> </ul>	Section 6.3
<ul style="list-style-type: none"> <li>Any potential impacts (e.g. erosion, accretion or inundation) on these access arrangements, and</li> </ul>	Section 6.3
<ul style="list-style-type: none"> <li>The cultural and heritage significance of the plan's area.</li> </ul>	Section 6.2
Proposed actions in the implementation schedule to manage any environmental or safety impacts from current access arrangements, and to protect or promote the culture and heritage environment.	Section 7.4

## Coastal Management Principles

Principle	Where principal is considered in Part B - Coastline South of the Harbour
<b>Principle 1:</b> Consider the objects of the <i>Coastal Protection Act 1979</i> and the goals, objectives and principles of the NSW Coastal Policy 1997.	Were considered when developing objectives of Part B - Coastline South of the Harbour (Section 3.0), and throughout all sections of Part B - Coastline South of the Harbour
<b>Principle 2:</b> Optimise links between plans relating to the management of the coastal zone.	See Section 4.0, Council considered a number of previous studies when developing Part B - Coastline South of the Harbour. Council will also use other planning mechanisms (e.g. public domain plans) to deliver some of the actions contained in Section 7.4
<b>Principle 3:</b> Involve the community in decision making and make coastal information publically available	See Section 5.0 for a description of the community consultation undertaken during the preparation of Part B - Coastline South of the Harbour
<b>Principle 4:</b> Base decisions on the best available information and reasonable practice; acknowledge the interrelationship between catchment, estuarine and coastal processes; adopt a continuous improvement management approach.	Consultants prepared the hazard study for Council which reflects the best available information at the time, and recognises the interrelationships (see summary of hazard study in Section 6.1) (BMT WBM, 2014a)
<b>Principle 5:</b> The priority for public expenditure is public benefit; public expenditure should cost-effectively achieve the best practical long-term outcomes.	Council is proposing to spend public funds to protect public assets (see Section 7.0)
<b>Principle 6:</b> Adopt a risk management approach to managing risks to public safety and assets; adopt a risk management hierarchy involving avoiding risks where feasible and mitigation where risks cannot be reasonably avoided; adopt interim actions to manage high risks while long-term options are implemented	A risk management approach was adopted, as outlined in Section 7.1
<b>Principle 7:</b> Adopt an adaptive risk management approach if risks are expected to increase over time, or to accommodate uncertainty in risk predictions	A risk management approach was adopted, as outlined in Section 7.1
<b>Principle 8:</b> Maintain the condition of high value coastal ecosystems; rehabilitate priority degraded coastal ecosystems	Council has prioritised coastal ecosystems (see Section 6.2), and continues to undertake works to rehabilitate priority ecosystems (see Sections 6.2 and 7.4)
<b>Principle 9:</b> Maintain and improve safe public access to beaches and headlands consistent with the goals of the NSW Coastal Policy	Council will continue to develop and implement public domain plans to improve public access (see Sections 6.3 and 7.4)
<b>Principle 10:</b> Support recreational activities consistent with the goals of the NSW Coastal Policy	Council will continue to develop and implement public domain plans to support recreational activities (see Sections 6.3 and 7.4)

The management of the coast interacts with various other legislative acts, planning instruments and environmental management strategies and initiatives implemented by both Council and other stakeholders. The relationship between Part B - Coastline South of the Harbour and other legislative acts, strategies and plans is shown in **Figure 3**.

The proposed management actions in Part B - Coastline South of the Harbour are consistent with the Newcastle

Community Strategic Plan. The actions will contribute to the Newcastle Community Strategic Plan's directions Protected and Enhanced Environment, Vibrant and Activated Public Places, and Liveable and Distinctive Built Environment. The Plan is also consistent with Council's other key coastal planning documents including the Newcastle Coastal Plan of Management (NCC 2015), the Bathers Way Public Domain Plan (NCC 2012), and Merewether Beach Reserves Public Domain Plan (JILA and Thalys 2010).



**Figure 3:** Relationship between legislation and strategies and the Newcastle Coastal Zone Management Plan



## 5.0 Community Consultation

Extensive community consultation has been undertaken over a number of years to discuss the best management approaches for dealing with key coastal issues. Consultation during the preparation of Part B - Coastline South of the Harbour (including the accompanying hazard and management studies) was largely facilitated through the Newcastle Coastal Technical Working Group.

Members of the Group represent key stakeholders, including the community, state and local governments and the former Newcastle Port Corporation. Part B - Coastline South of the

Harbour was placed on public exhibition for a period of 21 days in October 2016 and a community information session was held during the exhibition period. Council's response to submissions can be found in **Appendix E**.

Further consultation has been undertaken in 2018 with the Department of Industry - Lands and Water (Crown Lands); Hunter Water Corporation, the Port of Newcastle and the Roads and Maritime Service to confirm agency support for the management actions proposed for Part B - Coastline South of the Harbour.

## 6.0 Overview of Priority Coastal Issues

As outlined in **Section 1.0**, the priority coastal management issues have been separated into three themes: Coastal Hazards, Beach Environment and Heritage, and Public Access and Amenity. This section provides an overview of the priority issues under each theme.

### 6.1 Coastal Hazards

The Newcastle Coastal Zone Hazard Study (BMT WBM, 2014a) outlined the key coastal processes that impact on the Newcastle coastline, including: regional geology and geomorphology, waves, water levels, sediment transport, and climate change. The hazard study used a sea level rise benchmark of 0.4m by 2050 and 0.9m by 2100 above 1990 mean sea level. Council has adopted this sea level rise benchmark for the purposes of this Plan, as it is consistent with the levels contained in the now repealed NSW Sea Level Rise Policy Statement 2009 (DECCW 2009), and is considered to be currently widely accepted by competent scientific opinion.

When coastal processes impact on the use of coastal lands, they are referred to as coastal hazards. Coastal hazards are one of the priority issues affecting the Newcastle coastline. The key coastal hazards impacting on the Newcastle coastline are beach erosion/recession, coastal inundation, and cliff/slope instability. A brief summary of how each of these hazards affects the Newcastle coastline is provided in **Sections 6.1.1 to 6.1.3** below. The information provided in **Sections 6.1.1 to 6.1.3** is a summary of the descriptions provided in the Newcastle Coastal Zone Hazard and Management Studies (BMT WBM, 2014a&b).

It should be noted that there is a lot of uncertainty when trying to define areas that are potentially impacted by coastal hazards. There is often limited data on coastal processes; coastal hazards are often episodic and unpredictable in nature; and there is also uncertainty regarding the potential impacts and timeframes of climate change. In the Newcastle Coastal Zone Hazard Study (BMT WBM, 2014a), A band of potential hazard extents for beach erosion/recession and inundation were adopted. The bands represent different probabilities/likelihoods that the hazard will occur ranging from almost certain to rare (see **Table 6.1**). The bands were considered across three timeframes (immediate, 2050 and 2100).

**Table 6.1. Risk Probability/Likelihood (source BMT WBM, 2014a)**

Probability	Description
Almost Certain	There is a high possibility the event will occur as there is a history of frequent occurrence.
Likely	It is likely the event will occur as there is a history of casual occurrence.
Unlikely	There is a low possibility that the event will occur, however, there is a history of infrequent or isolated occurrence
Rare	It is highly unlikely that the event will occur, except in extreme/exceptional circumstances, which have not been recorded historically.

#### 6.1.1 Beach Erosion and Recession

Beach erosion can be defined as the offshore movement of sand from the sub-aerial beach during a storm (OEH, 2013). Beach recession refers to the landward movement of the shoreline over time (caused by a loss in the sediment budget) (OEH, 2013). BMT WBM (2014a) used a combination of historical analysis and modelling to identify the areas potentially affected by beach erosion/recession. The 'average' and 'maximum' historical extents of erosion were calculated and used to define the hazard areas. Bedrock and engineer designed seawalls were generally considered to limit the extent of erosion/recession, except in the rare scenario (where it has been assumed that seawalls fail). The methodology used to identify the areas potentially affected by beach erosion/recession is summarised in **Table 6.2**. Maps showing the beach erosion/recession hazard areas are contained in **Appendix A**.



**Table 6.2. Beach Erosion and Recession Hazard Areas (source BMT WBM, 2014a)**

Probability	Immediate	2050	2100
Almost Certain	'Average' beach erosion <sup>1</sup> , to limit of all structures.	Immediate 'average' beach erosion + harbour impacts, to limit of all structures	Immediate 'average' beach erosion + harbour impacts, to limit of all structures
Likely	Not mapped <sup>2</sup>	Immediate 'average' beach erosion + 0.4m SLR recession + harbour impacts (Nobbys), to limit of all structures	Immediate 'average' beach erosion + 0.9m SLR recession + harbour impacts (Nobbys), to limit of all structures
Unlikely	'Maximum' beach erosion <sup>3</sup> , to limit of engineered seawalls and known bedrock	Immediate 'maximum' beach erosion + 0.4m SLR recession + harbour impacts (Nobbys), to limit of all engineered seawalls and known bedrock	Immediate 'maximum' beach erosion + 0.9m SLR recession + harbour impacts (Nobbys), to limit of all engineered seawalls and known bedrock
Rare	'Extreme' beach erosion <sup>4</sup> and engineered seawalls fail or are removed/absent	<p><b>Worse case of either</b></p> <p>Immediate 'maximum' beach erosion + 0.7m SLR recession</p> <p><b>OR</b></p> <p>Immediate 'extreme' beach erosion + 0.4m SLR recession</p> <p><b>OR</b></p> <p>Immediate 'maximum' beach erosion + structural impacts + 0.4m SR + 5° more easterly wave climate</p> <p><b>AND</b></p> <p>Engineered seawalls fail or are removed/absent</p>	<p><b>Worse case of either</b></p> <p>Immediate 'maximum' beach erosion + 1.4m SLR recession</p> <p><b>OR</b></p> <p>Immediate 'extreme' beach erosion + 0.9m SLR recession</p> <p><b>OR</b></p> <p>Immediate 'maximum' beach erosion + structural impacts + 0.9m SLR + 5° more easterly wave climate</p> <p><b>AND</b></p> <p>Engineered seawalls fail or are removed/absent</p>

<sup>1</sup> The average of the most eroded position for all photogrammetric profiles, see Tables 3-5 and 3-6 of the Newcastle Coastal Zone Hazard Study (BMT WBM, 2014a).

<sup>2</sup> Not mapped due to inadequate data to differentiate likelihoods between 'almost certain' and 'unlikely'.

<sup>3</sup> The maximum of the most eroded position measured for any and all photogrammetric profiles, see Tables 3-5 to 3-8, and Figure 3-1 of the Newcastle Coastal Zone Hazard Study (BMT WBM, 2014a).

<sup>4</sup> Assumed to be the addition of the 'almost certain' and 'maximum' erosion extents, in lieu of better data.



The **almost certain** hazard band (line) adopted the 'average' historical erosion over the three timeframes. For Part B - Coastline South of the Harbour, the almost certain hazard line was the same across all three timeframes (immediate, 2050, 2100) because there is no evidence of recession at the beaches in the study area.

The **likely** hazard line is the same as the almost certain line, except it includes sea level rise in the 2050 and 2100 timeframes.

The **unlikely** hazard line adopted the 'maximum' historical erosion over the three timeframes. The 2050 and 2100 timeframes also included sea level rise. Council will adopt the unlikely hazard lines for planning and development purposes, as they represent a conservative estimate of potential beach erosion/recession extents (see **Appendix A**)

The **rare** hazard line represents an extreme event, and was calculated as the maximum extent (worst case) of a higher than expected sea level rise, or a change in the wave direction, or the addition of the 'average' historical erosion with the 'maximum' historical erosion (see **Table 6.2**).

### 6.1.2 Coastal Inundation

Coastal inundation is defined as storm related flooding of coastal lands by ocean water due to elevated water levels (storm surge) and wave run-up (OEH 2013). BMT WBM's (2014a) assessment of elevated water levels considered the effects of astronomical tides, inverted barometric set up, wind setup, wave setup and sea level rise (see **Section 3.4.1** of the Newcastle Coastal Zone Hazard Study (BMT WBM, 2014a)). Wave runup levels (and overtopping rates) were calculated for 16 locations across the coastline, using the *EurOtop Wave Overtopping of Sea Defences and Related Structures Assessment Manual (Pullen et al., 2007)* (see **Sections 3.4.2** and **3.4.3** of the Newcastle Coastal Zone Hazard Study (BMT WBM, 2014a)). The methodology used to identify the areas potentially affected by coastal inundation is summarised in **Table 6.3**. Maps showing the coastal inundation hazard areas (including potential overtopping locations) are contained in **Appendix B**. The calculated inundation levels from the Newcastle Coastal Zone Hazard Study (BMT WBM, 2014a) are shown in **Table 6.4**.



**Table 6.3. Coastal Inundation Hazard Areas (source BMT WBM, 2014a)**

Probability	Immediate	2050	2100
Almost Certain	1 in 20 year storm surge and wave set up	As per immediate	As per immediate
Likely	NM <sup>5</sup>	NM	NM
Unlikely	1 in 100 year storm surge and wave set up <b>AND</b> wave run up and overtopping <sup>6</sup>	1 in 100 year storm surge and wave set up + 0.4m SLR and change in storm surge <b>AND</b> Indicative areas of potential overtopping <sup>6</sup> including 0.4m SLR	1 in 100 year storm surge and wave set up + 0.9m SLR and change in storm surge <b>AND</b> Indicative areas of potential overtopping <sup>6</sup> including 0.9m SLR
Rare	1 in 100 year storm surge and wave set up + extreme climatic conditions (e.g. tropical cyclone, 1 in 1000 year east coast low)	<b>Worse case of either</b> 1 in 100 year storm surge and wave set up + Extreme climatic conditions + 0.4m SLR and climate change impacts <sup>7</sup> <b>OR</b> 1 in 100 year storm surge and wave set up + 0.7m SLR and climate change impacts	<b>Worse case of either</b> 1 in 100 year storm surge and wave set up + Extreme climatic conditions + 0.9m SLR and climate change impact <sup>7</sup> <b>OR</b> 1 in 100 year storm surge and wave set up + 1.4m SLR and climate change impacts

<sup>5</sup> NM = not mapped

<sup>6</sup> Only applies at open coast barriers (not within lagoons, estuaries etc.). Wave run up and overtopping are calculated using 1 in 100 yr storm surge + 1 in 100 yr 6 hr duration Hs.

<sup>7</sup> Includes increase in set up levels associated with a 5% and 10% increase in storm wave heights by 2050 and 2100 respectively, see Section 2.8 of the Newcastle Coastal Zone Hazard Study (BMT WBM, 2014a).

**Table 6.4. Inundation levels (source BMT WBM, 2014a)**

Adopted Inundation Levels <sup>8</sup>	Immediate (m AHD)	2050 (m AHD)	2100 (m AHD)
Almost certain	2.5	2.5	2.5
Unlikely	2.7	3.1	3.6
Rare	2.9	3.4	4.1
Unlikely Wave Run-up <sup>9</sup>			
Nobbys	5.6	5.9	6.4
Newcastle	5.7	6.0	6.5
Merewether to Bar Beach	5.6	5.9	6.4

<sup>8</sup> Refer to Tables 3-10 to 3-12 of Newcastle Coastal Zone Hazard Study (BMT WBM, 2014a) for derivation of inundation levels.

<sup>9</sup> Run-up height for the 1 in 100 yr 6 hr storm wave height of 8.7m.

The **almost certain** hazard area is equivalent to a 1 in 20 year event, and is the same for all three timeframes (doesn't include sea level rise). The unlikely hazard area is equivalent to a 1 in 100 year event, and includes sea level rise (and a minor increase in storm surge due to climate change) for the years 2050 and 2100. Potential overtopping locations have been mapped for the **unlikely** hazard scenario. The rare hazard line represents an extreme event and was calculated as the highest (worst case) of a 1 in 100 year event plus greater than expected sea level rise, or an event roughly equivalent to a 1 in 1000 year event (see **Table 6.3**).

### 6.1.3 Coastal Cliff/Slope Instability

Coastal cliff/slope instability risks were identified during a geotechnical assessment, and considered both existing risk and the potential impacts of sea level rise by 2050 and 2100 (see **Appendix B** of the *Newcastle Coastal Zone Hazard Study* (BMT WBM, 2014a)). The assessment was undertaken by consultant's RCA Australia in accordance with the *Practice Note Guidelines for Landslide Risk Management* developed by the Australian Geomechanics Society Landslide Practice Note Working Group. Twenty two potential instability hazards were

identified across the coastline, and a qualitative assessment of risk to property, and a quantitative assessment of risk to life, was undertaken for each potential hazard. The potential hazards were then ranked in order of the combined risk to property and life, and risk management options were identified for each hazard.

All potential risks to life were considered tolerable for existing slopes and development. The majority of potential hazards were also assessed as having a low to moderate risk to property. Higher risks to property were identified at the southern end of Shortland Esplanade (in King Edward Park), Bar Beach car park, and Hickson Street Merewether. The locations of the 22 potential instability hazards are shown on the maps contained in **Appendix C**.

The RCA assessment also identified a coastal landslide risk assessment zone (see **Appendix C**). The landslide risk zone was determined by slope geometry, with reference to past slope instability. RCA defined the slope geometry as a 1H:1V line from adjacent coastal cliff(s)  $\geq 0.75\text{H}:1\text{V}$  ( $\sim 53^\circ$ ), or within a 3H:1V lines of coastal slope(s)  $\geq 2\text{H}:1\text{V}$  ( $\sim 27^\circ$ ) (BMT WBM, 2014a).

## 6.2 Beach Environment and Heritage

This section provides an overview of the environmental and heritage values of the Newcastle coastline, and summarises the key potential management issues.

### 6.2.1 Beach Environment

Newcastle's coastline south of the harbour has a great diversity of coastal environments including sandy beaches, high coastal cliffs and rock platforms. The coast is home to the *Themeda* grasslands endangered ecological community, which can be found around King Edward Park, Strzelecki and The Obelisk. A range of internationally important shorebirds can also be found along the Newcastle coastline, including the Ruddy Turnstone and Pacific Golden Plover.

Native vegetation found along the coastline is quite limited due to pressures from urbanisation and the spread of the highly invasive coastal weed called Bitou Bush. Whilst our coastline is subject to significant pressures, there is still a small, but significant vegetation corridor that exists along most of the coast. Council, Landcare, and others are undertaking ongoing revegetation works along our coastline to maintain this vital corridor.

In 2014, Council prepared the *Coasts and Estuary Vegetation Management Plan* (Umwelt 2014). The plan assessed the flora and fauna values of Council's coastal land and prioritised sites for rehabilitation works. The prioritisation process considered both condition (e.g. % native vegetation cover, % weed cover) and functionality (e.g. presence of threatened species, patch size) of sites. The *Themeda* grasslands at King Edward Park were ranked as the most important coastal environmental site, followed by Nobbys and Stockton beaches. Council currently delivers an annual program of rehabilitation works at priority coastal sites.

Newcastle's coastal rock platforms are also occupied by a great diversity of flora and fauna. Council undertook an assessment of the biodiversity of local rock platforms (Gladstone and Herbert, 2006) and a total of 170 invertebrate species were recorded on Newcastle's rock platforms, including:

- 8 anemone species
- 4 sponge species
- 10 arthropod species (crabs and barnacles)
- 68 mollusc species (including snails, slugs, octopus)
- 18 bird species (Gladstone and Herbert, 2006).

Potential management issues facing the coastal environment include:

- Pest and weeds (e.g. Bitou Bush management)
- The management of stormwater discharges onto beaches
- The impact of litter on local beaches (including marine debris)
- Urban pressures on native vegetation (e.g. trampling) and rock platforms (e.g. species harvesting)
- Climate change (e.g. impacts of sea level rise and increasing temperatures on vegetation).

### 6.2.2 Heritage

Newcastle's coastal cultural landscapes, while having been cleared, mined, and developed for over 200 years during phases of settlement and industry, still have rich cultural layers. These layers can be discovered on the surface, buried deep beneath shifting sands and rock, and submerged under the sea. Some of the earliest Aboriginal archaeological sites of great antiquity would underlie estuarine sediments or be submerged beneath the sea, as would many maritime and shipwreck sites.

**Sections 6.2.2.1 to 6.2.2.4** provide an account of the character of the coastal cultural landscapes from north to south. The historic sites represent significant contributions to Local and State heritage registers. Most of these landscapes also contain significant Aboriginal sites such as stone tools and middens as well as spiritual sites.

#### 6.2.2.1 Coal River Precinct

The Coal River Precinct deserves national recognition because it was the site of Australia's first coal discoveries and the burgeoning economy of the fledgling NSW colony that the government founded on timber, coal and lime export. The Coal River Precinct comprises Nobbys Headland, Macquarie Pier, Fort Scratchley and the Convict Lumber Yard. The Coal River Precinct contains convict mine shafts and tangible features including Macquarie Pier that links Nobbys Island with Colliers Point forming Nobbys and Horseshoe Beaches, and Fort Scratchley with its numerous intact structures and armaments relating to the late nineteenth century and twentieth century fortifications. The Coal River Precinct is also of exceptional significance for Aboriginal people.

In 1818, quarrying stone for the major engineering work of Macquarie Pier began at Signal Hill and Nobbys, to connect Nobbys Island to the mainland. Most of the headland is made up of light grey and cream coloured layers of siliceous volcanic ash, Nobbys Tuff that extends from sea level up to the top of the cliff, with a thickness of 25 metres. Nobbys Tuff overlays the Nobbys Coal Seam, whose black layers are visible at low tides, and form part of the rock platform next to the break wall.

The first shipping beacon was on Signal Hill (Fort Scratchley) from 1804, an open coal fire that after 1822 housed in a pagoda-style structure with crew but the fire was only visible for a short distance. After 1852, with the increasing shipping commerce and shipwrecks, the NSW Colonial Government built Nobbys Lighthouse on Nobby's Head. The lighthouse provided the first continuous light on the east coast of Australia. The government reduced the height of the island in 1858 by 25 metres to accommodate the building of the signal station. The light was converted to electric operation in 1935 and de-crewed.

Signal Hill (today Fort Scratchley) from 1813 was a coal beacon and a flagstaff to aid ships attempting to find the port. This structure was recorded in 1819 as "a small stone tower with Lighthouse". Early mining ventures kept close to the coastline around Collier's Point and Signal Hill under Crown control as the seams were easy to access by convict labour with horizontal or inclined tunnels. Mining here ceased circa 1817. A cross-section of Signal Hill drawn in 1854 suggested that there were two mine openings on the southern side, the entrance labelled "Government Workings".

Fort Scratchley is in its WW2 configuration, but has several small c1880-90s buildings, gun emplacements, guns, and interconnecting tunnels. It is encircled by a defensive wall and dry moat. The Fort would still have much archaeological

evidence of the various stages of development as a fort, as well as potential Aboriginal sites in undisturbed areas. Fort Scratchley continues to make a considerable contribution to the military history of NSW.

The Convict Lumberyard site, including the Stationmaster's residence and Paymaster's office in Newcastle East, is of outstanding heritage significance for the following reasons:

- Rare evidence of a convict industrial workplace and of convict structures thought to have been lost
- Evidence of Aboriginal occupation which is now rare in the urban Newcastle area
- It was the site of Newcastle's first historic archaeological excavation that unearthed convict built remains (such as a well, forge and brick paving) in 1987, after Enterprise Park opened.

Newcastle East emerged as a complex rail, warehousing, industrial, commercial, residential, and leisure precinct. The residential area is significant for its consistent streetscapes of two and three storey terrace housing dating from the mid-19th through to early 20th Centuries and its housing for workers. There are also examples of single storey detached houses. It is also an important place of recreation at facilities like the ocean baths, Nobbys Beach, and Foreshore Park.

Nobbys Head claimed a number of ships, several very early, signifying the rapid development of Newcastle and the Hunter River as a major coastal port. Many of these early vessels were trading timber, coal and agricultural products from further up the river. Coal became the greatest export from the region, with the port known widely throughout the world in the 19th Century. Still locatable is the screw steamer *Maianbar* (1940), which was carrying a full load of livestock and produce when it left Jerseyville on the NSW north coast.

The Coal River Precinct also holds great meaning and significance to Aboriginal people because it is associated with Dreaming stories that depict the laws of the land and signify how people should behave in regard to the environment. Aboriginal people who lived here enjoyed its rich and varied environment. Despite extensive changes, evidence of Aboriginal occupation can still be found in the Landscape. Reverend Lancelot Threlkeld (a 'Missionary to the Lake Macquarie Aborigines' between 1824 and 1859) recorded being guided by M'Gill, an Awabakal chief also known as Biraban, meaning 'Eaglehawk', who is held in the highest regard by coastal tribes. *Whibay gamba* or Nobbys Headland is a Dreaming place and represents a site of fundamental importance to Aborigines.



### 6.2.2.2 Newcastle Government Domain

Newcastle Government Domain comprises the James Fletcher Hospital site, Obelisk, King Edward Park & Shepherds Hill Defence Group.

At the northern extremity, was the location for Newcastle's Government House and gardens. Behind the Government House was the Government's 'sheep pastures' from 1802, known today as Shepherd's Hill and King Edward Park. On the hillside facing the Hunter River is the James Fletcher Hospital, where military buildings and parade grounds still exist and sections of the hillside were quarried using convict labour. The former Newcastle Court House is on the northern boundary of this precinct. This is also the location of the first working coal shafts in Australia.

The Bogey Hole (also known as the Commandant's Baths) is to the south of the military buildings on a rock platform at the base of a gully at King Edward Park. Above the Bogey Hole is the defence site of Shepherd's Hill. The Obelisk on the hill to the west overlooking the military buildings, has panoramic views and is on a standalone peak that was once the site of the windmill belonging to the penal settlement.

King Edward Park was dedicated for public recreation in 1863. In 1894 the Park, described in the gazettal as a recreation ground, was revoked to allow part of the original dedication to be used for defence purposes at Shepherds Hill. The balance of the land was then rededicated for public recreation. King Edward Park spans two headlands and has been used for a wide range of public purposes – health, defence, public utilities and recreation. The recreational facilities at the Park included a cricket oval, tennis courts, ornamental gardens and trees, seating and bandstand.

The Shepherds Hill Defence Group is considered an important site in the history of the coastal defence of Australia. Originally designated as a key defensive position by Jervois and Scratchley during the 1878 Royal Commission into Colonial Defences, the site, in association with Fort Scratchley, was designed to aid the defence of the coal port of Newcastle. The development of the site during the late 19th and early 20th centuries is illustrative of the changing approaches to coastal defence systems in NSW and Australia generally, demonstrating the growing need at the time for coastal defence installations. In particular, during World War II the Shepherds Hill site and associated fortifications were a central command position for Newcastle's defences and continued to act as such until the end of the war.

Of the shipwrecks to founder in the precinct, paddle steamer *Cawarra* (1866) was the most renowned, and the 63 victims

of the tragedy have been remembered at Cathedral Park by some of their burials. It foundered on the inside of the harbour near Horseshoe Beach. The tragedy was amplified by the fact that there were so many people watching on the shore who could do nothing to save the passengers and crew, and the lifeboats were not launched in time. This tragedy led to new procedures in the colony for the use of lifeboats in rescue. *The City of Newcastle* (1878) foundered on the rocks below Signal Hill. The rescuers saved all passengers.

The Domain has significance for Aboriginal people as *Yi-ran-na-li*, a cliff face at South Newcastle beach was considered a 'fearful' place where it was Aboriginal custom to be silent when passing the cliffs due to the occurrences of rock falls.

### 6.2.2.3 Mitchell & Merewether Estates

The Merewether area was part of a Crown grant to AW Scott in 1834. Scott held no interest in retaining the land so sold it in 1835 to Dr James Mitchell. Mitchell developed the early coal mining interests that challenged the leviathan Australian Agricultural Co to the north that held a monopoly until 1847. Mitchell opened and leased several coal mines and shafts across his extensive property known as the Burwood Estate. This continued well after the demise of the Newcastle Coal and Copper Company in 1864 and Mitchell's death, whereby the estate passed into the hands of the Merewether family.

However by 1886, the area initially designated as 'sandy hills' was resumed by the Crown due to sand drifts and unsuitability for development. It remained undeveloped as a Crown public reserve, later called Empire Park, after which Council constructed a carpark and other infrastructure during the second half of the 20th Century. The Council officially purchased sections of the study site for its use as Dixon Park in 1949 and 1960. The old coal and copper railway lines and tunnels still criss-cross the general area all the way through to The Junction, but have been buried through development.

Later the Merewether Baths and more recreational buildings replaced the coal industry in the landscape and Newcastle promoted its image as a health spa. In the hinterland are the former sites of the Merewether gravel quarry and a gun club. On the northern perimeter on Scenic Drive, Merewether is the site of Bailey's Orchard, with its structures, orchard and garden remains.

The wreck of the barque *Susan Gilmore* (1884) gave its name to the beach below Shepherds Hill when tug's tow rope fouled at night. Next morning, the Rocket Brigade rescuers secured a safety line to the ashore. No lives were lost, but the wreck has been.

The ancestral landscape of the Awabakal around Merewether was low hills behind the beach and flatter inundated land in the hinterland. The area of Merewether ridge and the lagoon to the south have presented varying flora regimes with rich resources. Southward, and including those that emptied into Glenrock Lagoon, several creeks drained the surrounding ridges and watered a rainforest. Available foods within close vicinity to the study area would have included fish, pipi, and shellfish from the rock platforms, eastern grey kangaroo, pigface fruit and the nectar of banksia flowers.

Aboriginal sites included open campsites with tuff stone tools, as well as shell middens. One open campsite was identified and recorded in Dixon Park. The site has been disturbed by urbanization and industry, including large scale earth movement, the construction of a railway line for the movement of coal, coal mining, dwelling, building and access.

### 6.2.2.4 Aboriginal Cultural Heritage

As outlined in **Sections 6.2.2.1 to 6.2.2.3**, the Newcastle coastline is home to a number of significant Aboriginal sites. Sites are important to Aboriginal people for social, spiritual, historical, and commemorative reasons, and are crucial for maintaining culture and connections to land (OEH 2015). Since 1998, Council has maintained a Commitment to Aboriginal and Torres Strait Islander Peoples and has developed a Reconciliation Action Plan that promotes Aboriginal Cultural Heritage throughout the city. Council is currently implementing a Dual Naming Project, whereby the Lower Hunter Language names sit alongside Newcastle's geographical names. Council is also preparing an Aboriginal Heritage Management Strategy to help Councillors, Council staff, developers and community and heritage practitioners to protect and celebrate Aboriginal Heritage in the city.

### 6.2.2.5 Potential Heritage Management Issues

Potential coastal heritage management issues include:

- Ensuring due diligence processes are followed during development
- Protecting heritage items and sites from coastal processes
- Trampling and damage of archaeological sites.

## 6.3 Public Access and Amenity

Council is currently delivering a range of access and amenity improvements as part of the Coastal Revitalisation program. The Coastal Revitalisation program has seen significant Council investment in improving coastal public assets, with Council winning a number of awards for the works implemented to date and seeing increased visitor numbers. The Newcastle Coast Plan of Management (NCC 2015) guides the future management of much of the coastal public land. Public domain plans have been prepared for Merewether Beach, and the Bathers Way. Works from the public domain plans are being implemented as funding and resources allow.

Potential public access and amenity management issues include:

- Designing coastal accessways to accommodate coastal erosion events
- Continuing to improve public assets along the coastline (e.g. accessways, Surf clubs, amenity facilities) whilst considering potential hazard impacts.
- Catering for increased visitors to the coastline.



# 7.0 Management of Priority Coastal Issues

This section outlines the risk management approach Council used to identify potential management actions (see **Section 7.1**), the management actions that Council is already undertaking (see **Section 7.2**), and the management actions that Council proposes to undertake in the future (see **Section 7.3**).

## 7.1 Risk Management Approach

A risk management approach was used to identify appropriate options for managing the risks from coastal hazards. The approach used was adapted from the Australian Standard Risk Management Principles and Guidelines (AS/NZS ISO 31000:2009) and is outlined in **Figure 7.1** (BMT WBM, 2014b).

As outlined in **Figure 7.1**, key steps in the process included risk identification, risk analysis, risk evaluation and risk treatment. An overview of these key steps is provided below.

Risk identification was undertaken during the preparation of the Newcastle Coastal Zone Hazards Study (BMT WBM, 2014a). The key coastal risks identified included beach erosion and recession, coastal inundation, and cliff/slope instability. A summary of the key risks is included in **Section 6.0**, and the hazard maps are included in **Appendices A to C**.

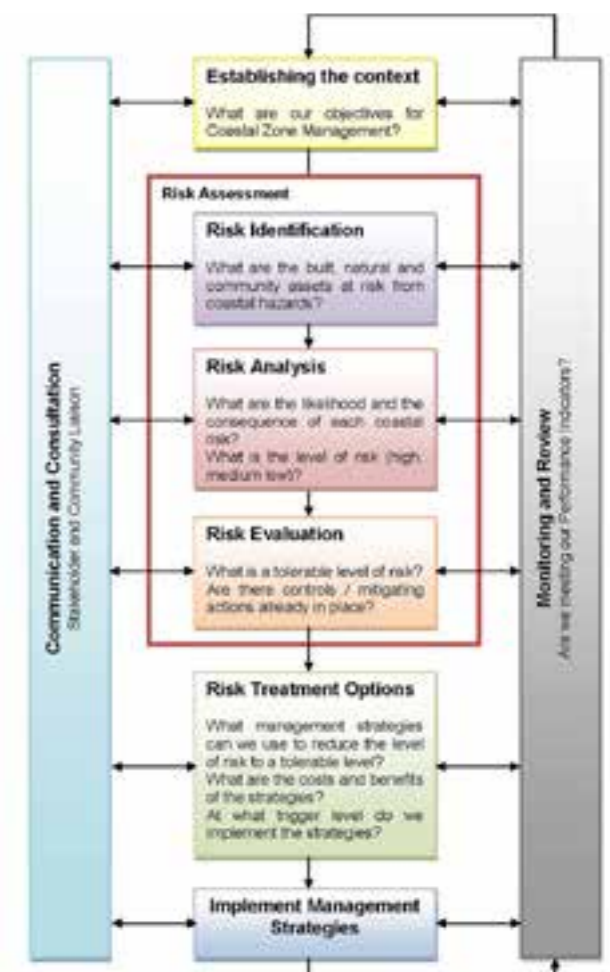
Risk analysis included the consideration of the likelihood and consequence of the identified risks, to determine an overall risk level. The likelihood of the risk was defined in the Newcastle Coastal Zone Hazard Study (BMT WBM, 2014a) and was summarised in **Section 6.0**. The consequence of the risk was determined through a number of workshops held with relevant stakeholders, as outlined in the Newcastle Coastal Zone Management Study (BMT WBM, 2014b). The risk likelihood and consequence was combined to provide the overall risk level, which is illustrated as a series of maps in the Newcastle Coastal Zone Management Study (BMT WBM, 2014b).

Risk evaluation involved the identification of risks that were considered tolerable, and those risks that were considered intolerable and required action. The risk evaluation process was completed during workshops with relevant stakeholders. Risks requiring action, and potential risk treatment options, were identified in the Newcastle Coastal Zone Management Study (BMT WBM, 2014b). Potential risk treatment options were identified using a rapid cost-benefits tool (BMT WBM, 2014b).

The tool assessed the following criteria during the options assessment:

- Capital and maintenance costs
- Environmental and/or social impacts
- Likely community acceptability
- Reversibility/adaptability of the option
- Effectiveness of the option over time
- Required approvals
- Ease of implementation.

Council considered the list of potential risk treatment options identified in the Newcastle Coastal Zone Management Study (BMT WBM, 2014b) when determining its preferred coastal risk treatment options. Council's preferred risk treatment options (management actions) are outlined in **Section 7.4**. As the Newcastle Coastal Zone Management Study (BMT WBM, 2014b) largely focused on actions to address coastal hazards, a number of additional actions have been included in **Section 7.4** to address the coastal themes Beach Environment and Heritage and Public Access and Amenity.



**Figure 7.1** Risk Management Approach Used (Source BMT WBM, 2014b)



## 7.2 Current Management Actions

As Council worked through the risk management approach described in **Section 7.1**, it became clear that Council was already undertaking a number of actions to manage priority coastal issues. Examples of actions currently being undertaken by Council are provided in **Table 7.1**.

**Table 7.1 Examples of Actions Currently Undertaken to Address Priority Coastal Issues**

Coastal Hazards	Beach Environment & Heritage	Public Access & Amenity
<b>Beach Erosion and Recession</b>		
Council undertakes emergency post storm works after coastal erosion events.	Council undertakes condition and functionality assessments to prioritise coastal rehabilitation works	Council is renewing a number of accessways along the Coastline South of the Harbour during delivery of the Bathers Way
Council is renewing a number of lower promenades/seawalls on the beaches to the south of the Hunter River (e.g. the Merewether promenade and South Newcastle sea wall)	Council has implemented WSUD along the coastline as part of the delivery of the Bathers Way	Council has developed a number of public domain plans for coastal areas south of the harbour
	Council undertakes coastal rehabilitation at priority sites	Council is delivering the Coastal Revitalisation Program
	Council has installed interpretive signage to highlight the values of local coastal rock platforms	
	Council has commenced the Dual Naming Project	
<b>Coastal Inundation</b>		
Council works with the relevant agencies to shut roads affected by inundation during storms (e.g. Shortland Esplanade)		
Council considers potential inundation and overtopping impacts when designing coastal infrastructure (e.g. seawalls)		
<b>Coastal Cliff/Slope Instability</b>		
Council undertakes coastal cliff/slope instability assessments		
Council undertakes works to address priority coastal cliff/slope instability risks (as funding and resources allow)		

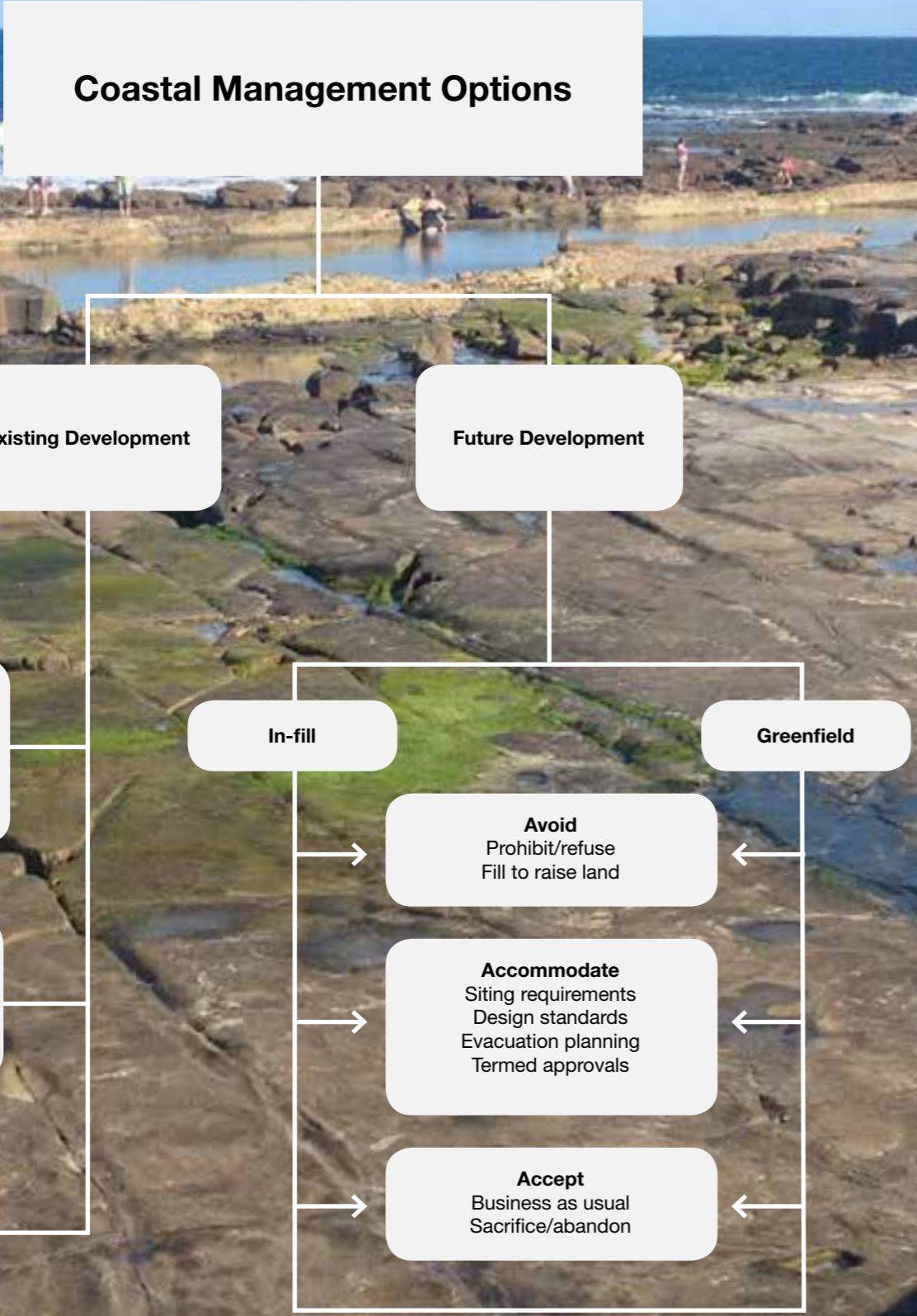
## 7.3 Coastal Hazard Management Intent

Whilst Council is already undertaking a number of actions to address priority coastal issues (see **Table 7.1**), recent storm events have highlighted the need for further action, particularly related to the management of coastal hazards. Management approaches for addressing coastal hazards are often split into those approaches for existing development and those approaches for future development (BMT WBM, 2014b). In terms of existing development, BMT WBM (2014b) defines the management approaches are **Protect**, **Accommodate** or **Retreat** (see **Figure 7.2**). **Protection** of existing development may be in the form of hard structures (e.g. seawalls, groynes), soft measures (e.g. beach nourishment), or a combination of the two (e.g. seawall with beach nourishment) (BMT WBM, 2014b).

**Accommodating** risk in existing development means to redevelop or retrofit existing assets in a manner that could minimise impacts from coastal hazards (e.g. piled foundations, relocatable homes) (BMT WBM, 2014b). **Retreat** approaches allow coastal processes (e.g. erosion) to occur, with assets requiring relocation or becoming sacrificial (BMT WBM, 2014b).

Future development management approaches are defined as **Avoid**, **Accommodate** or **Accept** (see **Figure 7.2**) (BMT WBM, 2014b). **Avoiding** the risk means not allowing development within coastal hazard areas (BMT WBM, 2014b). **Accommodating** the risk means including controls that reduce the potential impacts of the hazard (e.g. set minimum floor levels) (BMT WBM, 2014b). The **Acceptance** approach means that development can be undertaken where the level of risk is considered tolerable (BMT WBM, 2014b).





**Figure 7.2:** Risk management approach for Newcastle Coastal Zone Management Plan - Part B Coastline South of the Harbour (BMT WBM, 2014(b) p55)

In determining the relevant approaches for managing coastal hazards, Council considered the objectives of Part B - Coastline South of the Harbour (see **Section 3.0**). Based on the objectives of Part B - Coastline South of the Harbour, Council's coastal hazard management intent can be summarised as 'to manage current and future coastal risks (taking into account the effects of climate change), whilst maintaining public access, amenity and use of the coast'. To achieve the coastal hazard management intent, Council is proposing to:

- **Accommodate** coastal inundation risks by redesigning promenades to withstand wave inundation and overtopping, and ensuring development applications consider inundation risks
- **Accommodate** coastal cliff/slope instability risks by undertaking geotechnical investigations, and ensuring development applications consider landslide risks.

An outline of Council's management intent for each of the key coastal hazards is provided in **Sections 7.3.1 to 7.3.3** below.

**7.3.1 Beach Erosion and Recession**

The beaches south of the harbour are generally backed by seawalls/promenades that limit the extent of erosion. While Bar Beach doesn't have a seawall, recent erosion has shown that bedrock does exist at height behind the beach and would limit erosion. In the short to medium term, it is expected that the impacts of erosion on these beaches will be limited due to the existing bedrock and seawalls. However in the future, beach amenity may be impacted by erosion events stripping all of the sand from the beach, and Council may need to consider a nourishment program.

**7.3.2 Coastal Inundation**

Coastal inundation and wave overtopping currently impacts on Shortland Esplanade, as well as a number of beach promenades and public assets (e.g. ocean baths), and this is expected to worsen in the future. Council will consider inundation hazards when renewing coastal assets (including promenades, ocean baths and SLSC clubs), and if required in the future, will consider the installation of additional mitigation measures (e.g. parapets) to minimise inundation impacts on Council's assets. Coastal inundation risks will also require consideration during the development assessment process.

**7.3.3 Coastal Cliff/Slope Stability**

Council will continue to undertake geotechnical assessments of coastal cliff/slope instability, and will implement priority works (subject to funding and resource availability). Vegetation cover will be encouraged on coastal soil slopes, whilst

vegetation causing root jacking of rock faces will be removed (as funding/resources allow). Council's Development Control Plan will be reviewed to ensure that properties in the landslide risk area consider the potential hazard when preparing a development application.

**7.4 Management Actions**

Council aims to achieve the objectives of Part B - Coastline South of the Harbour (including the summarised coastal hazard management intent outlined in **Section 7.3**) by implementing the management actions outlined in **Table 7.2** to address priority coastal issues.

The timeframes contained in **Table 7.2** refer to:

- Short term - the action is expected to commence in the first two years following certification of the Plan.
- Medium term - the action is expected to commence in the first five years following certification of the Plan.
- Long term - the action is expected to commence after the first five years following the certification of the Plan .

For the purpose of **Table 7.2**, properties/land considered to be affected by coastal erosion/recession or inundation hazards are those areas affected by (seaward of) the unlikely 2100 hazard line area (see **Appendix A and B**). This is consistent with the adoption of the unlikely hazard line for planning purposes, as outlined in **Section 6.1**.

**7.4.1 Management Action Approvals and Considerations**

Coastal management actions in Part B - Coastline South of the Harbour will potentially require approvals or authorisation from relevant land owners or stakeholders with interest in the land where the management action is proposed. These approvals or authorisations may potentially be required under various legislative instruments and will be obtained prior to commencement of the management action.

There are areas of Department of Industry - Lands and Water (Crown Lands) (DoI - Crown Lands) land along the open coastline of the Part B study area that are currently managed by Council under a Reserve Trust arrangement. Where management actions are proposed on DoI - Crown land relevant authorisations and approvals may need to be obtained under the *Crown Land Management Act 2016*. Management actions undertaken on DoI - Crown land will also need to consider Aboriginal Land Claims lodged under the *Aboriginal Land Rights Act 1983*. Any works as a result of management actions will need to be compliant with the *Native Title Act 1993 (Cwlth)*.



**Table 7.2 Management Actions to Address Priority Coastal Issues****Theme: Coastal Hazards**

*Objective: To manage current and future risks from coastal hazards, taking into account the effects of climate change.*

#	Action	Primary Responsibility	Timeframe	Indicative Cost
<b>Planning Controls</b>				
1	Revise s149 certificates to ensure that properties potentially affected by coastal hazards (including coastal erosion/recession, coastal inundation, coastal cliff/slope instability) contain an appropriate notation. The relevant Planning Circulars developed by the Department of Planning will be used to guide the content of the notations.	Council	Short term	Minimal
2	Review s149 certificates to ensure that properties potentially affected by coastal hazards contain the appropriate notation with regards to the ability for complying development to be carried out on the land.	Council	Short term	Minimal
3	Revise Council's Development Control Plan to ensure properties potentially affected by coastal hazards consider the risk when preparing development applications. Development applications should consider the coastal hazards identified in the Newcastle Coastal Zone Hazards Study (BMT WBM, 2014a) and the proposed management actions contained in this Plan.	Council	Medium term	Minimal
4	Investigate the most appropriate planning mechanisms for illustrating hazard areas.	Council	Short to Medium Term	Minimal
5	Public Domain Plans (and similar masterplan documents) prepared for coastal lands should consider the coastal hazards outlined in the Newcastle Coastal Zone Hazards Study (BMT WBM, 2014a) and the proposed management actions contained in this Plan. The hazards should be considered during the development of the Public Domain Plan (or other similar masterplan document), as well as during the design of the works resulting from the implementation of the Public Domain Plan (or other similar masterplan document).	Council	Short term	Incorporated into cost of preparing public domain plan (may increase cost of plan preparation)

#	Action	Primary Responsibility	Timeframe	Indicative Cost
<b>Coastal Protection Works and Asset Management</b>				
6	Investigate alternative revenue sources to assist with funding coastal protection works.	Council	Medium - Long term	Minimal
7	Investigate and implement works to reduce sand drift in affected locations (e.g. Nobbys).	Council	Short - Medium term	\$10,000 to \$50,000 per site
8	If required, consider use of parapets (or other relevant management options) to minimise coastal inundation impacts along coastal promenades/seawalls.	Council	Long Term	Option dependant
9	Consider impacts of coastal hazards when maintaining, renewing or constructing new coastal promenades (which often act as seawalls) along the beaches to the south of the Hunter River (Merewether to Nobbys). The design of works should consider the hazards outlined in the Newcastle Coastal Zone Hazards Study (BMT WBM, 2014a). Asset life, purpose/service, and location should be considered, as well as the potential impacts from climate change.	Council	Short term	\$5,000 to \$80,000 per design. Further costs would depend on proposed works
10	Consider impacts of coastal hazards when renewing or constructing other coastal public assets. The design of works should consider the hazards outlined in the Newcastle Coastal Zone Hazards Study (BMT WBM, 2014a). Asset life, purpose/service, and location should be considered, as well as the potential impacts from climate change.	Council	Short term	\$5,000 to \$80,000 per design. Further costs would depend on proposed works
11	Continue to undertake post storm inspections of coastal hazards, to identify potential works that may be required.	Council	Short - Long Term, depending on storm frequency	Minimal
12	If required, develop a beach scraping program for the beaches to the south of the Hunter River (Merewether - Nobbys beaches). Consultation should be undertaken with the Merewether National Surfing Reserve prior to commencement of scraping at Merewether.	Council	Short - Long Term, depending on storm frequency	Minimal
13	As required, undertake additional coastal hazard investigations and design and implement works to address identified hazards (e.g. investigate adaptation options for the ocean baths, or impacts of climate change on stormwater assets).	Council	Long Term	Study cost between \$10,000 and \$60,000. Further costs would depend on proposed works
14	Investigate opportunities for further incorporation of coastal hazards in Council's asset management systems and asset management plans.	Council	Medium Term	\$5,000 to \$20,000

#	Action	Primary Responsibility	Timeframe	Indicative Cost
15	Investigate, design and implement opportunities for the relocation of public assets to minimise the potential impacts on coastal hazards (e.g. surf clubs could be relocated further landward when being replaced).	Council	Medium - Long Term	Depend on proposed asset being relocated, new surf clubs could cost over \$2M to construct.
16	As needed, undertake geotechnical investigations of coastal cliff/slope instability, and implement works to minimise priority risks. Investigate the development of a monitoring program for priority coastal/cliff slope instability sites.	Council	Ongoing	Investigations cost between \$15,000 and \$80,000. Further costs would depend on proposed works
17	Encourage vegetation cover on coastal slopes comprised of soil and/or low strength rock, to minimise potential geotechnical risks.	Council	Short - Medium Term	\$20,000 to \$100,000 per slope section (dependant on area revegetated)
18	As required, cut or poison vegetation with robust root systems that are 'root jacking' rock faces.	Council	As required	\$10,000 to \$300,000 (dependant on area requiring treatment)
19	Undertake annual inspection of Nobbys Breakwall and assess potential issues from coastal hazards.	Port of Newcastle	Ongoing	As required
<b>Emergency Management</b>				
20	Develop an Emergency Procedure for the closure of coastal roads impacted by coastal inundation. The procedure could be implemented by Council, NSW police, or other relevant agencies.	Council	Ongoing	Minimal
21	If deemed appropriate, undertake emergency works to manage beach erosion during storm events in accordance with the Emergency Action Subplan contained in <b>Appendix D</b> .	Council	Ongoing	Dependant on extent of emergency works required
22	Educate the community about the coastal hazards impacting on the Newcastle community (might include website pages, pamphlets, and community information sessions).	Council	Ongoing	Minimal to \$15,000

## Theme: Beach Environment and Heritage

### Objective: To protect and enhance the coastal environment

#	Action	Primary Responsibility	Timeframe	Indicative Cost
23	Continue to assess the flora and fauna values of coastal assets (including coastal rock platforms).	Council	Ongoing	\$10,000 to \$80,000 dependant on assets being assessed
24	Undertake annual coastal rehabilitation projects (including flora and/or fauna works) at priority coastal sites (includes sand dunes, coastal headlands and other coastal environments). Rehabilitation works should be undertaken with local provenance. Plantings should only be undertaken with species listed on Council's native coastal vegetation species list.	Council	Ongoing	\$20,000 to \$200,000 annually
25	Develop a Technical Manual for coastal revegetation works. The manual should outline preferred planting techniques and suitable plant species.	Council	Short - Medium Term	Minimal to \$20,000
26	Investigate potential options for controlling the spread of Bitou Bush on coastal cliffs/slopes.	Council	Short - Medium Term	Minimal to \$30,000.
27	Reissue a procurement alert for the provision of turf products which outlines that plastic turf reinforcement mesh should not be used on Council's land adjacent to coast. Educate staff about not using the product along the coastline.	Council	Short Term	Minimal
28	Public domain works along the coast should include landscaping with native species (or other tree species as per the Street Tree Selection Manual).	Council	Ongoing	\$5,000 to \$100,000
29	Investigate, design and implement works to improve the quality/quantity of stormwater discharged onto the city's beaches. This could include (but is not limited to) stormwater harvesting, water quality controls, and/or the removal of outlets discharging onto the beach.	Council	Short - Medium Term	\$20,000 to \$800,000
30	Investigate the potential impacts of climate change on the coastal environment	Council	Short - Long Term	\$30,000 to \$60,000
31	Promote the environmental values of the coastline. This could include (but is not limited to) the provision/support of community seminars/talks, the promotion of values on Council's website, or the installation of educational signs.	Council	Ongoing	Minimal to \$10,000
32	Support research of key environmental coastal values/issues. This could include supporting research by a university or other research agency.	Council	As deemed appropriate	\$5,000 to \$50,000



*Objective: To acknowledge and enhance the Indigenous and European heritage of the coast.*

#	Action	Primary Responsibility	Timeframe	Indicative Cost
33	Prepare an Aboriginal Heritage Management Strategy to ensure due diligence processes are followed.	Council	Short - Medium Term	Minimal to \$60,000
34	Continue to raise community awareness of Aboriginal cultural heritage through projects such as the Dual Naming of Landforms.	Council	Short - Medium Term	Minimal to \$60,000
35	Prepare Conservation Management Plans as required.	Council	Short - Long Term	Minimal to \$60,000 per plan
36	Promote heritage values of the coastline. This could include the development of apps, installation of interpretive signage, promotion on Council's website.	Council	Short - Medium Term	Minimal to \$10,000
37	Investigate opportunities for further incorporation of heritage values in Council's asset management systems and asset management plans.	Council	Short - Medium Term	Minimal to \$20,000
38	Continue to pursue Federal heritage listing of the Coal River Precinct.	Council	Ongoing	Minimal
39	Consider the principles of the Newcastle Heritage Strategy 2015 when undertaking works that may impact on coastal heritage items/ areas.	Council	Ongoing	Minimal

**Theme: Public Access and Amenity**

*Objective: To maintain and enhance public access, amenity and use of the coast*

#	Action	Primary Responsibility	Timeframe	Indicative Cost
40	Continue to develop and implement public domain plans (or similar masterplan documents) for coastal lands.	Council	Ongoing	\$30,000 to \$100,000 for plans. Further costs would depend on proposed works
41	Investigate the numbering of authorised beach accessways (for tourism and emergency management purposes).	Council	Medium Term	\$2,000 to \$10,000
42	Beach accessways being replaced should be designed to face away from the dominant south-easterly winds, and where deemed appropriate, should include varied alignments (e.g. dog legs) or dune fencing to minimise potential sand blow outs. Accessways on beaches to the south of the Hunter River (Merewether to Nobbys beaches) should be constructed to bedrock, or the lowest part of the stairs should be designed to be sacrificial.	Council	As required	\$1,000 to \$50,000 dependant on design of accessway
43	The design of beach fencing and accessways should consider the Coastal Dune Management Manual (NSW Department of Land and Water Conservation, 2001).	Council	As required	Minimal

## 8.0 Implementation

Council will implement Part B - Coastline South of the Harbour in accordance with the Integrated Planning and Reporting framework. Management actions will be prioritised and identified in the four year Delivery Program and annual Operational Plan for funding. Council will also investigate the incorporation of coastal hazards into strategic asset management plans.

Council will fund the proposed management actions from a combination of Council's Working Funds and grants. Council will apply for funding from the NSW Government's Coastal Grants Program. Council may also apply for funding from other sources (e.g. Crown Reserves Improvement Fund, NSW Environment Trust).

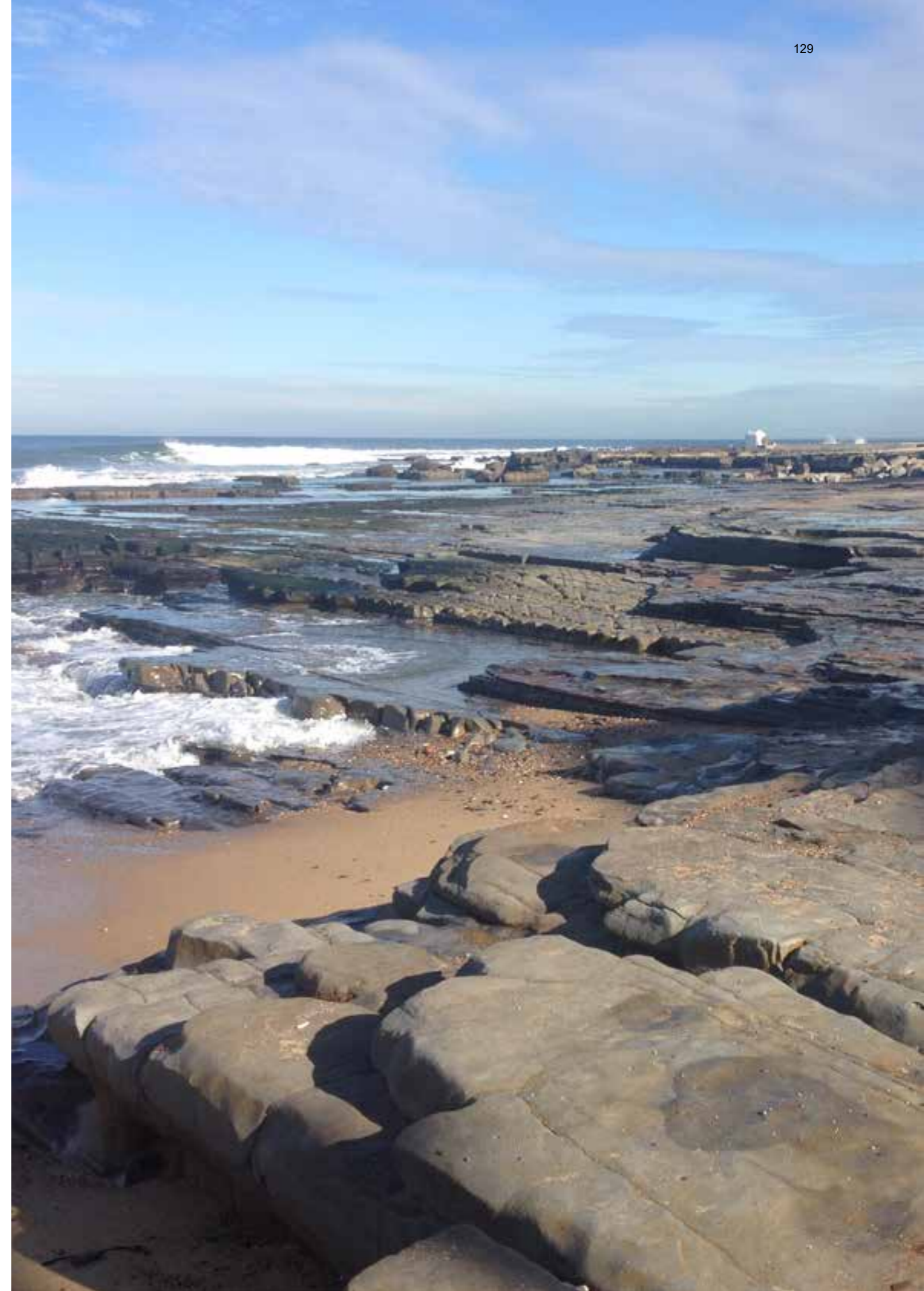
Council will monitor the progress of implementation of the Plan by undertaking audits of the Plan as required. Council will provide periodic reports on the progress of the Plan's implementation on Council's website.

## References

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- BMT WBM (2014b). *Newcastle Coastal Zone Management*.
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- Gladstone, W., and Herbert, C. (2006). *Newcastle Coastal Rock Platforms Biodiversity and Management Study*.
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- Umwelt (2003a). *Newcastle Coastline Management Plan*.
- Umwelt (2003b). *Newcastle Coastline Management Study*.
- Umwelt (2014). *Coasts and Estuary Vegetation Management Plan*.

## 9.0 Review

The review of Part B - Coastline South of the Harbour management actions will be undertaken as part of the future coastal management program to be prepared under the *Coastal Management Act 2016*. This review will be conducted by the end of 2021. The implementation of Part B - Coastline South of the Harbour will be reported by Council through the Annual Report and End of Term Report under the Integrated Planning and Reporting Framework. Updated information regarding management actions will also be placed on Council's website.





# Appendix A

## Beach Erosion/ Recession Hazard Area

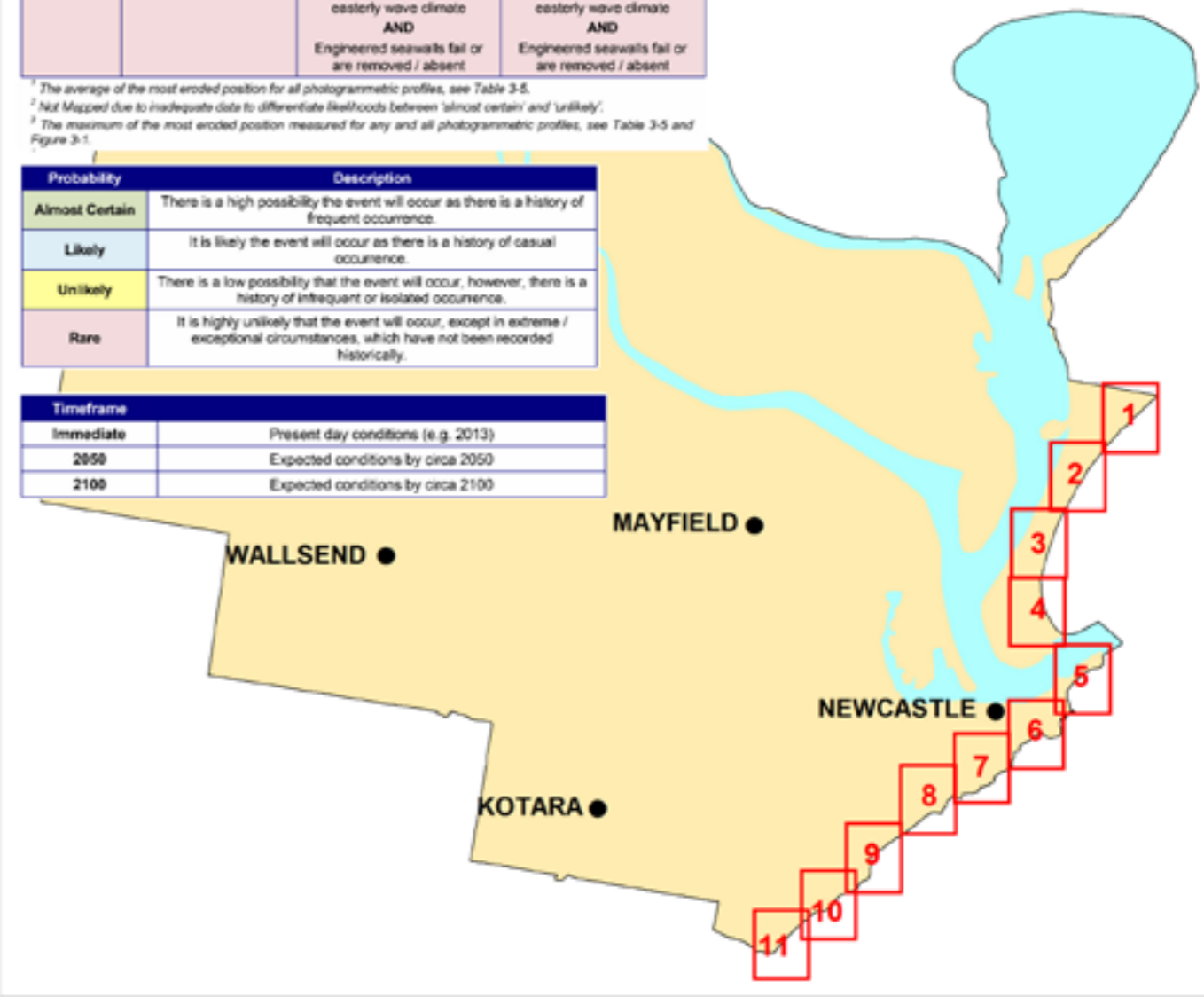
Probability	Immediate	2050	2100
<b>Almost Certain</b>	'average' beach erosion <sup>1</sup> , to limit of all structures	Immediate 'average' beach erosion + harbour impacts (Stockton), to limit of all structures	Immediate 'average' beach erosion + harbour impacts (Stockton), to limit of all structures
<b>Likely</b>	Not Mapped <sup>2</sup>	Immediate 'average' beach erosion + 0.4 m SLR recession + harbour impacts (Nobbys, Stockton), to limit of all structures	Immediate 'average' beach erosion + 0.9 m SLR recession + harbour impacts (Nobbys, Stockton), to limit of all structures
<b>Unlikely</b>	'maximum' beach erosion <sup>3</sup> , to limit of engineered seawalls and known bedrock	Immediate 'maximum' beach erosion + 0.4 m SLR recession + harbour impacts (Nobbys, Stockton), to limit of engineered seawalls and known bedrock	Immediate 'maximum' beach erosion + 0.9 m SLR recession + harbour impacts (Nobbys, Stockton), to limit of engineered seawalls and known bedrock
<b>Rare</b>	'extreme' beach erosion <sup>4</sup> and engineered seawalls fail or are removed / absent	<b>Worst Case of either:</b> Immediate 'maximum' beach erosion + 0.7 m SLR recession OR Immediate 'extreme' beach erosion + 0.4 m SLR recession OR Immediate 'maximum' beach erosion + structural impacts + 0.4 m SLR + 5' more easterly wave climate AND Engineered seawalls fail or are removed / absent	<b>Worst Case of either:</b> Immediate 'maximum' beach erosion + 1.4 m SLR recession OR Immediate 'extreme' beach erosion + 0.9 m SLR recession OR Immediate 'maximum' beach erosion + structural impacts + 0.9 m SLR + 5' more easterly wave climate AND Engineered seawalls fail or are removed / absent

<sup>1</sup> The average of the most eroded position for all photogrammetric profiles, see Table 3-5.  
<sup>2</sup> Not Mapped due to inadequate data to differentiate likelihoods between 'almost certain' and 'unlikely'.  
<sup>3</sup> The maximum of the most eroded position measured for any and all photogrammetric profiles, see Table 3-5 and Figure 3-1.

Probability	Description
<b>Almost Certain</b>	There is a high possibility the event will occur as there is a history of frequent occurrence.
<b>Likely</b>	It is likely the event will occur as there is a history of casual occurrence.
<b>Unlikely</b>	There is a low possibility that the event will occur, however, there is a history of infrequent or isolated occurrence.
<b>Rare</b>	It is highly unlikely that the event will occur, except in extreme / exceptional circumstances, which have not been recorded historically.

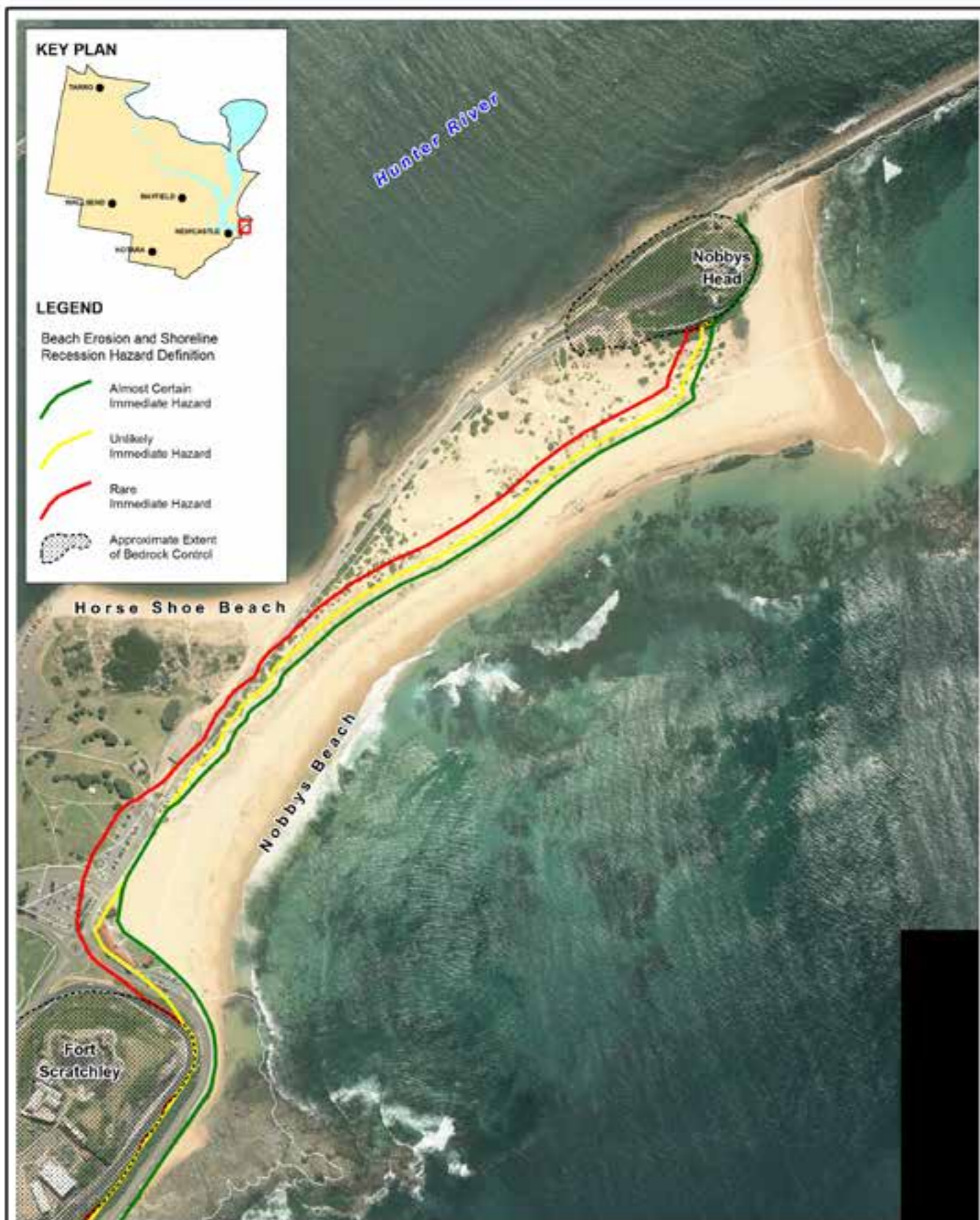
  


Timeframe	Description
<b>Immediate</b>	Present day conditions (e.g. 2013)
<b>2050</b>	Expected conditions by circa 2050
<b>2100</b>	Expected conditions by circa 2100




<b>Title:</b> Index to Erosion and Recession Hazard and Risk Drawings		<b>Figure:</b> INDEX	<b>Rev.:</b> A
BMT WBM endeavours to ensure that the information provided in this map is correct at the time of publication. BMT WBM does not warrant, guarantee or make representations regarding the currency and accuracy of information contained in this map.			
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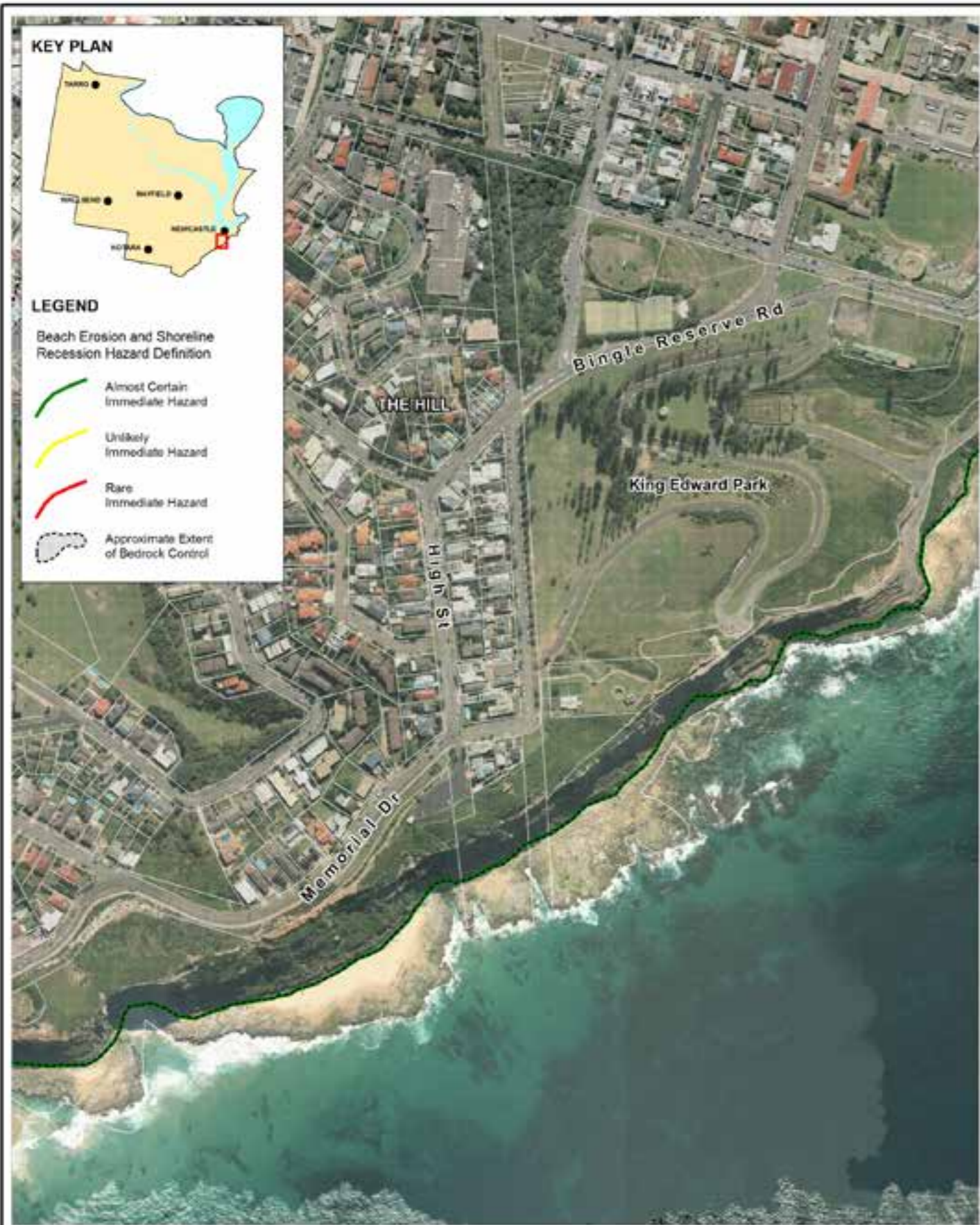


<p>Title: <b>Erosion and Recession Hazard Definition Immediate Planning Horizon - Nobbys Beach</b></p>		<p>Figure: <b>A-5</b></p>	<p>Rev: <b>A</b></p>
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<p>Title: <b>Erosion and Recession Hazard Definition Immediate Planning Horizon - Newcastle Beach</b></p>		<p>Figure: <b>A-6</b></p>	<p>Rev: <b>A</b></p>
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Title: **Erosion and Recession Hazard Definition Immediate Planning Horizon - The Hill**

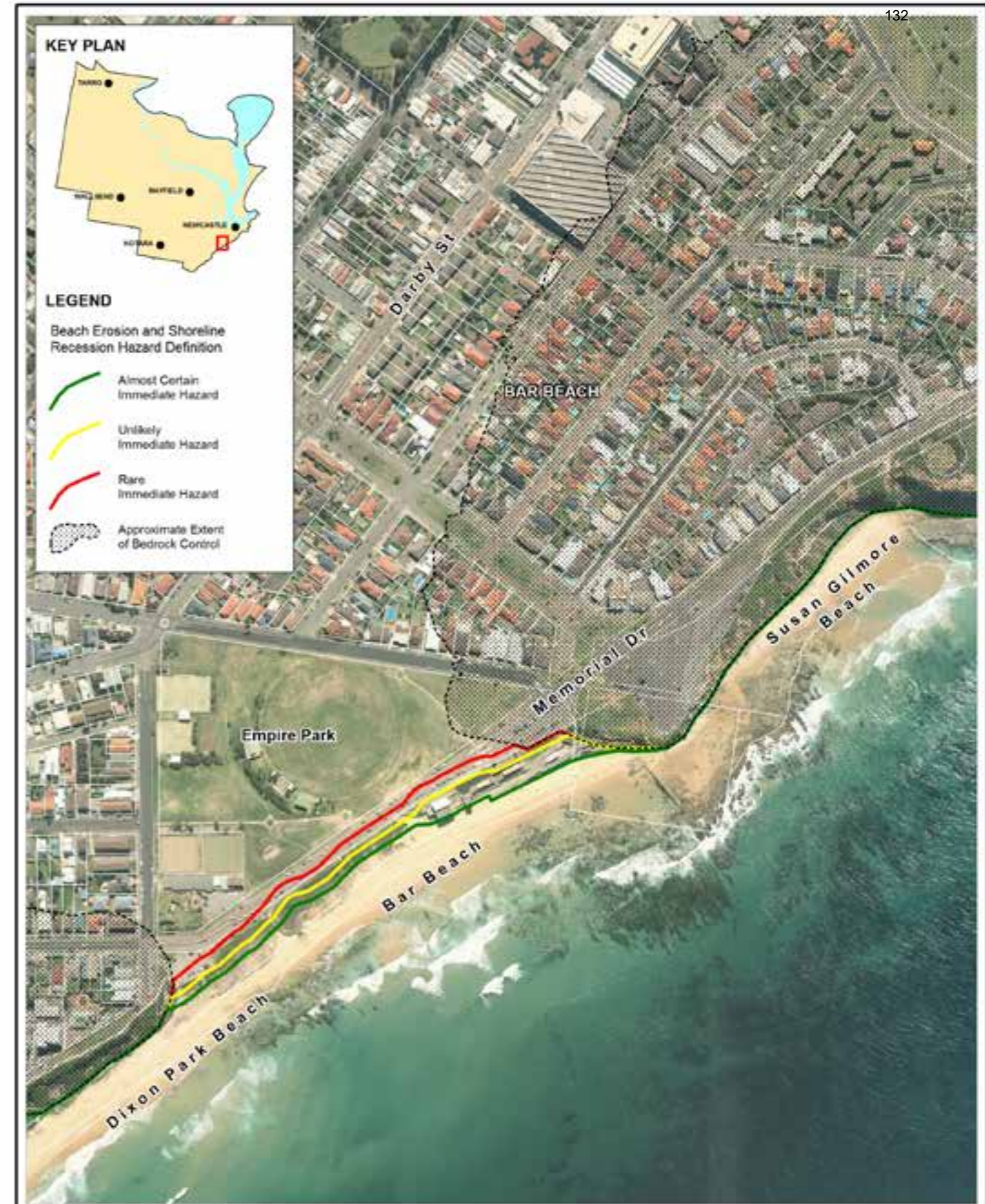
Figure: **A-7** Rev: **A**

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Title: **Erosion and Recession Hazard Definition Immediate Planning Horizon - Bar Beach**

Figure: **A-8** Rev: **A**

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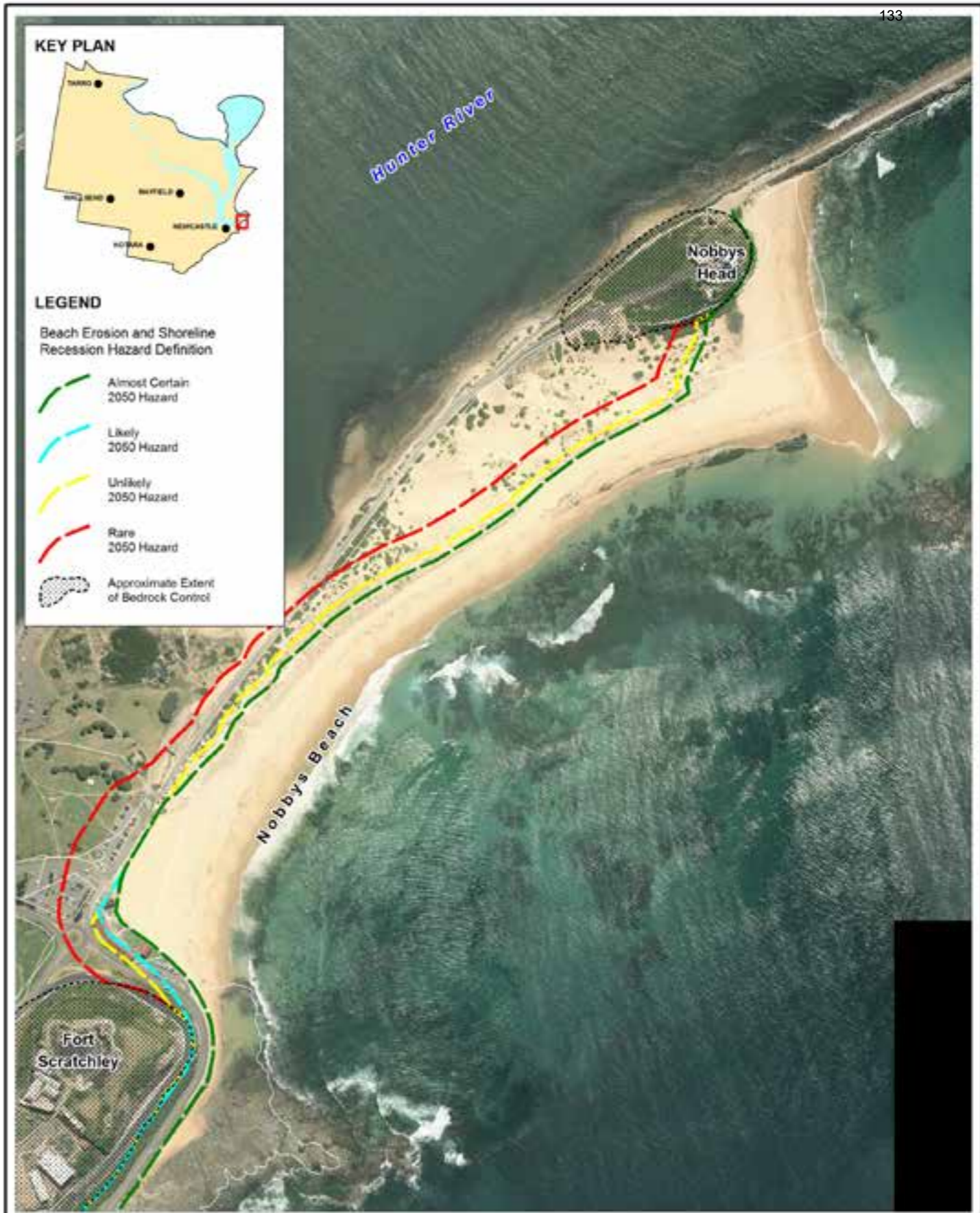
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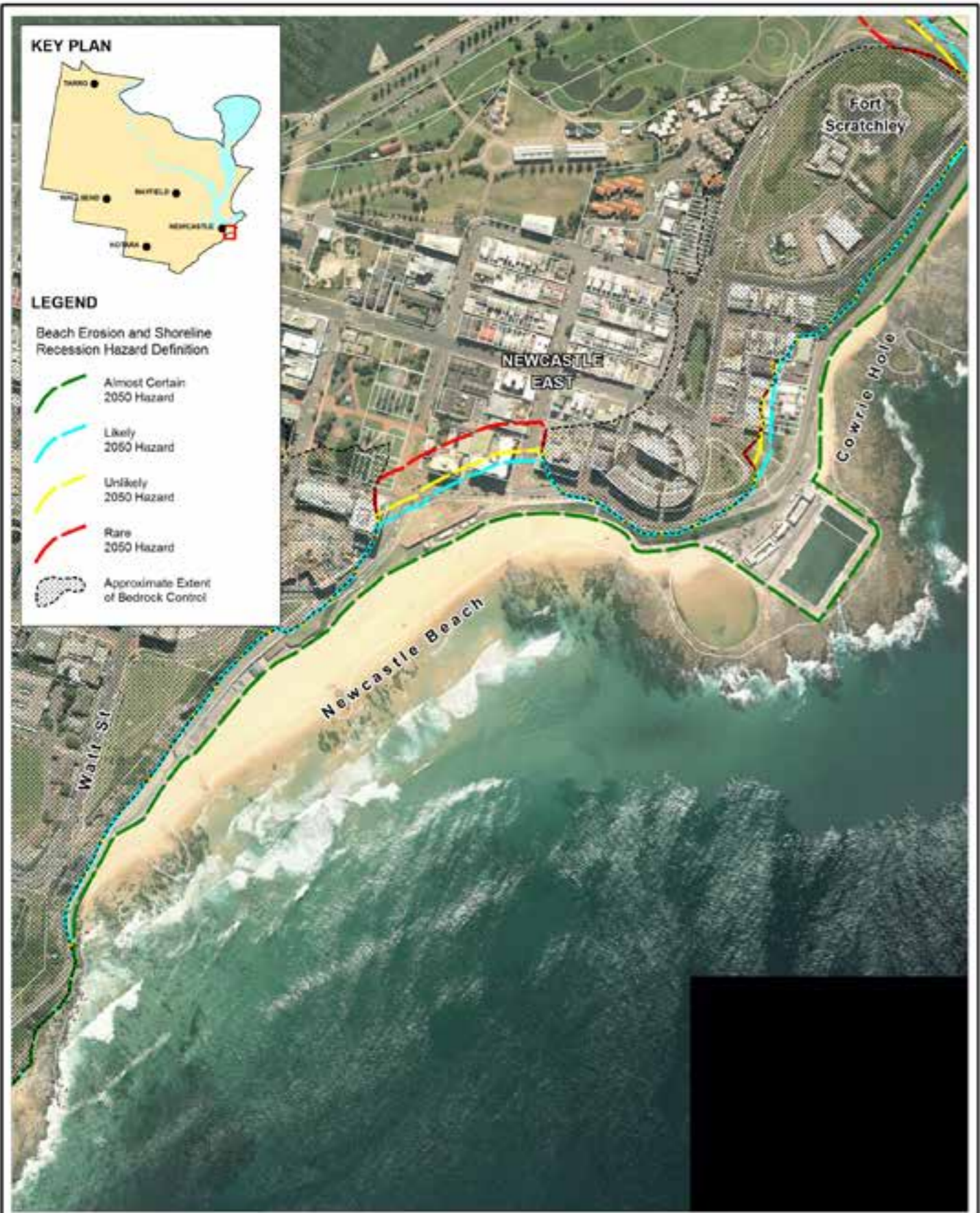


<p>Title: <b>Erosion and Recession Hazard Definition Immediate Planning Horizon - Merewether Beach</b></p>	<p>Figure: <b>A-9</b></p>	<p>Rev: <b>A</b></p>
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<p>Title: <b>Erosion and Recession Hazard Definition 2050 Planning Horizon - Nobbys Beach</b></p>	<p>Figure: <b>B-5</b></p>	<p>Rev: <b>A</b></p>
<p><small>BMT WBM endeavours to ensure that the information provided in this map is correct at the time of publication. BMT WBM does not warrant, guarantee or make representations regarding the currency and accuracy of information contained in this map.</small></p>	<p>Approx. Scale</p>	<p>www.bmtwbm.com.au</p>
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Title: **Erosion and Recession Hazard Definition 2050 Planning Horizon - Newcastle Beach**

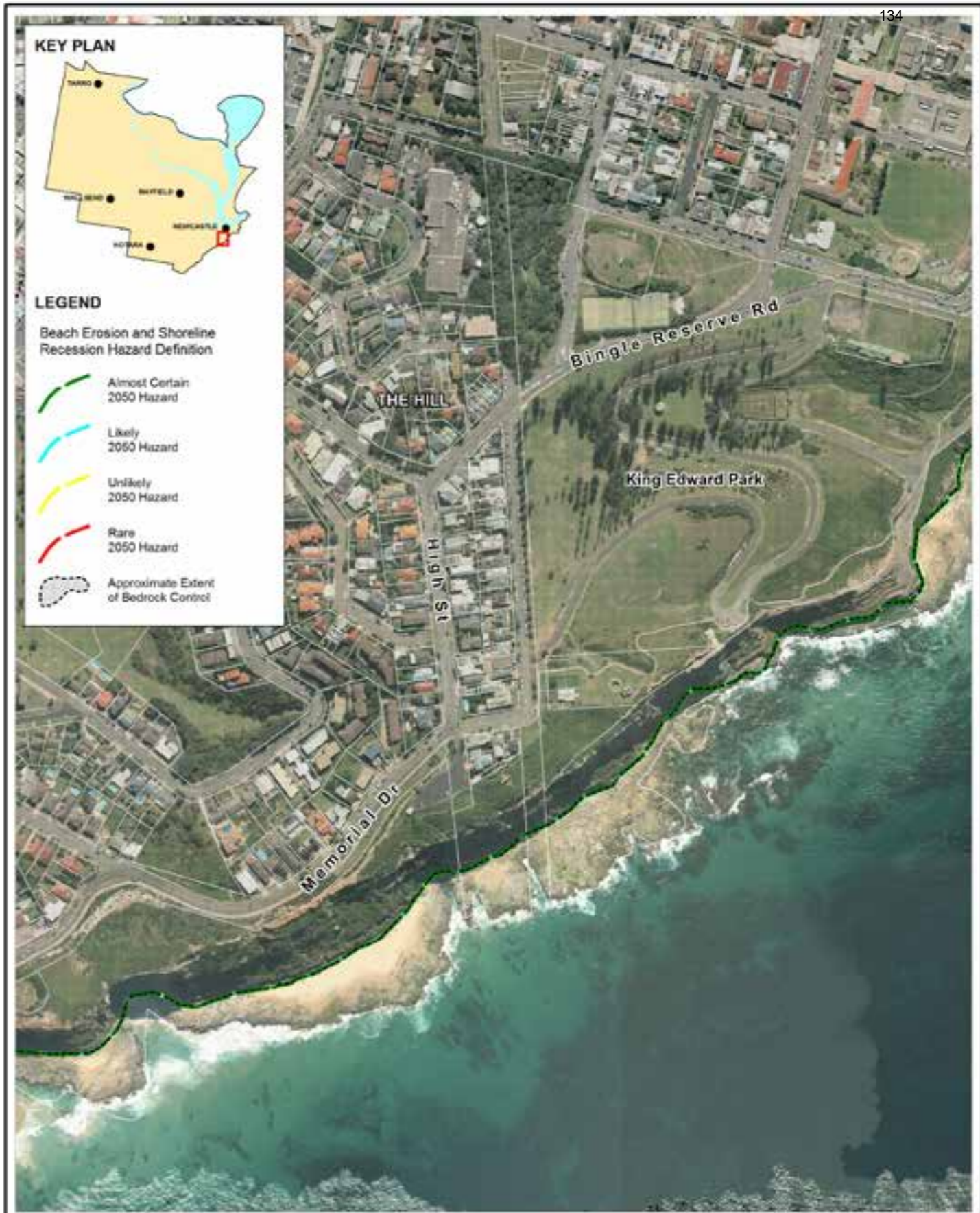
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Title: **Erosion and Recession Hazard Definition 2050 Planning Horizon - The Hill**

Figure: **B-7** Rev: **A**

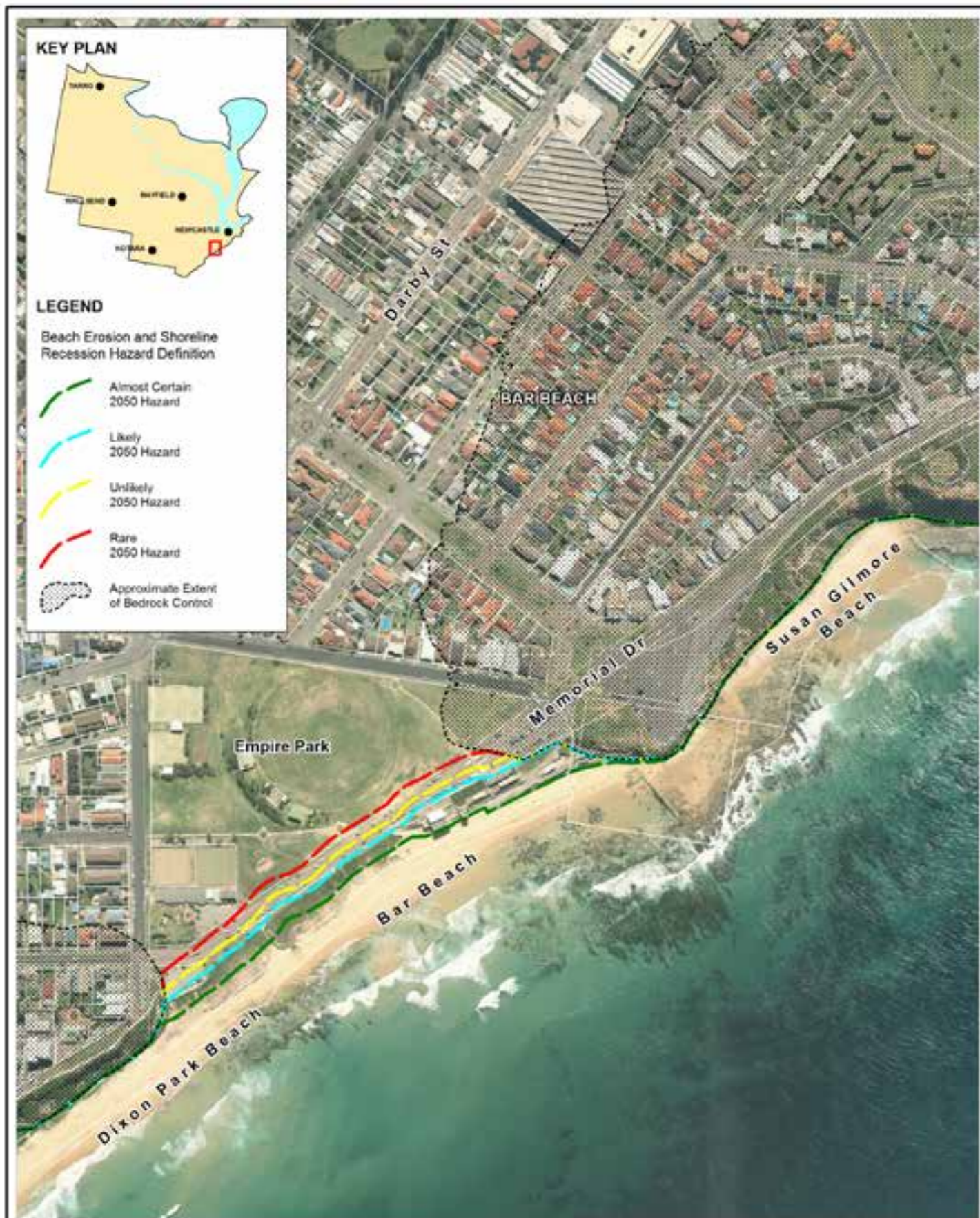
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Title: **Erosion and Recession Hazard Definition 2050 Planning Horizon - Bar Beach**

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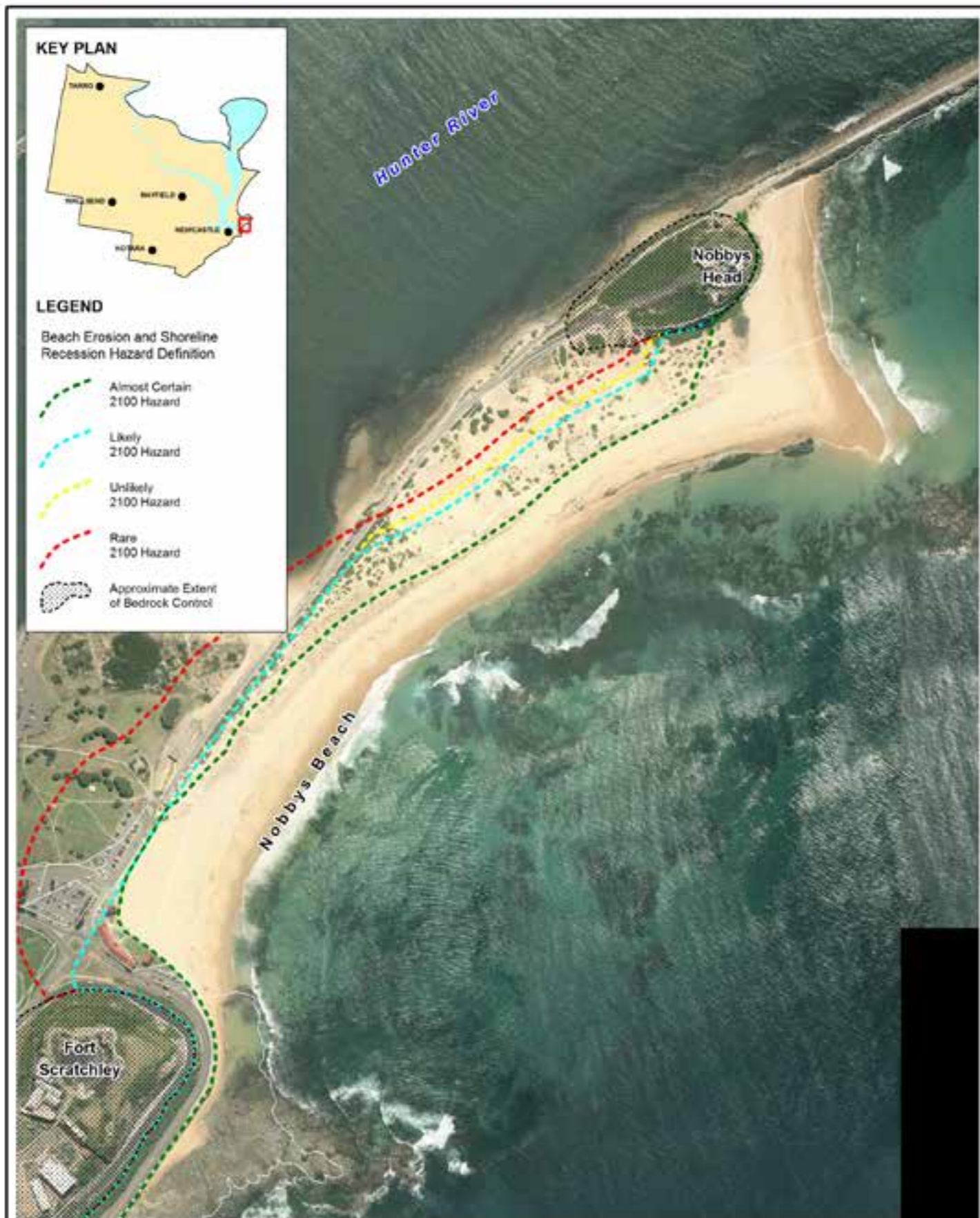
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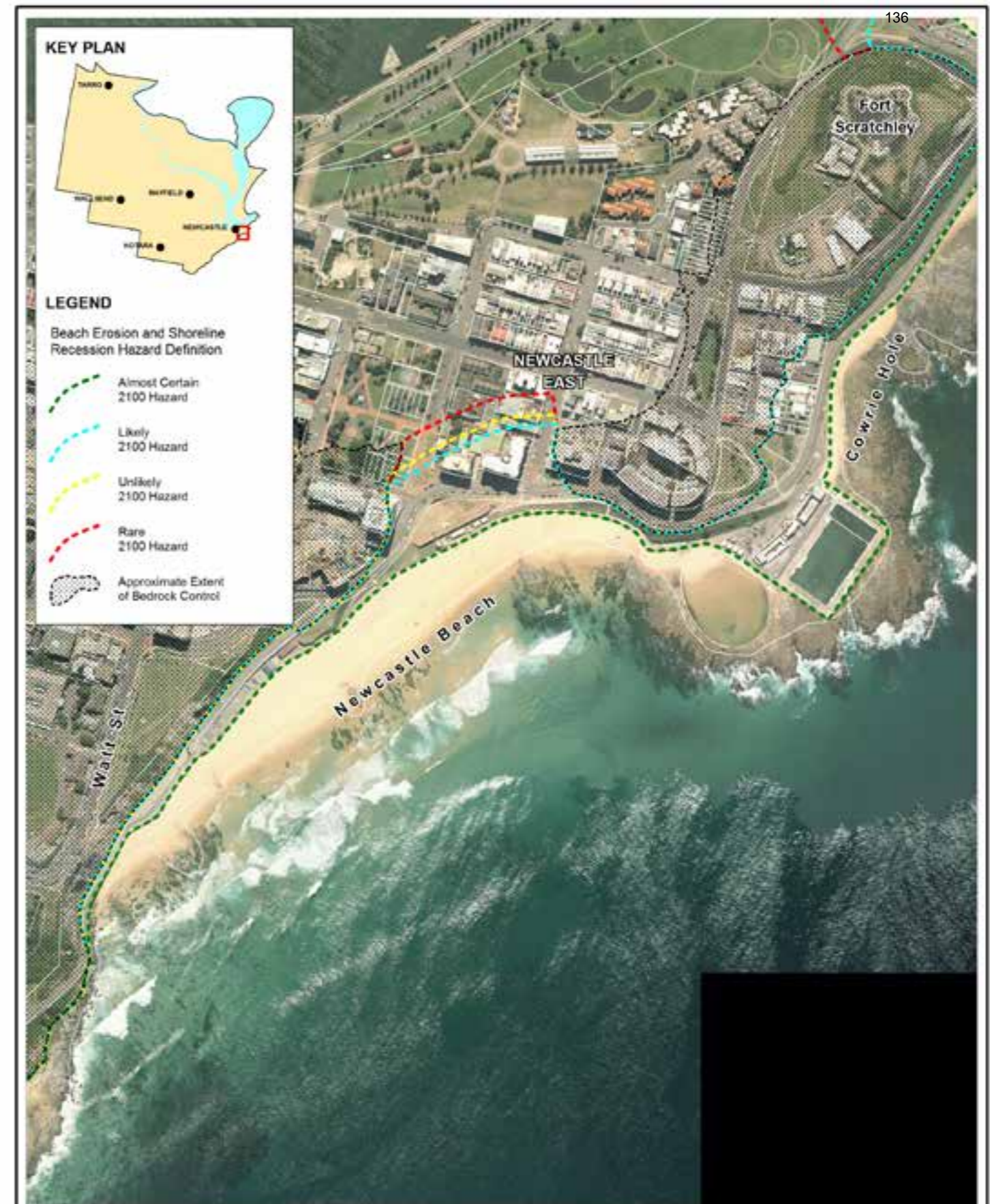
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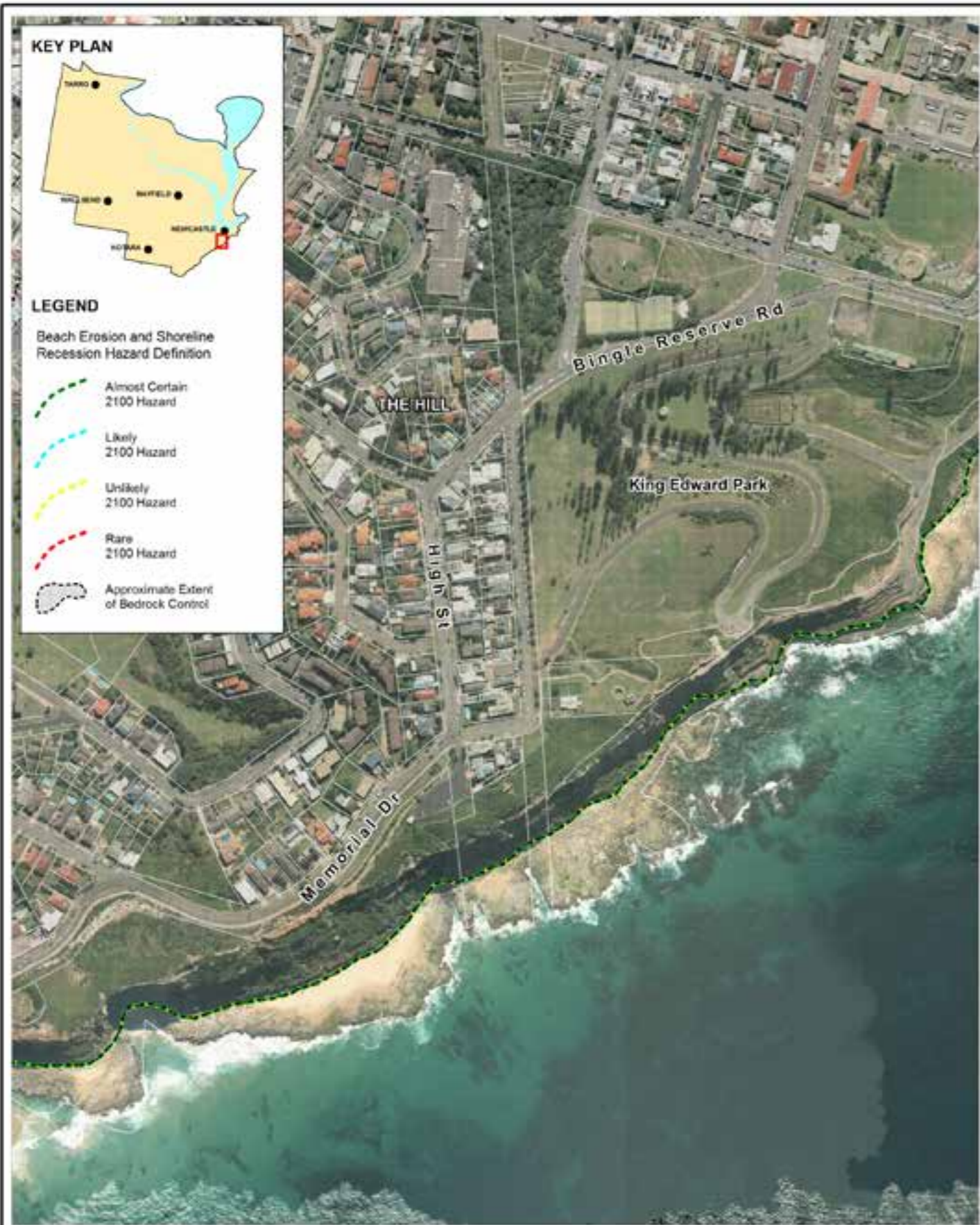
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Title: **Erosion and Recession Hazard Definition 2100 Planning Horizon - The Hill**

Figure: **C-7** Rev: **A**

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Figure: **C-8** Rev: **A**

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# Appendix B Coastal Inundation Hazard Areas





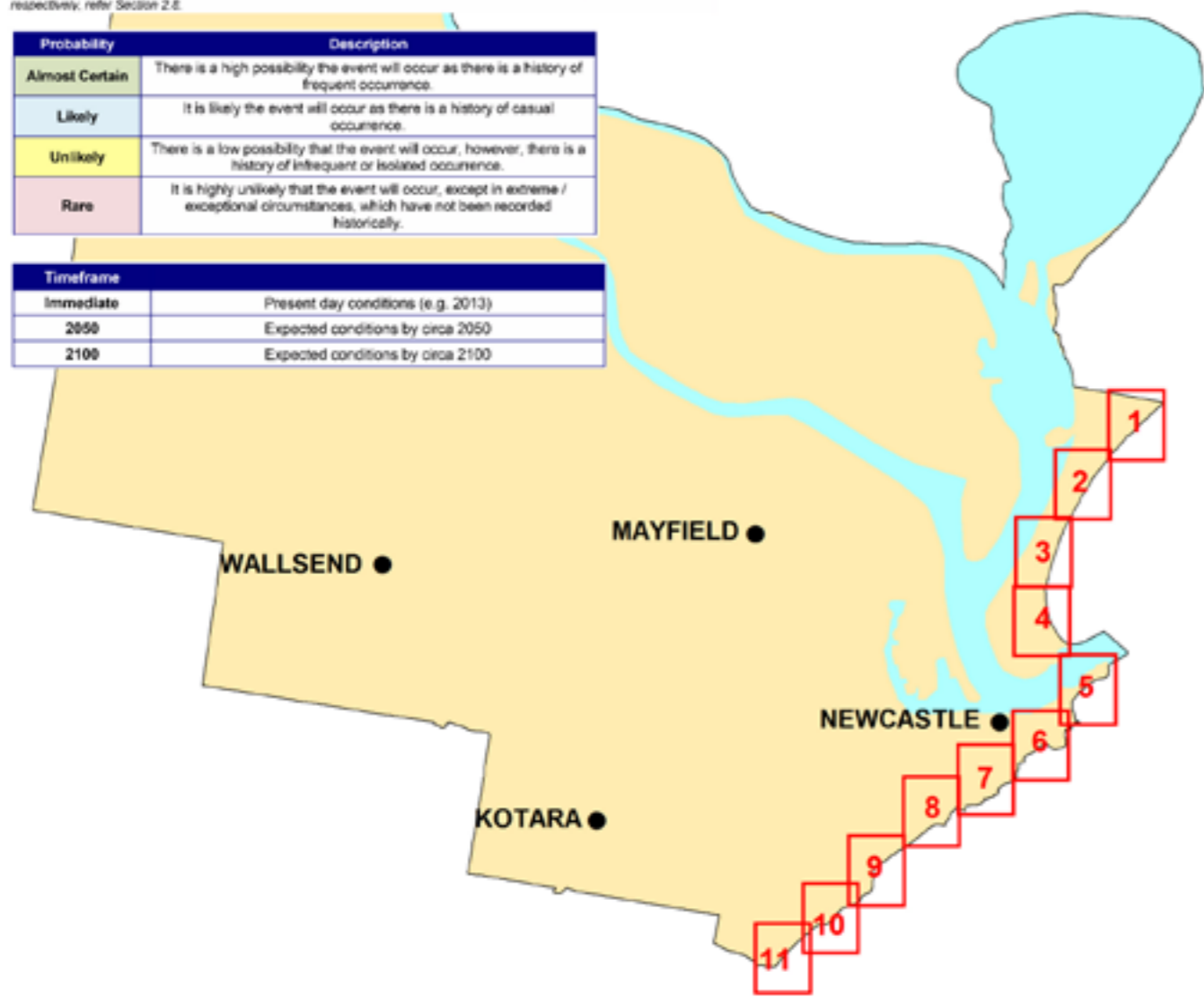
Probability	Immediate	2050	2100
Almost Certain	1 in 20 yr storm surge and wave set up	As per Immediate	As per Immediate
Likely	NM <sup>1</sup>	NM	NM
Unlikely	1 in 100 yr storm surge and wave set up AND Wave run up and overtopping <sup>2</sup>	1 in 100 yr storm surge and wave set up + 0.4 m SLR and change in storm surge AND Indicative areas of potential overtopping <sup>3</sup> including 0.4 m SLR	1 in 100 yr storm surge and wave set up + 0.9 m SLR and change in storm surge AND Indicative areas of potential overtopping <sup>3</sup> including 0.9 m SLR
Rare	1 in 100 yr storm surge and wave set up + extreme climatic conditions (e.g. tropical cyclone, 1 in 1000 year east coast low)	Worst Case of either: 1 in 100 yr storm surge and wave set up + extreme climatic conditions + 0.4 m SLR and climate change impacts <sup>3</sup> OR 1 in 100 yr storm surge and wave set up + 0.7 m SLR and climate change impacts	Worst Case of either: 1 in 100 yr storm surge and wave set up + extreme climatic conditions + 0.9 m SLR and climate change impacts <sup>3</sup> OR 1 in 100 yr storm surge and wave set up + 1.4 m SLR and climate change impacts

<sup>1</sup> NM = Not Mapped  
<sup>2</sup> Only applies at open coast barriers (not within lagoons, estuaries etc). Wave run up and overtopping are calculated using 1 in 100 yr storm surge + 1 in 100 yr 6 hr duration H<sub>s</sub>.  
<sup>3</sup> Includes increase in set up levels associated with a 5 % and 10 % increase in storm wave heights by 2050 and 2100 respectively, refer Section 2.8.

Probability	Description
Almost Certain	There is a high possibility the event will occur as there is a history of frequent occurrence.
Likely	It is likely the event will occur as there is a history of casual occurrence.
Unlikely	There is a low possibility that the event will occur, however, there is a history of infrequent or isolated occurrence.
Rare	It is highly unlikely that the event will occur, except in extreme / exceptional circumstances, which have not been recorded historically.

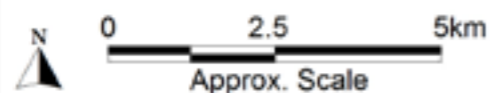
Timeframe	Description
Immediate	Present day conditions (e.g. 2013)
2050	Expected conditions by circa 2050
2100	Expected conditions by circa 2100



Title: **Index to Inundation Hazard and Risk Drawings**

Figure: **INDEX** Rev: **A**

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Title: **Coastal Inundation Hazard Definition Immediate Planning Horizon - Nobbys Beach**

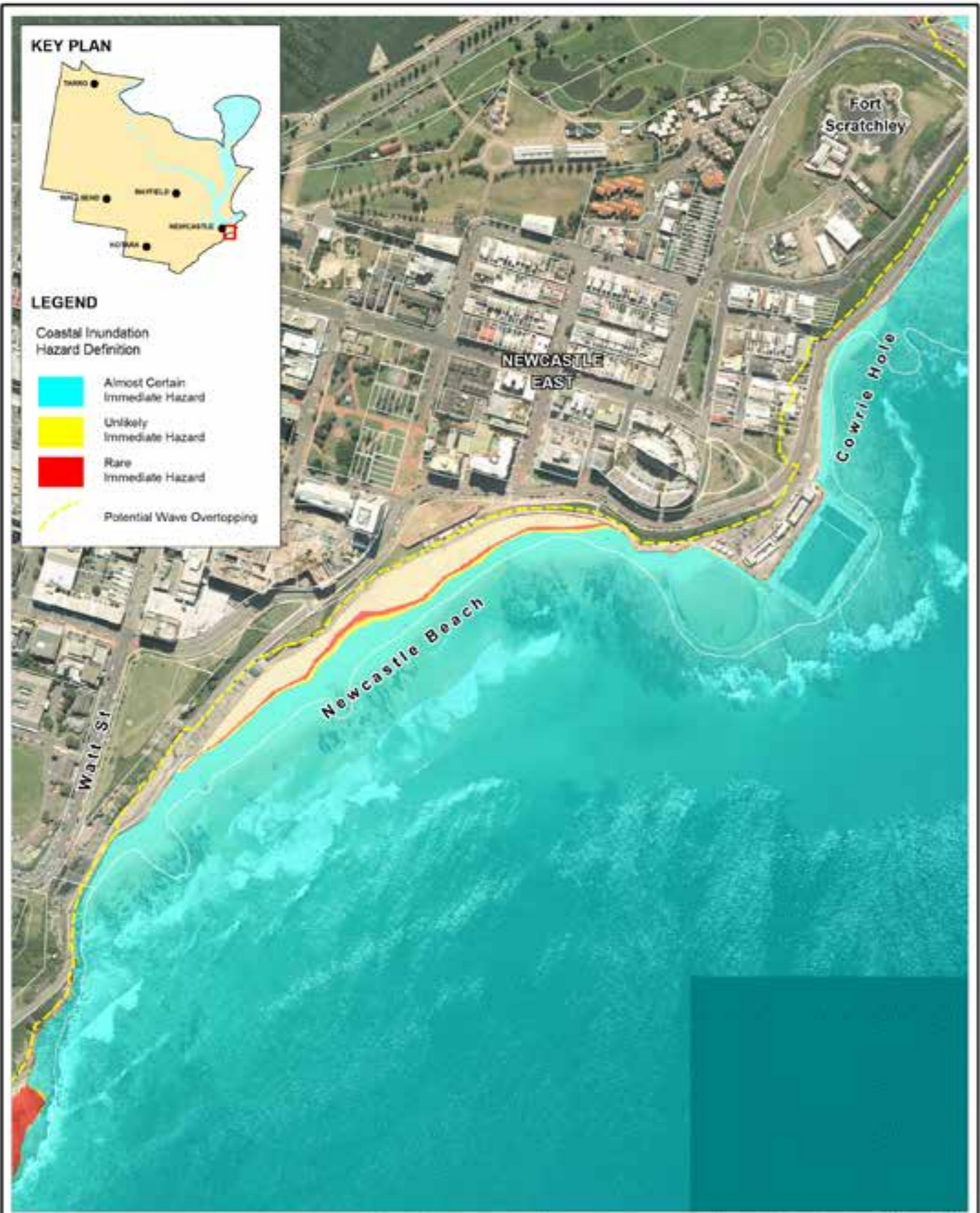
Figure: **D-5** Rev: **A**

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Title: **Coastal Inundation Hazard Definition Immediate Planning Horizon - Newcastle Beach**

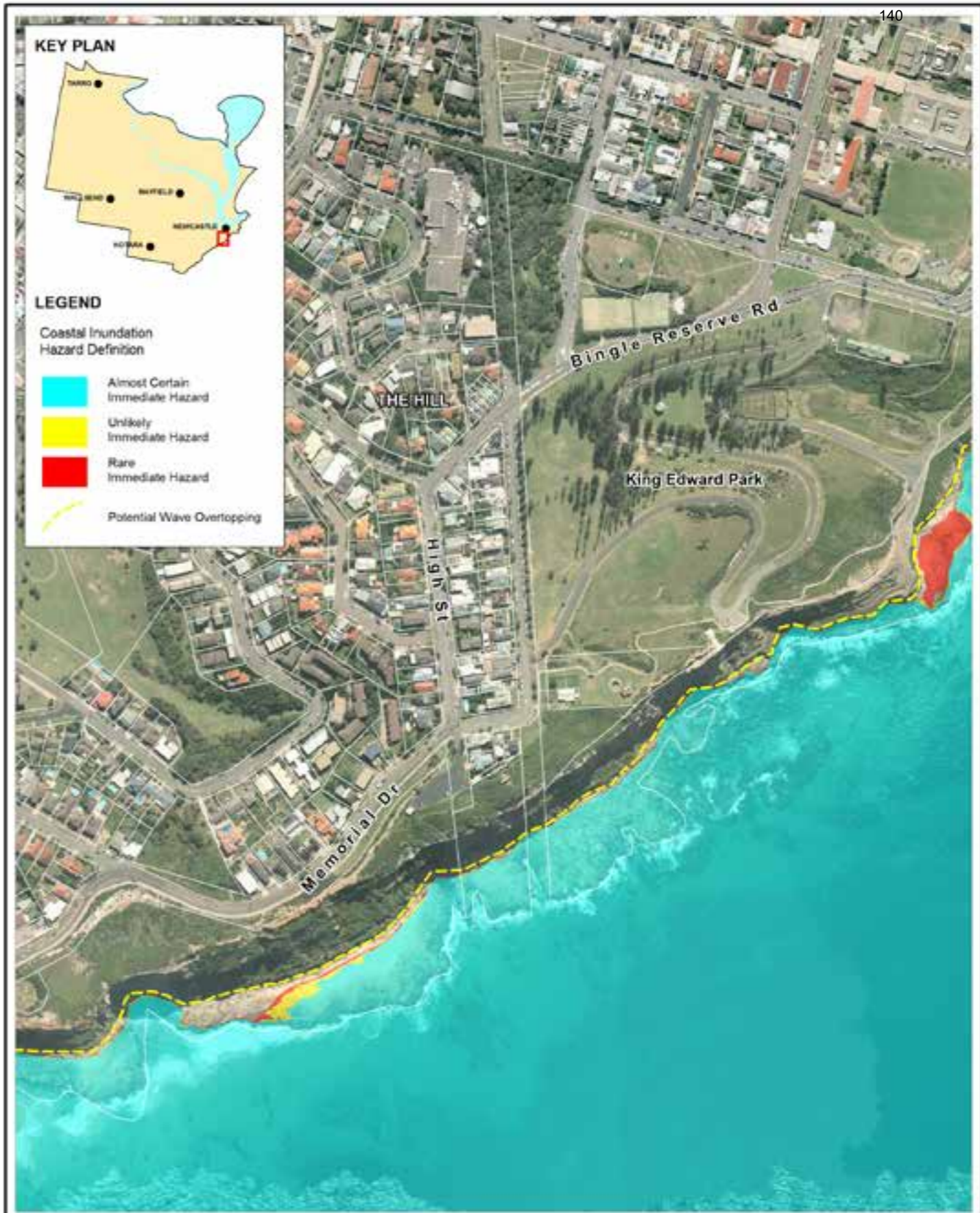
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Title: **Coastal Inundation Hazard Definition Immediate Planning Horizon - The Hill**

Figure: **D-7** Rev: **A**

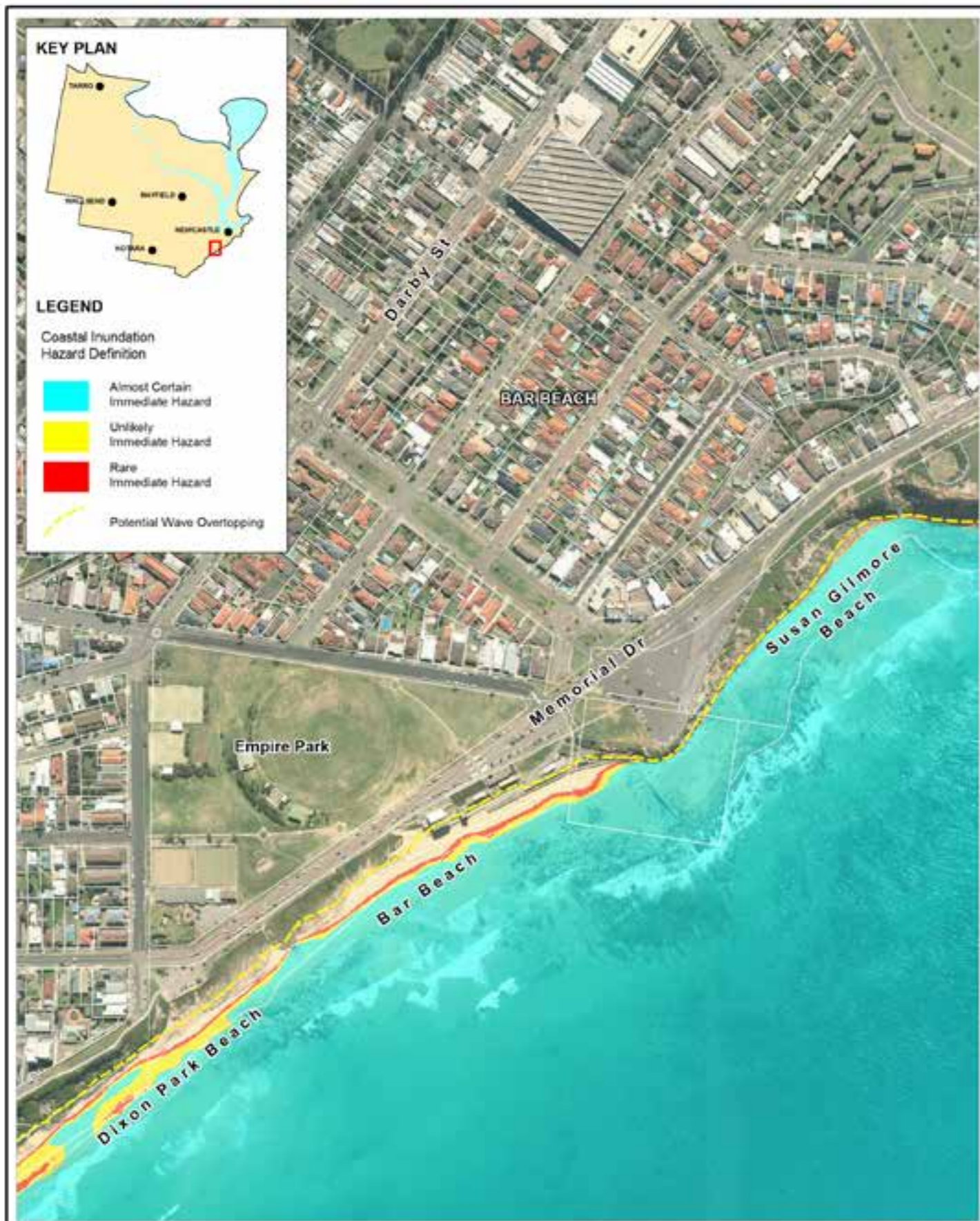
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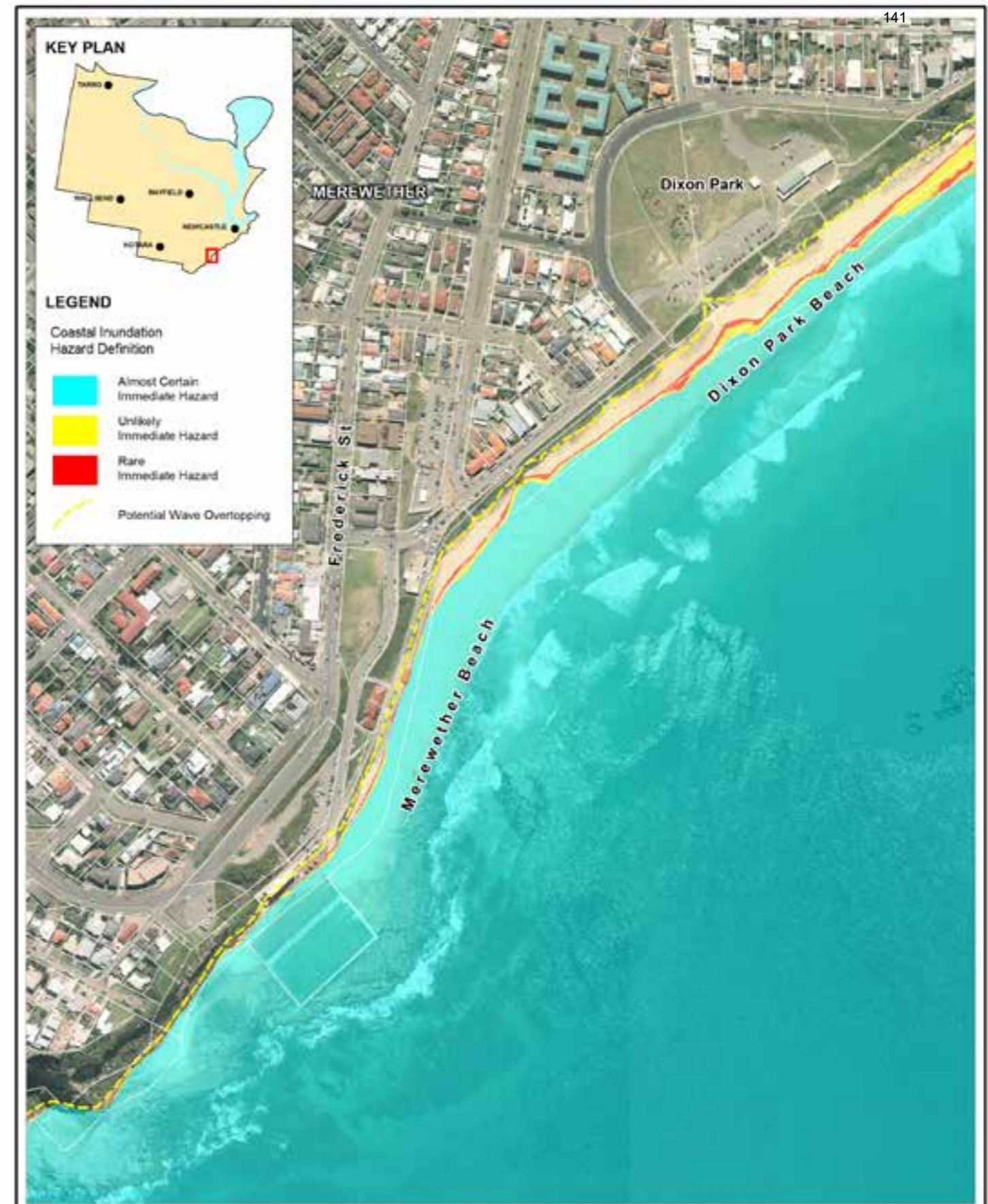
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<b>Title:</b> <b>Coastal Inundation Hazard Definition</b> <b>Immediate Planning Horizon - Bar Beach</b>		<b>Figure:</b> <b>D-8</b>	<b>Rev:</b> <b>A</b>
<small>BMT WBM endeavours to ensure that the information provided in this map is correct at the time of publication. BMT WBM does not warrant, guarantee or make representations regarding the currency and accuracy of information contained in this map.</small>		 Approx. Scale	
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<b>Title:</b> <b>Coastal Inundation Hazard Definition</b> <b>Immediate Planning Horizon - Merewether Beach</b>		<b>Figure:</b> <b>D-9</b>	<b>Rev:</b> <b>A</b>
<small>BMT WBM endeavours to ensure that the information provided in this map is correct at the time of publication. BMT WBM does not warrant, guarantee or make representations regarding the currency and accuracy of information contained in this map.</small>		 Approx. Scale	
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Title: Coastal Inundation Hazard Definition 2050 Planning Horizon - Nobbys Beach

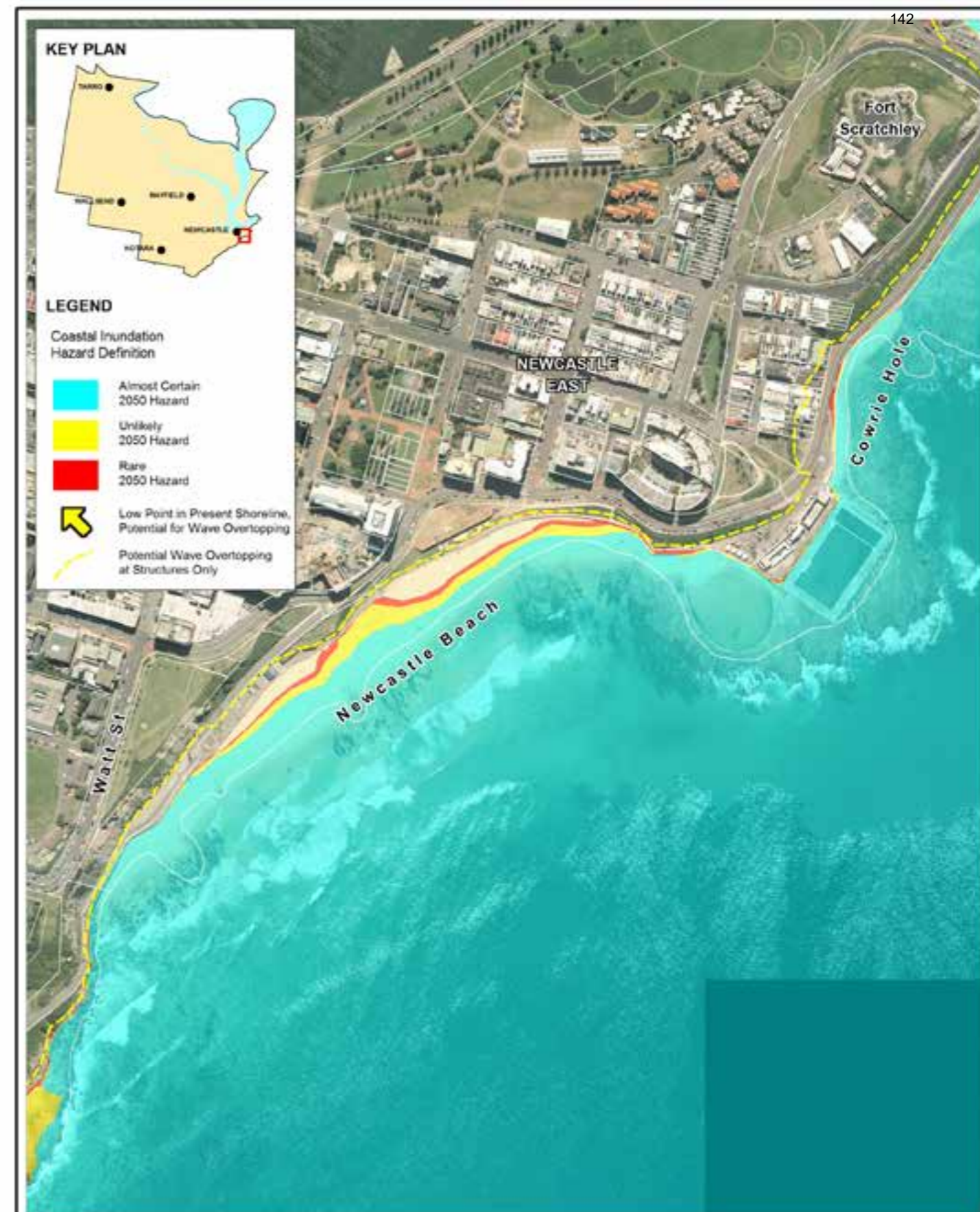
Figure: E-5 Rev: A

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Title: Coastal Inundation Hazard Definition 2050 Planning Horizon - Newcastle Beach

Figure: E-6 Rev: A

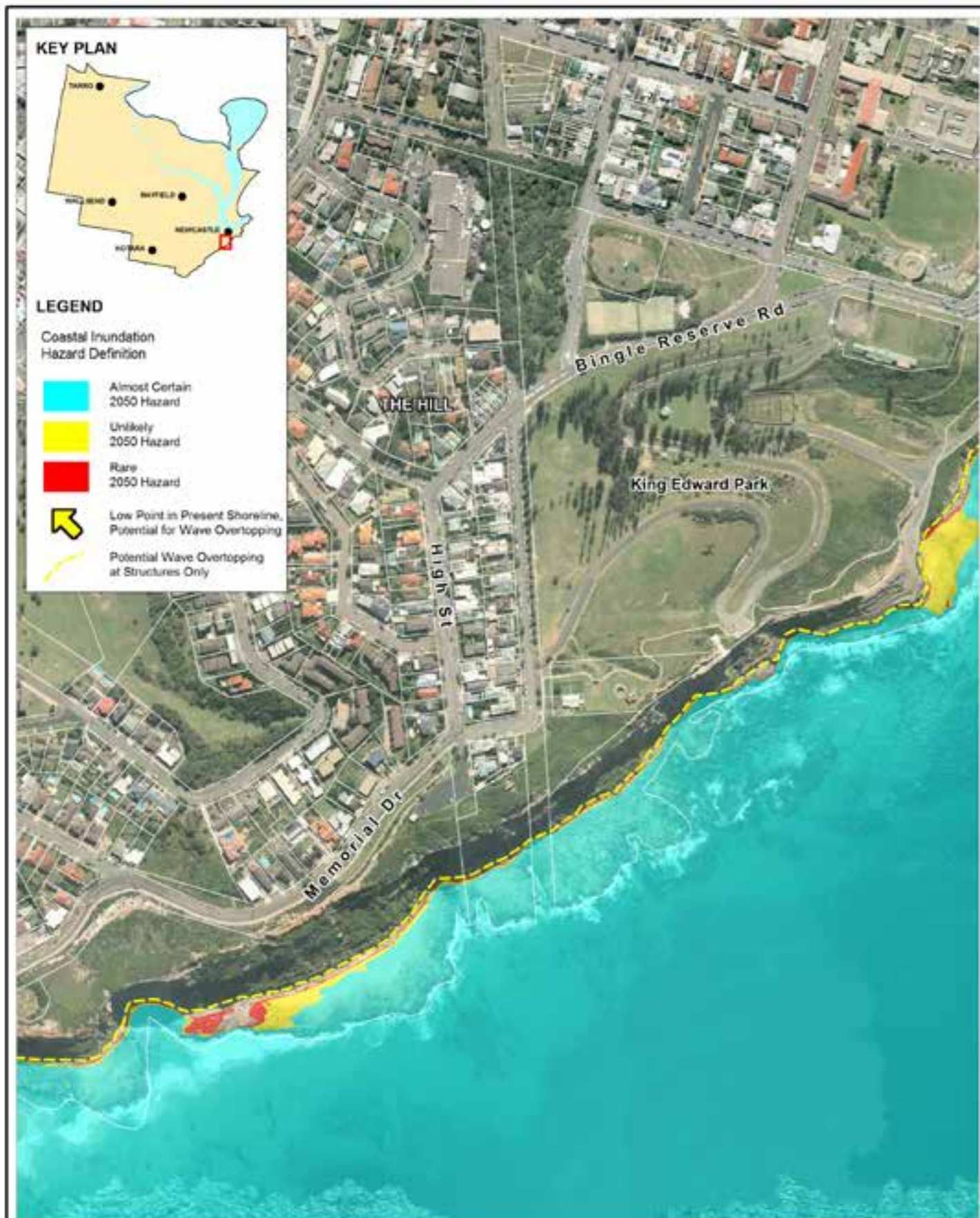
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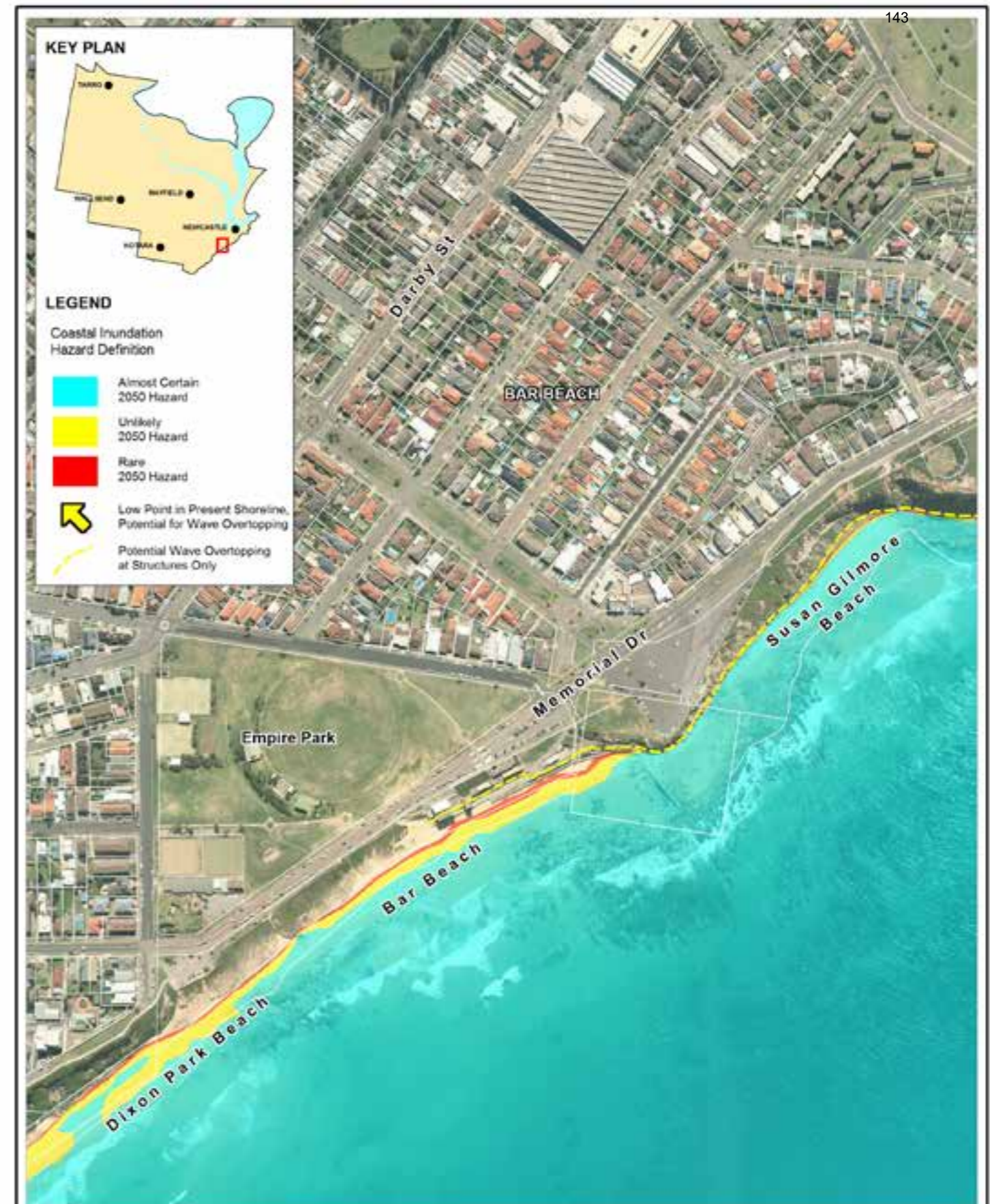
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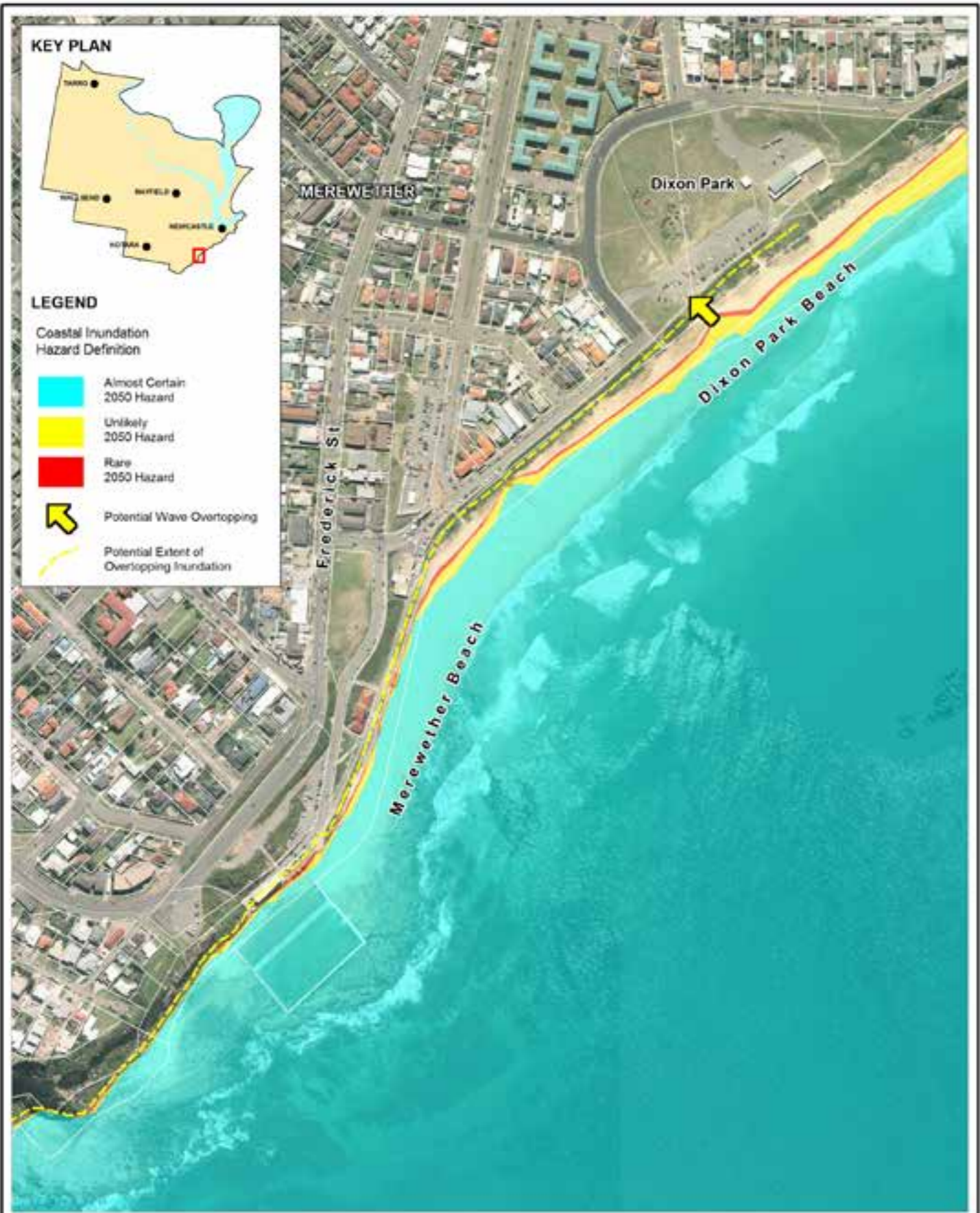


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<small>BMT WBM endeavours to ensure that the information provided in this map is correct at the time of publication. BMT WBM does not warrant, guarantee or make representations regarding the currency and accuracy of information contained in this map.</small>			
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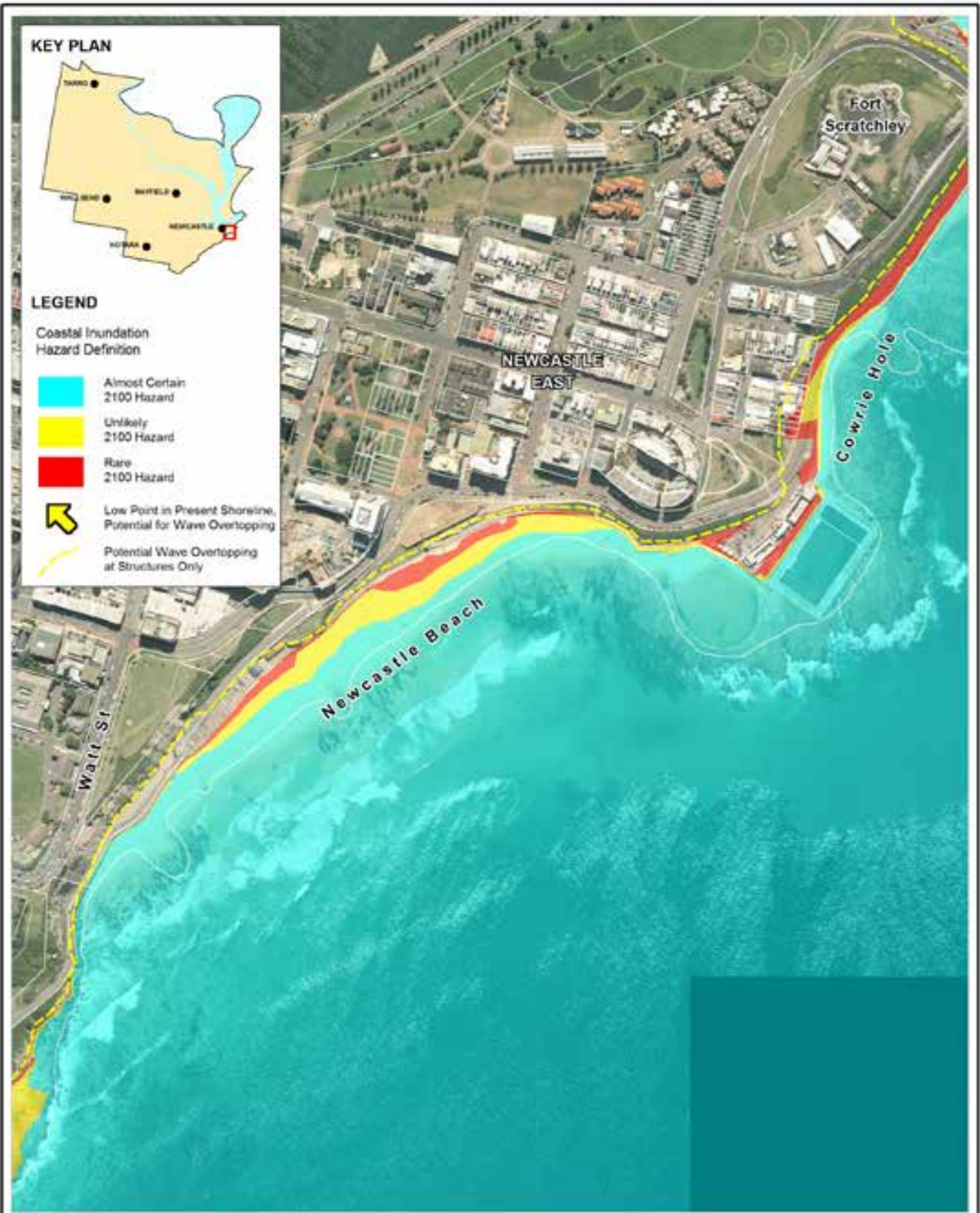


<p>Title: <b>Coastal Inundation Hazard Definition 2050 Planning Horizon - Merewether Beach</b></p>	<p>Figure: <b>E-9</b></p>	<p>Rev: <b>A</b></p>
<p><small>BMT WBM endeavours to ensure that the information provided in this map is correct at the time of publication. BMT WBM does not warrant, guarantee or make representations regarding the currency and accuracy of information contained in this map.</small></p>	<p>Approx. Scale</p>	<p>www.bmtwbm.com.au</p>
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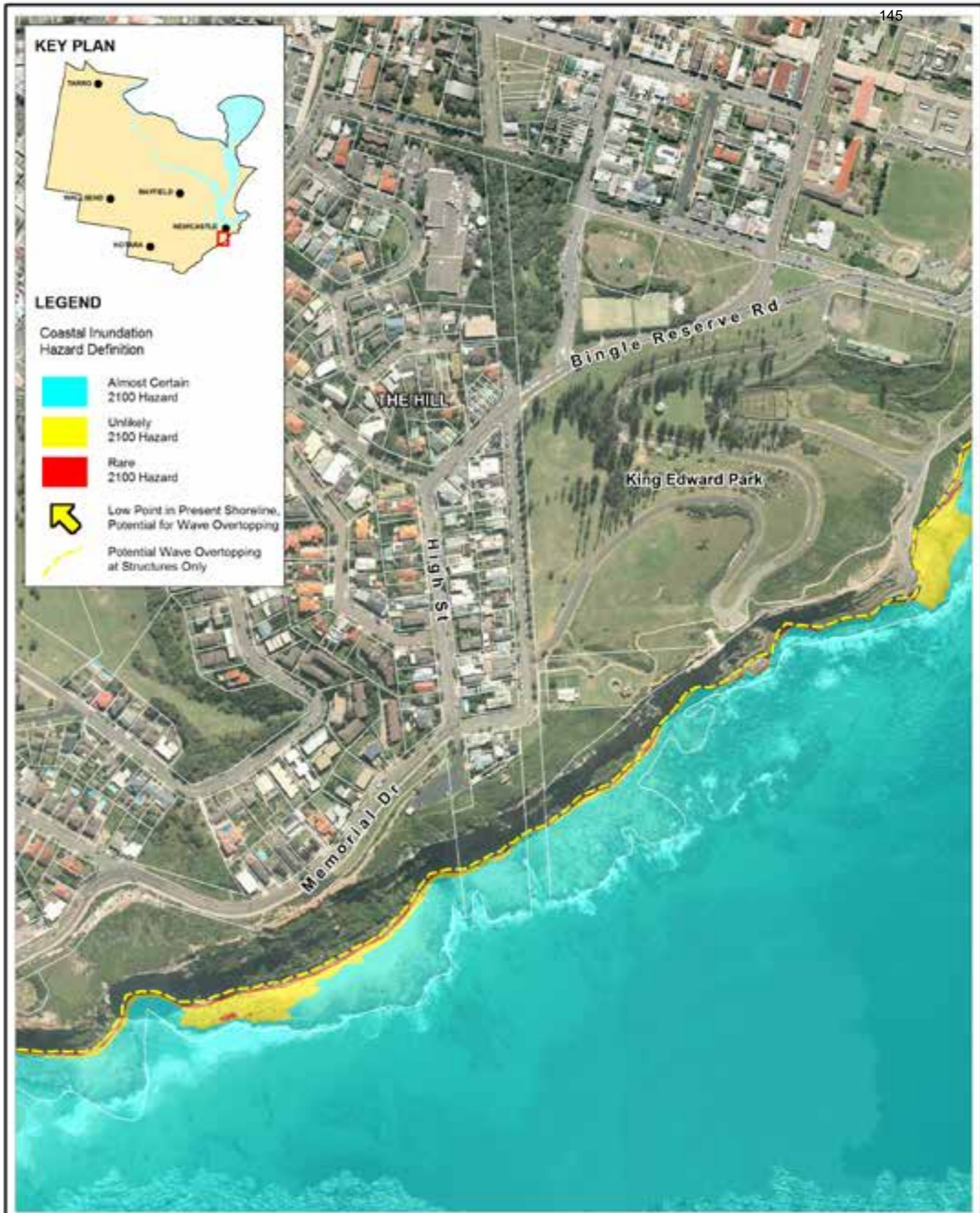


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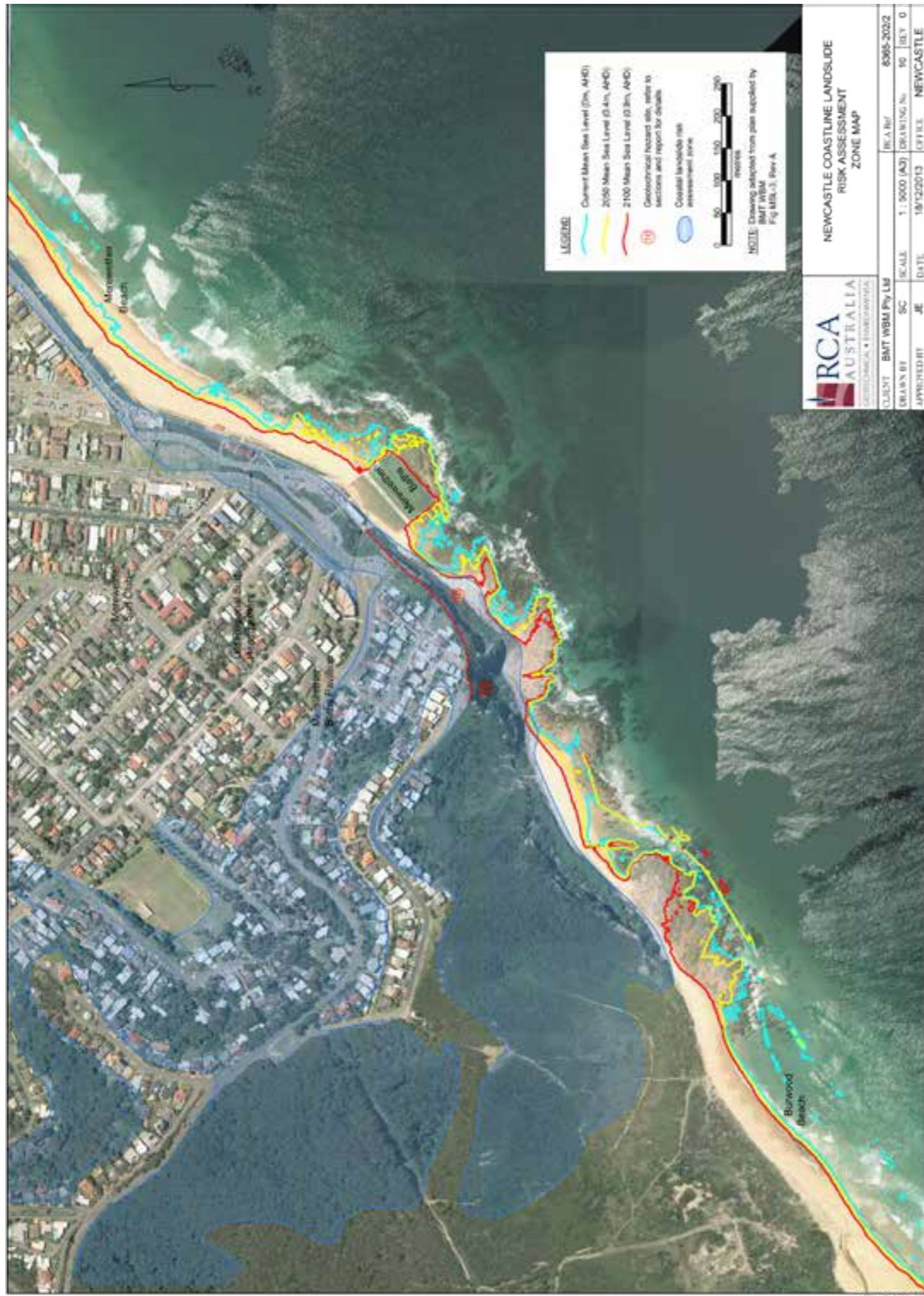


# Appendix C

## Coastal Cliff/Slope Instability Hazards







C3 Newcastle Coastal Zone Management Plan – Part B - Coastline South of the Harbour (Appendix C)



Newcastle Coastal Zone Management Plan – Part B - Coastline South of the Harbour (Appendix C) C4





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# Appendix D

**Newcastle Coastline South of  
the Harbour Coastal Erosion  
Emergency Action Subplan**

# **Newcastle Coastline South of the Harbour Coastal Erosion Emergency Action Subplan**



## 1.0 Introduction

The purpose of the *Newcastle Coastline South of the Harbour Coastal Erosion Emergency Action Subplan* (the Newcastle CEEAS) is to outline the emergency coastal protection actions that Council will implement during periods of beach erosion. The Newcastle CEEAS is an accompanying document to the *City of Newcastle Flood Emergency Subplan* (NLEMC 2013) (the Flood Subplan), which outlines the measures to prepare for, respond to, and recover from, flooding and coastal erosion in the Newcastle local government area (LGA). During a storm event (which includes coastal erosion), Council will respond in accordance with the requirements of the Flood Subplan (as the priority) and the Newcastle CEEAS for the coastline south of the harbour.

The Newcastle CEEAS has been prepared in accordance with the requirements of the *Coastal Protection Act 1979* and the *Guidelines for Preparing Coastal Zone Management Plans* (OEH, 2013).

## 2.0 Area Covered by the Erosion Subplan

The Newcastle CEEAS applies to the Coastline within the Newcastle local government area south of the harbour. The Stockton Coastal Erosion Emergency Action Subplan (Stockton CEEAS) is to be implemented during periods of beach erosion along the Stockton coastline - refer to Part A of the Newcastle Coastal Zone Management Plan.

## 3.0 Planning Context

Coastal erosion events that occur during storm conditions are covered by two Acts, the *State Emergency and Rescue Management Act 1989* and the *Coastal Protection Act 1979*. If the coastal erosion occurs during a high water event that doesn't coincide with a storm, the provisions of the *State Emergency and Rescue Management Act 1989* may not apply.

### 3.1 State Emergency and Rescue Management Act 1989

The *Newcastle DISPLAN* (NLEMC, 2012) and the *Flood Subplan* (NLEMC, 2013) have been prepared in accordance with the requirements of the *State Emergency and Rescue Management Act 1989*. The Flood Subplan (NLEMC, 2013) designates the NSW SES as the Combat Agency for damage control from storms (including coastal erosion). Council's role in preparing for, responding to, and recovering from, a storm event is defined in the Flood Subplan (NLEMC, 2013). During a storm event Council undertakes actions in accordance with the Flood Subplan (NLEMC, 2013).

Section 3.1.2 of the Flood Subplan (NLEMC, 2013) outlines that the NSW SES's role includes '*damage control for coastal erosion and inundation from storm activity, specifically the protection of life and the coordination of the protection of readily moveable household goods and commercial stock and equipment. The NSW SES is not responsible for planning or conduct of emergency beach protection works or other physical mitigation works*'. Section 2.1 of the Newcastle DISPLAN (NLEMC, 2012) outlines that Council is responsible for the '*construction of physical mitigation works for protection of coastal property on land under its care and control*'.

The Newcastle CEEAS outlines the physical mitigation works that Council proposes to undertake during periods of erosion (see Section 4.0). The Newcastle CEEAS can be activated under section 4.5.11 of the Flood Subplan (NLEMC, 2013), which outlines that during periods of coastal erosion from ocean storms Council will '*activate the Newcastle City Council Coastal Zone Management Plan - Emergency Action Plan*' (the Newcastle CEEAS).

### 3.2 Coastal Protection Act 1979

Whilst the Newcastle CEEAS will accompany (link to) the Flood Subplan (NLEMC, 2013), it must be prepared in accordance with the *Coastal Protection Act 1979* (not the *State Emergency and Rescue Management Act 1989*). The requirements of the *Coastal Protection Act 1979* and associated guidelines are outlined below.

Section 55C of the *Coastal Protection Act 1979* requires that a coastal zone management plan include '*emergency actions carried out during periods of beach erosion, including the carrying out of related works, such as works for the protection of property affected or likely to be affected by beach erosion, where beach erosion occurs through storm activity or an extreme or irregular event*'. The section also outlines that a coastal zone management plan must not include matters dealt with in any plan made under the *State Emergency and Rescue Management Act 1989* in relation to the response to emergencies.

The *Guidelines for Preparing Coastal Zone Management Plans* (OEH, 2013) require that an emergency action subplan also describes:

- intended emergency actions to be carried out during periods of beach erosion such as coastal protection works for property or asset protection, other than matters dealt with in any plan made under the *State Emergency and Rescue Management Act 1989* relating to emergency response (sections 55C(b) and (g) of the *Coastal Protection Act 1979*);
- any site-specific requirements for landowner temporary coastal protection works;
- the consultation carried out with the owners of land affected by a subplan.

## 4.0 Emergency Coastal Protection Actions

### 4.1 Council

Council's roles and responsibilities in preparing for, responding to, and recovering from, beach erosion events are outlined below. The roles and responsibilities described below will be undertaken in addition to Council's roles and responsibilities under the Flood Subplan (NLEMC, 2013).

#### 4.1.2 Preparedness

In preparing for a beach erosion event, Council should ensure that all of the relevant planning approvals are in place to undertake emergency coastal protection actions. In accordance with the *State Environmental Planning Policy (Infrastructure) 2007* Council can undertake emergency works (as exempt development) to protect stormwater management systems, roads and road related areas (e.g. footpaths and cycleways), sewerage systems and gas pipelines. Exempt development does not require an environmental assessment as long the as the development meets the following criteria:

- must meet the relevant deemed-to-satisfy provisions of the *Building Code of Australia*, or if there are no such relevant provisions, must be structurally adequate, and
- must not, if it relates to an existing building:
  - cause the building to contravene the *Building Code of Australia*, or
  - compromise the fire safety of the building or affect access to any fire exit, and
- must be carried out in accordance with all relevant requirements of the Blue Book, and
- must not be designated development, and
- if it is likely to affect a State or local heritage item or a heritage conservation area, must involve no more than minimal impact on the heritage significance of the item or area, and
- must be installed in accordance with the manufacturer's specifications, if applicable, and
- must not involve the removal or pruning of a tree or other vegetation that requires a permit or development consent for removal or pruning, unless that removal or pruning is undertaken in accordance with a permit or development consent.



If proposed emergency coastal protection actions are not exempt development, the relevant planning approvals would need to be obtained before the works could be implemented by Council. This means that if Council wanted to sandbag other public assets (e.g. surf clubs) to protect against coastal erosion, a Review of Environmental Factors would need to be prepared in accordance with Division 25 of the *State Environmental Planning Policy (Infrastructure) 2007*, before the works could commence. Council will continue to monitor its coastal assets and beach condition, to determine whether coastal protection works (that are not exempt development) may be needed. If Council identifies that public assets may be at risk in future beach erosion events, a Review of Environmental Factors will be prepared for the installation of sandbags.

It should be noted that Council can sandbag public assets to protect them from coastal inundation in accordance with the Flood Subplan (NLEMC, 2013), without the need for a Review of Environmental Factors.

Council will maintain the plant and equipment required for emergency coastal protection actions (including sandbags).

#### 4.1.3 Response

Response operations may commence when a Bureau of Meteorology warning indicates the potential for abnormally high tides, or unusually large surf, or where other evidence leads to an expectation of coastal erosion within the LGA.

During response operations, Council may undertake emergency works (as exempt development) to protect stormwater management systems, roads and road related areas (e.g. footpaths and cycleway), sewerage systems and gas pipelines from beach erosion. It is most likely that these emergency works would consist of sandbagging works. These works may be undertaken anywhere along the Newcastle coastline, as required.

If Council has obtained the required planning approvals, Council may also undertake sandbagging works to protect other public assets from coastal erosion in accordance with the requirements of the relevant approvals. These works may be undertaken anywhere along the Newcastle coastline, in accordance with the relevant approvals.

Where investigations, works or actions are proposed or to be implemented on DoI - Crown land, not under Council Trust management, an appropriate authorisation from DoI Lands & Water will be required under the *Crown Lands Management Act 2016* prior to the works commencing.

#### 4.1.4 Recovery

During the recovery phase of a beach erosion event, Council will undertake post storm beach inspections. The inspections will identify the damage to public assets and prioritise required works.

As needed, Council will install temporary signage to identify erosion risks, and will close eroded accessways. Beach accessways adjacent to surf clubs will be prioritised for reinstatement.

Beach scraping works may be undertaken to assist the recovery of the beach dune system.

#### 4.2 Private Landowners

At this point in time, there are no locations within the Newcastle LGA where private landowners can undertake temporary coastal protection works (as defined in the *Coastal Protection Act 1979*). Coastal protection works can only be constructed by private landowners if they have obtained development consent for the works in accordance with the *State Environmental Planning Policy (Infrastructure) 2007*. Council is not aware of any private landowners that would currently have development consent for the construction of the coastal protection works within the LGA.

## 5.0 Review

A review of the Newcastle CEEAS will be undertaken as part of the future Coastal Management Program to be submitted under the *Coastal Management Act 2016*. In the interim, the Newcastle CEEAS will be reviewed annually.

# References

Newcastle Local Emergency Management Committee (2012). *Newcastle DISPLAN*.

Newcastle Local Emergency Management Committee (2013). *City of Newcastle Flood Emergency Subplan*.

Office of Environment and Heritage (OEH) (2013). *Guidelines for Preparing Coastal Zone Management Plans*.

*Stockton Coastal Erosion Emergency Action Subplan (2018)*.



# Appendix E

## Submissions Response Table

Part B - Coastline South of the Harbour was publically exhibited for a 21 day period in October 2016. Fifteen public submissions were received, including one submission from the Office of Environment and Heritage.

Thirteen of the fifteen submissions requested Council protect and restore the old ladies pool at Merewether. An outline of the key issues raised from submissions received during the public exhibition period, and Council's response to the issues identified are outlined in Table 1 below.

**Table 1: Public submissions to Newcastle Coastal Zone Management Plan Part B - Coastline South of the Harbour and Council response**

Issue Raised During Public Exhibition	Council Response	Changes Made to the Plan
Council should protect the heritage values of the Old Ladies Pool at Merewether and undertake restoration works.	The Old Ladies Pool is listed as an item of local environmental heritage under the Newcastle Local Environmental Plan 2012. Council recognises the value of this important heritage asset. Specific reference was not made in this Plan, as an action to 'maintain the heritage of the Old Ladies Pool and provide safe use for all users' is already contained in the Newcastle Coastal Plan of Management (NCC 2015). The Old Ladies Pool is located on DoI - Crown Land, which is not managed by Council.	No changes required
Council needs to recognise the Merewether National Surfing Reserve as an important stakeholder at Merewether that needs to be consulted.	Noted. Council consults with relevant stakeholders during works at Merewether Beach, as required.	No changes required
The Plan should include an action to educate Council staff about the role of the Merewether National Surfing Reserve.	Noted. Council is more than willing to meet with members of the National Surfing Reserve to discuss education opportunities. An action is not required in the Plan.	No changes required
Coastal rehabilitation works around sand dunes should not be undertaken at Merewether without prior consultation with the Merewether National Surfing Reserve, as there is evidence to suggest that the works have had a detrimental effect on surf quality.	Council is happy to review the evidence of the impact of revegetation works on surf quality, however advice that Council has received from coastal engineers to date is that the revegetation works would not impact on surf quality.	No changes required
Beach scraping should not be undertaken without consulting with Merewether National Surfing Reserve.	Noted. Additional information added to Action 12 (see Table 7.2) requesting prior consultation with the Surfing Reserve.	Additional information added to Action 12 (see Table 7.2)
Promotion of the Merewether National Surfing Reserve should include the erection of fingerboard signs directing tourist to the location.	The Newcastle Coastal Plan of Management (NCC 2015) already contains an action to 'ensure the recognition of Merewether Beach as a National Surfing Reserve'. It is not necessary to duplicate the action in this Plan.	No changes required

Issue Raised During Public Exhibition	Council Response	Changes Made to the Plan
Council should level and replace the grass area next to the Merewether surf club.	Noted. Council is investigating potential options for the future management of this area.	No changes required

In May-July 2018 Council consulted with various stakeholders regarding management actions in Part B - Coastline South of the Harbour. In July 2018, Council received correspondence from the Department of Industry - Lands and Water (DoI -

Crown Land) regarding management actions outlined in Part B - Coastline South of the Harbour. The key issues raised by DoI - Crown Land, and Council's response to the issues identified are outlined in Table 2 below.

**Table 2: Key issues by Department of Industry - Lands and Water (DoI - Crown Land) and Council response**

Issue Identified	Council Response	Change to Part B - Coastline South of the Harbour
Authorisations or approvals by DoI - Crown Land needs to be clarified.	Approvals required for management actions on DoI - Crown Land included in Section 7.4.1	Section 7.4.1 added to Part B - Coastline South of the Harbour.
Confirm whether southern foreshore of Hunter River, including southern breakwater, is included in study area.	Nobbys breakwater included in Part B - Coastline South of the Harbour. Remainder of foreshore included in Hunter Estuary Coastal Zone Management Plan.	Additional information added in Section 2.0 to clarify study area.
Management of old ladies pool requires further discussion between stakeholders/land managers.	Noted.	No change required.
Emergency actions may require DoI - Crown Land approval where Council is not land manager.	Noted.	Additional information regarding approvals included in Section 4.1.3 of the Newcastle Coastal Erosion Emergency Action Sub Plan (Appendix D).



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