



SHOALHAVEN ADAPTATION PLAN

Increasing the Resilience of Shoalhaven
City Council using adaptive choices





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SECTION 1 INTRODUCTION

COUNCILS VISION,

as set out in the Community Strategic Plan (CSP) “Shoalhaven 2020”, is:

“We will work together in the Shoalhaven to foster a safe and attractive community for people to live, work, stay and play; where sustainable growth, development and environmental protection are managed to provide a unique and relaxed lifestyle.”

The Strategic Directions and Actions in Shoalhaven’s Adaptation Plan will act as a corporate reference point for preparation of Council’s annual Delivery Program and Operational Plan. As such, they will also be subject to Council’s resourcing and budget processes / considerations each financial year.

This Plan is consistent with the following Community Strategic Plan 2020 objectives:

Objective 2.3 A community that seeks to reduce global warming impacts and increase our ability to adapt to the effects and impacts of climate change

Strategy 2.3.3 Establish a risk based strategic adaptation response to climate change

Objective 4.4 A Council that is equitable, strategic and considers the needs of all generations, now and in the future

Strategy 4.4.4 Ensure Council is flexible in its approach to unforeseen impacts and influences.

This Plan addresses a series of risks that have been identified via a climate change risk assessment. Climate Change is just one of many factors which need to be considered in futuristic planning exercises. This Plan aims to provide guidance about adaptive decision making processes. It recognises that we live in a constantly evolving society where treatment of perceived risk may moderate harm or exploit beneficial opportunities. document will be reviewed annually and updated with new opportunities and key learnings.

This Plan also outlined adaptation actions to improve Councils performance in energy, waste, biodiversity and water management.





PURPOSE AND OBJECTIVE

Purpose

This document forms the implementation guide for the Climate Change Risk Assessment completed by Council in partnership with Statewide Mutual in 2010.

It covers risks which were identified as either 'extreme' or 'high' and offers a set of actions to either:

1. Increase Councils resilience to deal with the stated risk (*build adaptive capacity*); or
2. Reduce the likelihood of the risk occurring (*deliver an adaptation action*).

Actions that build adaptive capacity are often considered the 'first step' or 'precursor activities' in adaptation planning. They provide the underpinning information, supportive social structures and governance regimes required to facilitate the effective delivery of more substantive adaptation actions.

Objective

This document seeks to embed adaptive, resilience based planning firmly in Council strategies, plans and delivery mechanisms. Resilience can be defined as the capacity of a system to absorb disturbance, to undergo change and still retain essentially the same function and structure. Essentially, it's about foreseeing opportunities and responding proactively on the basis that we live in a dynamic world where change is always happening.

Knowing more about resilience helps to prioritise risk management. For example, different communities and natural systems will respond differently to any given change. A risk that may have a catastrophic consequence in one village may only be a moderate consequence in another due to their greater resilience. Therefore, you would be instigate different measures to treat the risk in each. Studies which inform us about a systems resilience become an important component of the decision making process.

Finding ways to enhance community resilience and encourage foresight and proactive transformations is particularly relevant in the context of climate change, considering that many of our current systems and ways of doing things are contributing to the problem (www.vlga.org.au – *building resilience toolkit*).





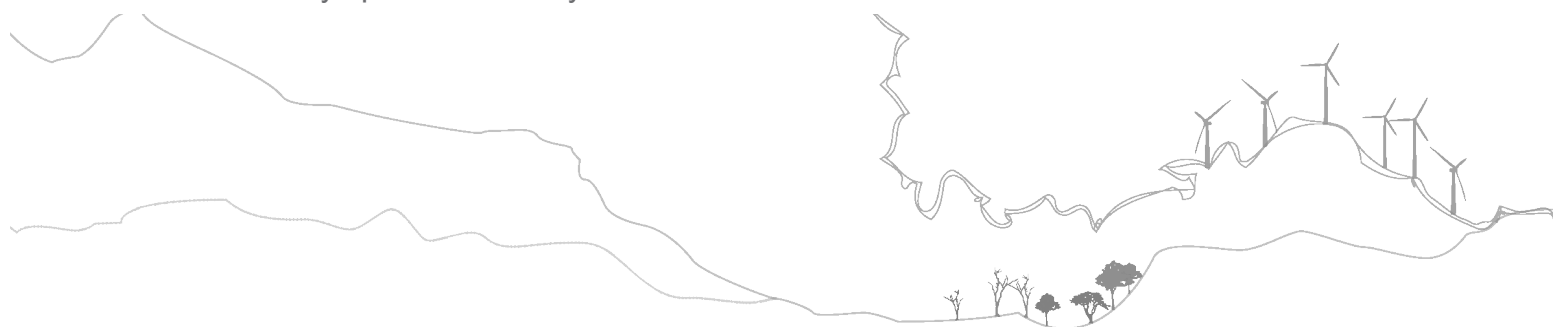
BACKGROUND

Generally, resilient communities will be better able to respond to changes and shocks arising from unforeseen events and circumstances. This makes it crucial for local governments to guide and help their communities strengthen their responsiveness. One area where this needs to occur is through building resilience to specific threats, such as weather related impacts. This may involve developing strategies that facilitate adaptation or transformational changes to the way things are done in local communities in to the specific climate change vulnerabilities which have been identified.

The Victorian Local Governance Association (www.vlga.org.au) has produced the following table as a guide to general features that are consistently present in resilient communities.

Economic development	Diverse, sustainable sources of economic prosperity
	High quality economic infrastructure
	Secure livelihoods and employment opportunities
	Equitable distribution of income and assets
Social capital	Broad and deep social networks within and beyond the community
	Experienced and widely respected community leadership
	A strong sense of community pride and optimism
	High levels of citizen engagement
Information and Communications	Rapid access to accurate, relevant information during emergencies
	Responsive, accessible and reliable communications infrastructure
Community competence	A tradition of self-reliance combined with the capacity to identify and secure external resources
	The capacity to collaborate effectively in identifying and achieving shared visions for the future
	A diversity of well resourced, well linked community organisations
	Governance systems which enable and facilitate rapid, flexible decisions and responses
	Strong education and innovation systems

In order to identify specific threats you need to undertake a risk assessment.





RISK MANAGEMENT PROCESS

A large percentage of the identified adaption options in this plan came from a risk assessment exercise. In 2010, Shoalhaven City Council undertook a risk assessment in partnership with its insurer, Statewide Mutual. The underlying basis of this project was risk management. It relied heavily on gathering information to produce qualitative risk assessment.

The objectives of the project were to:

1. Undertake a risk assessment process aligning with AS/NZS 4360 and ISO 31000
2. Develop strategies that focus on adaptation to potential climate change impacts
3. Provide Statewide with comprehensive Climate Change risk assessment planning data
4. Identify strategies that can be used for Councils' strategic and integrated planning

Potential Climate Change impacts were considered in relation to the following Council Functional Areas:

1. Infrastructure and Property Services
2. Recreational Facilities
3. Health Services
4. Planning and Development
5. Natural Resources and Management
6. Water and Sewage

The success criteria were defined as:

1. Maintain public safety
2. Protect and enhance the local economy
3. Protect existing community structures and the lifestyle enjoyed by the people of the region
4. Sustain and enhance the physical and natural environment
5. Ensure sound public administration

The process involved a range of technically skilled staff from across all groups of Council (*330 staff hours*) ranked risks to each functional area against a 'possible consequence' model. Risks were ranked as extreme, high, medium or low. Current controls were identified as well as limited adaptation actions. This Assessment was then endorsed by Council.

This adaptation plan focuses on those risks that were identified as being either extreme or high in nature. The consequence descriptors that were used during this ranking process are at Attachment A.





SECTION 2

ADAPTATION PLANNING

Adaptation is the conscious adjustment of natural or human systems to treat an identified risk – treatment may moderate harm or exploit beneficial opportunities. Put simply - it is a process of learning from our mistakes and making changes to our practices to increase our chance of future success.

Adaptive management involves putting in place small, flexible, incremental changes based on regular monitoring and revision of plans using information available at the time. Adaptive management contrasts markedly with highly limiting alternative approaches such as relying on one-off, large scale treatments (e.g. a sea wall).

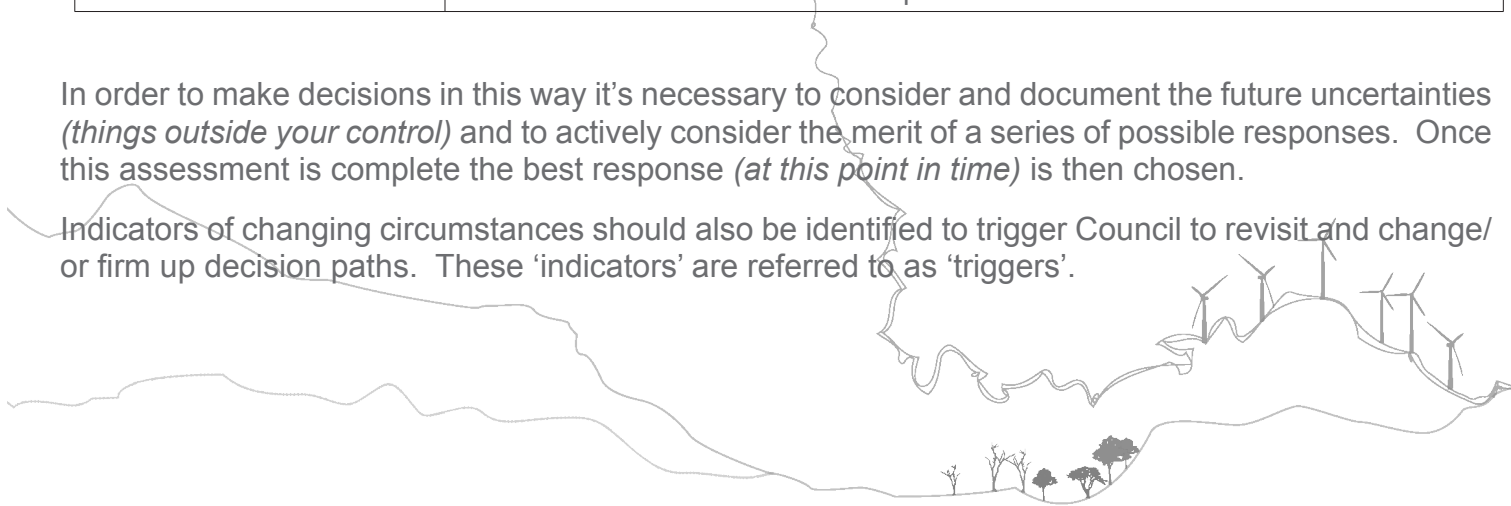
In order to have the capacity to respond positively and effectively to change it is essential for an organisation to make decisions that do not compromise future opportunities to adapt. This approach accepts that we can never have all the facts about the future. Issues for consideration during the decision making process are outlined in **Table 1**.

Table 1 - Issues to consider when making decisions about adaptation actions

Flexibility	Responsive to changing future conditions
Is it equitable?	No one is disadvantaged, option improves current situation
Is it robust?	Can operate effectively with a wide range of variables / uncertainties. Not contingent on third parties
Is it cost-effective?	Value for money
Align with Council goals?	Consistent with adopted Strategies, policies and goals Builds on the expected outcomes from existing policies in place
Avoid mal-adaption?	<ul style="list-style-type: none">• Does not increase GHG emissions• Does not burden vulnerable demographic• Results in low or no opportunity costs• Does not reduce incentive to adapt

In order to make decisions in this way it's necessary to consider and document the future uncertainties (*things outside your control*) and to actively consider the merit of a series of possible responses. Once this assessment is complete the best response (*at this point in time*) is then chosen.

Indicators of changing circumstances should also be identified to trigger Council to revisit and change/ or firm up decision paths. These 'indicators' are referred to as 'triggers'.



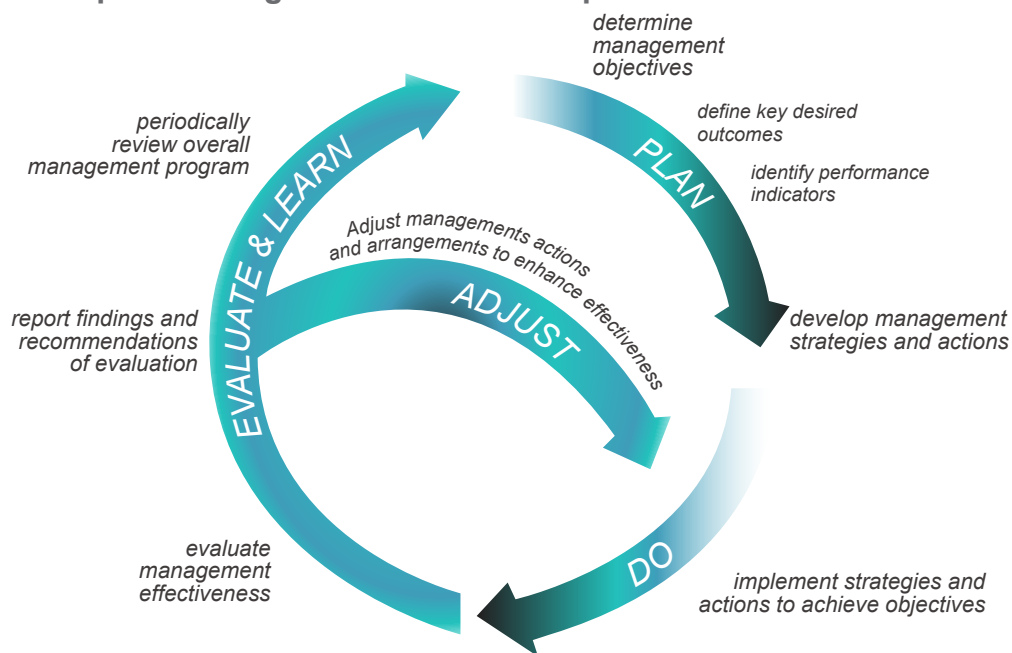


ADAPTATIVE MANAGEMENT

We need to move away from long term plans being written in stone - to plans which are constantly reviewed and revised to enable continual improvement. This has obvious work force planning implications but must be acknowledged up front to enable a truly flexible approach.

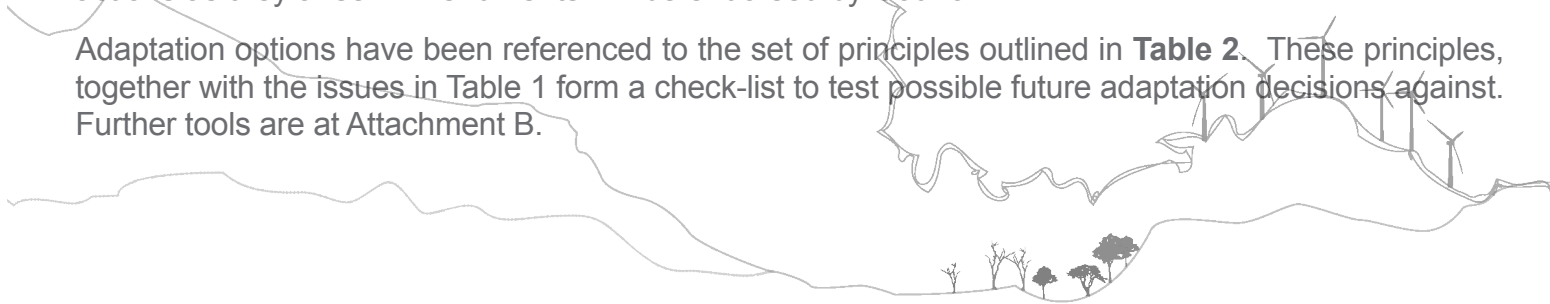
Innovation and experimentation need to be recognized and rewarded. We need to become an organisation of active learners. We need to evolve from a culture where there is one right answer to one where there are many possibilities - it's the external uncertainties coupled with the internal knowledge base which will dictate which decision is chosen at any given point in time. This recognizes that monitoring and reviewing are key components of adaptive and flexible organisations (*see figure below which demonstrates feedback loop*).

Figure 1 - The adaptive management feedback loop



The adaptation options in this document are considered to be important 'first steps' in planning for the future prosperity of our community. The options are not an exhaustive list of adaptation options and actions. This will be a 'living document' to allow the capacity to document additional options and actions as they arise. Amendments will be endorsed by Council.

Adaptation options have been referenced to the set of principles outlined in **Table 2**. These principles, together with the issues in Table 1 form a check-list to test possible future adaptation decisions against. Further tools are at Attachment B.





EFFECTIVE RISK TREATMENT

Table 2 Principles for effective climate risk treatment (*adapted from AGO 2006*)

Principle	Explanation
Achieve balance between climate & non-climate risk	Climate risk management should be integrated with an organisations broader risk management and with general management processes in order to limit the risk of undue emphasis being placed on any on (<i>climate or non-climate risk type</i>)
Manage priority climate change risks	An organisations risk treatment process should focus on their high priority risks
Use adaptive management	Adaptive management involves putting in place small, flexible, incremental changes based on regular monitoring and revision of plans using information available at the time. Adaptive management contrasts markedly with highly limiting alternative approaches such as relying on one-off, large scale treatments.
Look for win-win or no-regrets treatment options	Win-win treatments refer to measures that address the targeted climate change risk whilst also having other environmental, social or economic benefits. No regrets treatments are measures that should be undertaken anyway, regardless of whether climate change is an issue.
Avoid adaptation constraining decisions	Organisations should avoid taking decisions that make it more difficult for them or others to manage climate change in the future.
Review your treatment strategy	An organisation should regularly review its climate change risk treatment strategy as part of a planned monitoring and review cycle.

Reading the Actions Table

The action table is laid out in seven columns as follows:

Issue	Is identifies a specific risk which requires an adaption response. The bulk of the 'issues' were identified through the risk assessment process and were ranked as either 'high' or 'extreme' in nature.
Adaptation activities currently in the Delivery Program	Self evident
Adaptation Actions in progress but not in the Delivery Program	Pro-active action.
Adaptation Actions not in the Delivery Program	Where a gap was identified in our current response an action was developed.
Time frame	Refers to new actions identified in column four



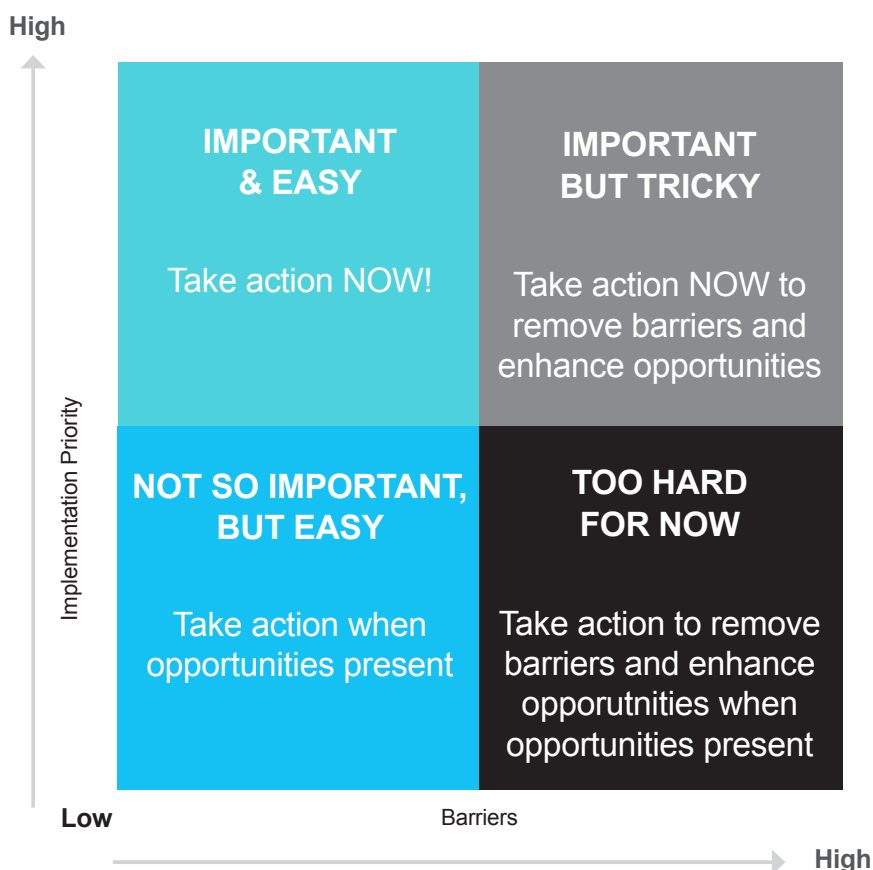
ADAPTATION OPTIONS AND ACTIONS TABLE

Each adaptation option in **Section 2** has been assigned a category to provide guidance on timeframes for actions and steps for implementation. The category reflects the importance of implementation and the potential barriers or opportunities to implementation.

The categories are:

1. **Important and Easy:** These options should be taken immediately as they have limited barriers to implementation and will treat a number of high priority risks.
2. **Important but Tricky:** Action should be taken to remove the potential barriers to implementation so that options assigned to this category can move across to the 'Take Action Now' category.
3. **Not So Important But Easy:** Action to implement these options may not start immediately. However, when opportunities arise e.g. funding sources, they should be acted upon.
4. **Too Hard for Now:** The objective is to remove the barriers to implementation for options in this category; however, efforts will be focused on removing the barriers in the 'Important but Tricky' adaptation actions.

(This concept is from WESROC Climate Change Risk Assessment and Adaptation Action Plan)



ADAPTATION OPTIONS AND ACTIONS TABLE

Risk	Adaptations activities currently in Delivery Program or DLG 2036	Adaptation actions <u>in progress</u> but not in delivery program	Adaptation actions not in delivery program	Time Frame to implement new actions		
				Short	Med	Long
OVERARCHING ISSUES				1-3yr	3-10 yrs	10-20 yrs
Lack of framework to implement change			<ol style="list-style-type: none"> Amend CSP to include a strategy under 4.4 or 2.3 that states: <ul style="list-style-type: none"> Implement adaptation actions identified in the Adaptation Plan through Delivery Program and update plan with new actions as required. Amend CSP 4.4.4 to read: <ul style="list-style-type: none"> Ensure Council is flexible and adaptive in its approach to future uncertainties and avoids mal-adaptive decisions Council to consider allocating a yearly budget to enable seed funding of feasibility projects and 'grant matching' for adaptation projects. 			
There is no dedicated budget to cover climate change impacts	NSW 2021: Minimise impacts of climate change in local communities (DLG 2036) Activity 9d <i>Develop skills in rural and regional councils to better ensure that they secure grant funding from other levels of Government</i>	Continue to monitor and obtain opportunistic matching grant funding for climate change projects.	<ol style="list-style-type: none"> Develop a policy direction for the implementation of funding streams (Council and other) to address required flood and coastal protection works associated with Climate Change. 			
Lack of engagement with the community about future planning and risks	Finalise Citywide Growth Management Strategy in consultation with the Community, Depart. of Planning and other State Government Agencies (2.2.1.5) Implement the Planning Works Program to complete strategic planning initiatives (2.2.1.7)	Incorporate community engagement re: long term planning into iteration 2 of Growth Management Strategy.	<ol style="list-style-type: none"> Develop and promote a climate change internet portal for Council's website to provide plain English information and resources for the Shoalhaven community in respect of climate change impacts for the region. 			

Issue	Adaptations activities in Delivery Program	Adaptation actions in progress but not in Delivery Program	Adaptation actions not in delivery program	Short	Med	Long
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EXTREME RISK ISSUES						
Intense Rain Fall						
Risks associated with community complacency and their unsafe /unpredictable and stupid behaviour during an event	Develop, implement and review Floodplain Risk Management Program (2.3.1.5)		6. Undertake safety audit of major drainage infrastructures. 7. Implement suggested management measures (fencing and signage etc) where required			
Lack of adequate funding to upgrade and implement flood mitigation measures and Coastal Protection strategies	NSW 2021: Increase the number of Floodplain Risk Management Plans available to support emergency management planning Apply for and manage grant funding to support Council's Activities in Natural Resource and Floodplain Management (4.2.4.4)		8. Investigate opportunities for regional resource sharing arrangements 9. Lobby State Government for resourcing 10. Investigate options for Council to budget for some of these high priority measures			
HIGH RISK ISSUES						
TEMPERATURE						
Increased cost of providing appropriate public facilities		Incorporated ESD in all project delivery activities.	11. Train staff to be able to undertake life cycle costing and produce cost/benefit analysis. 12. Undertake life cycle costing for new facilities. 13. Implement ESD and whole of life costing into councils corporate asset management plans for individual asset types. 14. Develop and Implement a standard for delivery procedure.			
Increase in hot days leads to boating infrastructure not coping			15. Approach state government for assistance to improve boating infrastructure which is beyond Councils capability to deliver.			

Issue	Adaptations activities in Delivery Program	Adaptation actions in progress but not in Delivery Program	Adaptation actions not in delivery program	Short	Med	Long
with demand			16. Include a community needs analysis question on boating infrastructure into CSP community consultation.			
Increased costs associated with design criteria considerations for future DAS	Assess and determine Development Applications, Construction Certificates and Complying Development Certificates in accordance with legislation, the Building Code of Australia (BCA), relevant Australian Standards and relevant policies. (2.2.2.1)	Ongoing monitoring and review of DCP's in line with Australian Standards & changes in BCA and Government regulations	17. Seek out professional development opportunities for staff (assessor accreditation etc). 18. Lobby for a higher rate of cost recovery for complex DA's.			
Increase in hardness and reduced general condition of playing surfaces and recreational areas			19. Review of ground closure policies. 20. Consider alternative maintenance measures based on climatic conditions <ul style="list-style-type: none"> • Increase irrigation installation programme • Investigate bore water in key areas • Increase aeration programme • Increase sand surface for cushioning 21. Identify a 'trigger' that field is becoming unusable 22. Consider a program to replace high usage areas with alternate surfaces.			
			23. Identify fields that may need to close permanently (too expensive to keep up to standard) and those that need to be upgraded 24. Consideration of a regional complex to replace several small grounds.			
Council recreational areas requiring more irrigation / change of plant profile		Review maintenance techniques	25. Review landscape master plans. 26. Review of grass types used in sportsgrounds and growing medium 27. Investigate storm water capture and reuse for key gardens and facilities			
Loss of trees and plant species through drier conditions		Liaison with relevant governmental agencies to protect threatened or endangered species/habitats.	28. Review species selection through the review of the Natural Area Plan of Management.			

Issue	Adaptations activities in Delivery Program	Adaptation actions in progress but not in Delivery Program	Adaptation actions not in delivery program	Short	Med	Long
Potential increase in fire events – fire load, hotter temperatures and drier conditions		High risk areas identified through Shoalhaven Bush Fire Risk Management Plan Make recommendation to alter fire mitigation strategies where necessary. Monitor and review State Government legislation and policy changes.	29. Ensure Council facility evacuation plans and procedures are understood by the community (education and awareness).			
Deficiencies in future land use considerations associated with climate change impacts on ecosystems			30. Review of existing strategies to introduce a resilience based planning approach. 31. Professional development of staff to guide them how to integrate climate issues into land use planning.			
Deficiencies in strategic planning processes for urban expansion and current consideration of climate change impacts on ecosystems	Develop and review Natural Area Management Plans. (2.1.1.15) <i>(DLG 2036) Activity14c Improve access to State agency information and data to assist councils and ROCs with local and regional planning.</i>		32. Identify thresholds for unacceptable change into Natural Area Management plans. 33. Identify areas where 'ecosystem retreat' may occur (e.g. as sea level rises salt marsh will move)			
Community expectations of infrastructure delivery exceed Council ability.			34. Develop communications strategies that enable the community to be fully informed of Councils limitations in the delivery of infrastructure.			
Additional costs associated with the management of Council's natural environment	Develop and review Natural Area Management Plans (2.1.1.15)	Develop condition assessment methodology for Natural Areas and rate Council owned and managed land.	35. Develop operational agreement for natural areas to ensure adequate budget for the sustainable management of Council's natural areas 36. 5 yearly condition assessment of targeted natural areas. 37. Seek increased funding from State Government.			

Issue	Adaptations activities in Delivery Program	Adaptation actions in progress but not in Delivery Program	Adaptation actions not in delivery program	Short	Med	Long
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HOT DAYS RISKS

An increase in hot days will increase load on Council buildings air conditioning systems i.e. loss of air-conditioning efficiency or failure leading to unsafe/uncomfortable working conditions			<p>38. Review the adequacy and need of air conditioning systems in all Council buildings and implement recommendations as and when necessary.</p> <p>39. Demand forecasting identified in AMP for replacement prior to failure.</p>			
The condition of roads, footpaths, cycleways, walkways and bridges deteriorate more quickly over time exposing users to a lower level of service	<p><i>(DLG 2036) activity 9b Representations to the Commonwealth Government to ensure permanency of the 'Roads to Recovery' program</i></p> <p>Maintain road assets in accordance with the Risk Management Procedures (1.1.4.5)</p> <p>Implement capital projects under the annual Roads, Pedestrian and Cycleway Facilities program (1.1.4.4)</p> <p>Carry out Cyclic Inspections of Roads and Town Centres in accordance with the schedule of roads and the Risk Management Procedure (1.1.4.6)</p> <p>Carry out scheduled road reseals, and gravel resheets in accordance with the annual program (1.1.4.8)</p> <p>Carry out scheduled and ad hoc repair of footpaths and cycleways in accordance with the Risk Management Procedure (1.1.4.7)</p>	<p>Review the adequacy and efficiency of existing control measures.</p> <p>Continual review of existing and potential technology that may increase information and aid decision making e.g. alternative road surface material with resistance to high temps.</p>	<p>40. Provide increased opportunity to up-skill staff about new technologies and practices.</p>			

Issue	Adaptations activities in Delivery Program	Adaptation actions in progress but not in Delivery Program	Adaptation actions not in delivery program	Short	Med	Long
	<p>Complete the annual Capital Works Program to be undertaken by in-house field based resources to repair/ rehabilitate the road network and associated infrastructure (1.1.4.12)</p> <p>Implement the annual maintenance works program to repair identified priority defects on Council's bridges and causeways. (1.1.4.14)</p>					
Public use areas surrounding Council assets will become much hotter and there may be a need to increase the number of shade structures thru trees/other structures.			<p>41. Proactively plan to ensure that this risk is integrated into concept plans for retrofits and new public buildings</p> <p>42. Investigate the use of alternative products e.g. 'porous' to alleviate this problem.</p>			
Greater need for access to public buildings and larger capacity for public gatherings	Undertake needs analysis for community facilities (1.2.2.3) .		43. Consider future options (e.g. busing elderly people to libraries on hot days or other measures)			
Increase in food borne bacteria	Ensure that the review and development of Development Control Plans considers public health and ecologically sustainability. (2.2.1.3)		<p>44. Provide flexibility into the system to target inspections for high risk events (e.g. Summer events).</p> <p>45. Develop a disaster response strategy to ensure timely and effective post disaster food hygiene surveillance. Integrate outcomes into displan.</p>			
Increase in dust leads to pollution issues			<p>46. Improve standard of sediment and erosion control plans including dust control measures.</p> <p>47. Proactive planning of site rehabilitation and progressively implement as project progresses.</p>			
Increased usage of water bodies for recreation that were not			48. Identification of risk areas and implementation of signage (apply Statewide BPM signage as remote supervision)			

Issue	Adaptations activities in Delivery Program	Adaptation actions in progress but not in Delivery Program	Adaptation actions not in delivery program	Short	Med	Long
intended for that purpose or present new risks						
CHANGE TO RAINFALL						
Effect on vegetation surrounding Council assets which could cause injury or property damage			49. Review of existing tree management policy and amend if and when required.			
Heritage buildings may have increased incidence of cracking due to reduced moisture in ground			50. Periodic inspections in Risk Management procedure and inspections when required. Photographic record to be taken to track any deterioration.			
There could be increased problems with dust control on gravel roads	Carry out scheduled road reseals, and gravel resheets in accordance with the annual program (1.1.4.8)	Seal gravel sections of roads where residential dwellings are impacted (DLG 2036) activity 9b Representations to the Commonwealth Government to ensure permanency of the 'Roads to Recovery' program				
Community expectations of engagement by and direction from Council	Address sustainable stormwater management measures (current 2.4.3.2) through integrating water sensitive urban design practices into the City Wide DCP)	Respond to inquiries Continue tap-star programs Implement Water demand management strategy Manage expectations through the Community Strategic Plan				
Impact of climatic changes on the management of lakes and waterway ecosystems		Review of existing controls and conditions of consent, alter as necessary	51. Implement Estuary Management Plans, Stormwater Management Plan			

Issue	Adaptations activities in Delivery Program	Adaptation actions in progress but not in Delivery Program	Adaptation actions not in delivery program	Short	Med	Long
	Ensure that riparian zones along creek and drainage lines are preserved and protected in accordance with legislative requirements when assessing development applications (2.1.1.2)		52. Create implementation policy (DCP component) to ensure intent of LEP clauses is realised.			
Increased threat to wetland ecosystems including river and creeks due to lower environmental flows	NSW 2021: Improve the environmental health of wetlands and catchments through actively managing water for the environment by 2021 Develop and review Natural Area Management Plans (2.1.1.15)	Protect wetland and riparian areas from erosion and disturbance through consistent implementation of LEP clauses	53. Review and identify and gaps in current controls.			
Increased complaints with regard to odour issues emanating from sewerage infrastructure		Continue to investigate new technology which will minimise likelihood of odour problems.	54. Review Buffer zones which already exist around treatment plants		ongoing	
WIND RISKS						
Increased cost of repairs to Council and natural assets that could be affected by high winds.	Review Council's insurances to ensure Council is adequately protected (4.4.2.5)		55. Ensure that all new infrastructure or infrastructure being refurbished complies with worst wind category building standards. 56. Review and update Asset Management Plan to comply with worst wind standard Identify priority adaptations to mitigate clean up expense in balanced consideration of other risks – nb. Recognising that if declared as natural disaster – State Gov will cover costs. 57. For minor events, increase operational budget by 5% to accommodate increased clean up costs.			

Issue	Adaptations activities in Delivery Program	Adaptation actions in progress but not in Delivery Program	Adaptation actions not in delivery program	Short	Med	Long
Emergency management issues (staffing/emergency centre/equipment/fatigue etc) during storm	NSW 2021: Ensure NSW has appropriate arrangements in place to respond to and recover from natural disasters	Respond through: <ul style="list-style-type: none"> - Site Emergency Management Plan - Ongoing development and testing of Council Business Continuity Plans - Active participation in DISPLAN network - Business Continuity Planning - 				
FIREWEATHER RISKS						
Increased risk of fires in land fill waste cells	Risk identified in management plan	Onsite machine set to respond to the outbreak of fires within landfill within 5 minutes – preferred method – smother with soil, with back up from water cart.				
Post fire effect on vegetation and assets (on Council property) cause increased risk of injury e.g. loss of fences / safety barriers, walking tracks			58. Inspection and response strategy - tape off unsafe areas e.g. stabilise or isolate within two weeks post event.			
Effects on vegetation, regeneration, animal life, catchment and water supplies of altered fire regimes			59. Develop an Asset Management Plans for Natural Areas.			
Community expectations of council to invest in and manage strategies that protect its infrastructure and property from fire risks	NSW 2021: Increase community resilience to the impact of fires through prevention and preparedness activities	Ongoing implementation of Bushfire Risk Management Plan and Australian Standard development controls for bushfire protection. Feed into RFS - community education on bush fire management.	60. Periodic review of vegetation risk surrounding council infrastructure.			

Issue	Adaptations activities in Delivery Program	Adaptation actions in progress but not in Delivery Program	Adaptation actions not in delivery program	Short	Med	Long
Severe fire events may lead to a greater need for access to public buildings and larger capacity for emergency housing		Engage consultant to assess suitability of facilities identified in DISPLAN.				
Hot works ignites bushfire during maintenance and construction activities leading to life and property damage		As part of risk assessment process outline when risk assessment procedures will occur for hot work activities.				
Staff safety, welfare and working conditions are effected by increase in the severity and number of bushfires			61. Review training on bush fire response practices for staff.			
SEA LEVEL RISE RISK						
Strategies to manage vulnerable areas must be developed and account for heightened levels of impact	<p><i>NSW 2021: Increase the number of Floodplain Risk Management Plans available to support Emergency management planning</i></p> <p>Develop, implement and review Coastal Management Program (2.1.1.13)</p> <p>Develop, implement and review Floodplain Risk Management Program (2.3.1.5)</p> <p>Ensure that expert flood and coastal advice is considered in land use zoning (2.3.1.6)</p>	Investigate opportunities arising from the reform of the EP &A Act in relation to coastal land development.	<p>62. Amend 2.3.1.6 to read ‘ensure that expert flood and coastal advice is considered in land use zoning and development assessment decisions’</p> <p>63. As resources allow, undertake detailed ‘holistic village risk management plans’ to identify opportunities and risks at a detailed level for the Shoalhaven’s coastal communities. Undertake initial pilot project for the Greenwell Point area.</p>			

Issue	Adaptations activities in Delivery Program	Adaptation actions in progress but not in Delivery Program	Adaptation actions not in delivery program	Short	Med	Long
			64. Investigate in association with Federal and State Governments retreat and protection scenarios. 65. Undertake a feasibility investigation in association with Federal and State Governments, including policy and legal basis, for the introduction of rolling easements to protect foreshore areas subject to climate change risk factors.			
Maintenance, renewal and protection funding and regimes for council's existing infrastructure and property must take into account gradual sea level rise		Review asset management plans in accordance with sea level impacts and budget accordingly in the medium term				
Sea level rise combined with storm surge events may lead to failure of evacuation routes or blockage of access and service routes	<i>(DLG 2036) Activity14c Improve access to State agency information and data to assist councils and ROCs with local and regional planning.</i>	Develop and implement Flood Risk Management Plans and Coastal Plans Investigate partnerships with research institutions to increase understanding of how to build resilience into communities to respond to the impacts of natural hazards.	66. Identify communities at risk and educate about possible isolations (e.g. Burrill, Greenwell Point) 67. Acquisition of more accurate contour data e.g. LIDAR for modelling purposes & planning and /or working with State Government to obtain improved data. 68. Capacity building of staff to use modelling software to manipulate data			
Inundation and damage to building substructures and foundations could impact upon public safety			69. Review asset management plans in accordance with sea level impacts and budget accordingly. 70. The Capital Strategy of the AMP will identify any assets which need to be relocated/abandoned. 71. Increase safety measures in high risk locations.			
Potential closure of some Council assets e.g. Coastal Caravan Parks, Surf Clubs		Further investigation of sea level rise impacts, particularly in areas identified as being of a high risk of sea level rise impacts.	72. Further investigation to ascertain the impacts of sea level rise on the local economy 73. Consider building a digital elevation model to inform land use planning for coastal villages that could then			

Issue	Adaptations activities in Delivery Program	Adaptation actions in progress but not in Delivery Program	Adaptation actions not in delivery program	Short	Med	Long
			be linked to sea level rise information to give the community a visual understanding of how sea level rise will directly impact them.			
Potential for compensation claims for loss of private land/development potential in zoned areas		Keep abreast of State and Federal policy in relation to the impacts and management of sea level rise in relation to planning and development. Review of Council Policies.				
Threats to historical and cultural sites (e.g. middens in close proximity to inter-tidal margins)		A continuation of the existing strategy maintaining an awareness of changing sea level rises				
Loss of beach fronts and sand dunes		Continue to review and monitor dune and beach front stability and respond with dune stabilisation program as well as beach nourishment/ reveg works.	74. Develop a targeted policy which identifies strategic water front areas for acquisition where legally practical and investigate land use planning (through dedication or development contribution plan) (refer – rolling easements)			
Council may need to consider a planned retreat option v's new infrastructure such as sea wall and flood levies		Lobby Federal and State governments for a clear policy on planned retreat vs new protection infrastructure.	75. Consider a planned retreat policy if evidence of sea level rise is realised. This would be in line with state and federal government policy for high risk areas. 76. Consider planned retreat implications in future land use planning (e.g. seek insertion of appropriate zones or provisions in the standard LEP instrument)			
The potential for increased cost of insurance claims (e.g. personal injury, damage from Council's failed infrastructure, professional indemnity)		Compliance with Council's DCP and State and Federal Government Guidelines.	77. Up skilling of staff, improved knowledge base and use of software e.g. mapping/modelling technology 78. Continued engagement of external expertise to increase capacity within Council.			
Sea level rise combined with storm surge events may lead to the failure of		Business Continuity Planning	<ul style="list-style-type: none"> Review asset management plans in accordance with sea level impacts and budget accordingly in the medium term (repeat) 			

Issue	Adaptations activities in Delivery Program	Adaptation actions in progress but not in Delivery Program	Adaptation actions not in delivery program	Short	Med	Long
facilities such as sewerage pumping stations from inundation and flooding						
Lack of capacity and specialist skills/technical capacity to adequately plan for Climate Change	(DLG 2036)Activity 3a Undertake research into innovation and better practice in Local Government in NSW, Australia and internationally		<ul style="list-style-type: none"> Up skilling of staff, improved knowledge base and use of software e.g. mapping/modelling technology (repeat) Continued engagement of external expertise to increase capacity within Council (repeat) <p>79. Amend certain job descriptions to have 'desirable' criteria that cover identified technical skill gaps.</p> <p>80. Encourage professional bodies to develop new design guidelines which better account for the possibility of more severe weather events</p>			
Inundation may impact boat ramps/jetties and restrict access			<p>81. Review Asset Management Plan in view of sea level rise.</p> <p>82. Approach state government for assistance to improve boating infrastructure which is beyond Councils capability to deliver.</p>			
Council fails to adopt it's Coastal Zone management plan			83. Adoption implementation and appropriate resourcing of Council Coastal Zone Management Plan			
Council fails to adopt its Coastal Development control Plan	<p>Develop appropriate DCPs/policies applying to private properties exposed to sea level rise, based on risks to lives and properties (2.3.3.1)</p> <p>Develop DCP/Policies that sustainably address the impacts of predicted sea level rise on coastal areas affecting private properties (2.3.4.2)</p>					

Issue	Adaptations activities in Delivery Program	Adaptation actions in progress but not in Delivery Program	Adaptation actions not in delivery program	Short	Med	Long
Council fails to adequately plan for the predicted loss of public land as a result of sea level rise impacts			84. Undertake a review of the Recreational Strategy taking into account the possible loss of public land and impact on future land use planning. 85. Liaise with Crown Lands in the reporting of land loss/gain through the reviewing of GIS information.			
Council may have to purchase new land to relocate those recreational facilities that have been affected by sea level rise		Identify land through future reviews of the LEP and zone appropriately for the future use and the ability to effectively relocate affected assets/facilities.	86. Identify those assets at risk and then plan accordingly to address the community's needs/ expectations			
Increased pressure for active management of mosquito borne diseases in wetland areas	Ensure that the review and development of Development Control Plans considers public health and ecologically sustainability (2.2.1.3)		87. Identify and monitor the need for public education to mitigate against potential increases in mosquito borne diseases in wetland areas in close proximity to urban areas.			
Community expectations of Council to invest in and manage strategies that protect public health associated with sea level rise risks	Develop appropriate DCPs/ policies that address community exposure to sea level rise and resulting risks (2.3.1.2)	Maintain open dialogue with relevant state/federal departments to ensure transferability/continuity of all pertinent information to be used in decision making process.				
Potential impact on Council owned/ leased and commercial assets			88. Map and assess risk to businesses or commercial activities that are impacted. 89. Consider developing controls to mitigate risk and increase resilience.			

Issue	Adaptations activities in Delivery Program	Adaptation actions in progress but not in Delivery Program	Adaptation actions not in delivery program	Short	Med	Long
Land release and development strategies must factor in ESD principles and the preservation of important environmental attributes	<p>Integrate environmental sustainability considerations across all of Council's policies.(4.4.3.2)</p> <p>Review and update existing Settlement strategies and Structure Plans as required following the completion of the Growth Management Strategy (2.2.1.10)</p>	<p>The GMS, Settlement Strategies and Structure Plans must identify appropriate areas for future development and conservation .</p> <p>High risk areas reviewed with appropriate overlays or zones included in ongoing reviews of the LEP.</p>				
Unable to get adequate State and Federal funding to evaluate, mitigate or adapt to Climate Change risks		<p>Apply for funding from other sources</p> <p>Lobby through LGSA.</p>	90. Budget to have 'matching funds' available each year to increase success and opportunities.			
Failure of State to adequately provide accurate land survey information for elevation modelling in the coastal zone		<i>Lobby State and Federal Government for direction and funding.</i>	91. Consider the need for in house expertise to use tools for modelling.			
Additional information required and expertise to manage erosion and landslide susceptibility of Council's natural resources e.g. geotechnical reports	Ensure the LEP and related planning documents contain known hazard information and related controls (2.3.1.3)	<p><i>Lobby State and Federal Government for direction and funding.</i></p> <p>Lobby State Government to incorporate improved local provisions in the Standard Instrument LEP to better manage the range of issues associated with Climate Change.</p>	92. Consider further studies to indicate areas of reduced foundation capacity			
Trunk sewers close to existing sea levels may be subject to increasing infiltration and deterioration			93. <i>Review asset management plans in accordance with sea level impacts and budget accordingly in the medium term (repeat)</i>			
Increase maintenance costs for drainage and stormwater	DCPs and policies address sustainable stormwater management measures		94. Review asset management plans and capital renewal programs in accordance with sea level impacts.			

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infrastructure as it becomes less capable over time e.g. replacing drainage or clearing refuse from drainage points	(2.4.3.2 and 4.5.4.5) Implement Council's Asset Management Policy using the Asset Management Strategy to manage existing infrastructure assets, having regard to risk, resource capacity, equity, lifecycle management and levels of service. (4.5.1.8)		95. Asset Management Plans must indicate whether or not an asset is decommissioned early, moved or upgraded.			
INTENSE RAINFALL RISKS						
Community halls/buildings availability for emergency housing			96. Suggest review of DISPLAN –to be amended if necessary.			
Increase in sedimentation barrier failure leading to pollution events and possible prosecution			97. All works must have robust sediment and erosion control plan. 98. Where supported by the building code - for large projects consider increasing sediment basin capacity in line with 80 percentile rain fall events. OR 99. Increase sediment basin capacity in accordance with proscribed standards.			
Intense summer rain fall events trigger unpredictable breeding events for threatened species with potential of impacting on drainage maintenance and construction activities		Build mitigation measures into standard operating procedures				
Council property / buildings / bridges / road pavement / footpaths		Asset Management Plan and Inspection Regime	100. Identify potential resource shortfalls			

Issue	Adaptations activities in Delivery Program	Adaptation actions in progress but not in Delivery Program	Adaptation actions not in delivery program	Short	Med	Long
and equipment damage.						
Council infrastructure and services are inadequate to respond to an event			101. Assess transportation, security, fire protection, sanitary provisions, cooking facilities for each identified recovery plan implicating council infrastructure.			
Risks associated with interruption/failure of levee system		Emergency recovery operations.	102. Review and implement Asset Management Plan.			
Rise in cost of repairing damaged council property (Road/Bridge/buildings/e quipment etc)		Review of Asset Management Plan and annual budget planning.				
Increased flooding of sportsgrounds, parks and reserves		<p>Closure of affected areas to prevent damage to playing surfaces.</p> <p>Identify proactive topdressing with sand and drainage works.</p> <p>Insure designs of sports fields cater for flooding issues.</p>	<p>103. Consider regional complex to replace flood liable grounds.</p> <p>104. Investigate the feasibility of synthetic surfaces and robust material.</p> <p>105. Consider budgeting for drainage improvements in key areas.</p>			
Impact of increased erosion on infrastructure and waterways	Ensure that riparian zones along creek and drainage lines are preserved and protected in accordance with legislative requirements when assessing development applications (2.1.1.2)		<p>106. Identify and budget for priority River Bank protection works.</p> <p>107. Adequate resourcing of compliance with Development Regulations.</p>			
Loss of income from council commercial activities			<p>108. Implementation of and update Caravan Parks Flood Emergency Plans as and when required.</p> <p>109. Implement Shoalhaven Flood Risk Management Policy for Caravan Parks.</p>			
Increased level of enquiries and complaints			110. Increase Education and Community Engagement Programs.			
Current insurance policies not covering all		Review current insurance policies, procedures and	111. Insurance Gap Analysis – invest in relevant			

Issue	Adaptations activities in Delivery Program	Adaptation actions in progress but not in Delivery Program	Adaptation actions not in delivery program	Short	Med	Long
scenarios of the event		levels of insurance.	additional cover.			
Impact of increased tree fall and other damage in the waterways and recreational areas caused by heavy water and flood waters	Ensure that riparian zones along creek and drainage lines are preserved and protected in accordance with legislative requirements when assessing development applications (2.1.1.2)	Council responds to and investigates complaints from LGA residents.	112. Encourage effective and consistent buffers to all riparian areas are identified for protection in land use planning.			
Water Contamination caused by flood waters and stagnant water			113. Develop a strategy to manage water quality issues in passive recreation areas in response to extreme rainfall events. 114. Establish event based water quality monitoring program to inform the water quality strategy.			
Failure to respond to increased levels of community enquiries and complaints			115. Identify the resource implications of increased extreme rainfall intensity events and prioritisation of complaints 116. Review options to disseminate results of information to residents.			
Impact of increased sediment movement	Address sustainable stormwater management measures (current 2.4.3.2) through integrating water sensitive urban design practices into the City Wide DCP) Ensure that appropriate sedimentation and erosion facilities are provided on building sites (2.1.4.2)		117. Continual monitor and review of existing practices and ensure environmental controls are incorporated in engineering projects (e.g. rehabilitate as you go). 118. <i>Adequate resourcing of compliance monitoring for development sites.</i>			
More frequent landslides	Integrate environmental sustainability considerations across all Council's Policies (4.4.3.2) Address sustainable stormwater management measures (current 2.4.3.2)		119. Review of Councils Strategic Asset Management Plan (SAMP) 120. Use available LIDAR to build a land slip risk overlay to be incorporated into the LEP.			

Issue	Adaptations activities in Delivery Program	Adaptation actions in progress but not in Delivery Program	Adaptation actions not in delivery program	Short	Med	Long
	<p>through integrating water sensitive urban design practices into the City Wide DCP)</p> <p>Ensure the LEP and related planning documents contain known hazard information and related controls (2.3.1.3)</p>					
Impact of increased infiltration into the sewage infrastructure			121. Undertake flow monitoring during rainfall events to enable prioritisation of renewals and replacements.			
Inadequate stormwater system exacerbating the flooding issues		<p>Prioritise pro-active maintenance regimes accordingly.</p> <p>Investigate water sensitive urban design measures to reduce flood exacerbation.</p> <p>Investigate drainage improvements at all known flash flood points of transport system. (in progress)</p>	<p>122. Asset Management Plan for Drainage will formally assesses all infrastructure, identify those areas at risk, identify area of failure and implications of failure.</p> <p>123. Consider reclaiming stormwater at key facilities</p>			
ADAPTATION ACTIONS	Strategic Risk Assessment process					
Natural disaster or other event resulting in damage to critical community infrastructure, a major disruption to service delivery and/or loss of life.		<p>Fire protection and reduction programs; physical security measures; property insurance; proactive maintenance programs; flood mitigation strategies; coastal protection measures; Local Area Disaster Plan (DISPLAN); Council's Business Continuity Plan</p>	<p>124. Finalise revised Corporate Business Continuity Plan.</p> <p>125. Development of Recovery Plans for critical business functions.</p> <p>126. Continue to increase emergency management networking and capability through working with other agencies on increased community awareness and preparedness programs</p>			
Major disruption to water and waste water		Waste Water Response Plan				

Issue	Adaptations activities in Delivery Program	Adaptation actions in progress but not in Delivery Program	Adaptation actions not in delivery program	Short	Med	Long
services due to natural disaster, mechanical failure, loss of power etc.		DisPlan Generators for critical assets Develop Emergency Management Plans				
Potential impact of sea level rise on developments and Council infrastructure		Coastal hazard mapping, climate change risk assessment, "Coastal Management Manual", amended DCP to address	127. Review DCPs and DSPs; Climate Change Adaptation Planning			
Lack of political and community acceptance that climate change is an issue resulting in lack of policy and strategic direction, inadequate investment.		Coastal hazard mapping, climate change risk assessment, "Coastal Management Manual", facilities adaptation plan	128. Develop a community engagement and education strategy for climate change			
Lack of community or political acceptance that ESD is core Council business		ESD Policy, State of the Environment Reporting, Business Treading Lightly Program, energy conservation programs	129. Review Energy Savings Action Plan and Asset Management Plans to further incorporate ESD			
ADAPTATION ACTIONS	OTHER					
Disturbances to acid sulfate soils leading to pollution event in response to pressure to clear out drains		All DA's where acid sulphate is mapped, conditions of consent specify measures to manage (e.g. engineering requirements, testing etc)	130. Liase with CMA and landholders to hand back flood mitigation drains (having filled them in?) that are not required for flood mitigation for Nowra residential areas. 131. Where Acid sulfate map indicates a risk, soils will be tested prior to any excavation works. Where acidity occurs works will be avoided or treatment will occur.			
Loss of utility services (e.g.Power cut to city due to high fire danger, tele communications, water/sewer, reticulated gas)			132. Review emergency management plan with key stakeholders for major city wide disasters. 133. Revisit existing protocol with energy network provider.			
Control of feral animals		Continue to distribute the				

Issue	Adaptations activities in Delivery Program	Adaptation actions in progress but not in Delivery Program	Adaptation actions not in delivery program	Short	Med	Long
and exotic plants		"Grow Me Instead" booklet - information on preferred plant options to avoid proliferation of invasive weeds.	134. If funding available, undertake free biodiversity audits of residents' backyards and produces a simple report on changes that can be made to improve biodiversity outcomes.			
Weed invasion threatening agricultural land, tourism and natural areas.		Continual assessment of weed species and extent of infestation. Lobby state and federal government for funds for weed removal.				
Inadequate resourcing of environmental expertise within City Services leads to prosecution under environmental legislation		Ensure adequate environmental expertise is available to project teams within City Services.				
Climate change leads to more threatened species being listed which impacts on operations		Build cooperative relationships with state and commonwealth environment agencies	135. Establish robust systems to account for threatened species habitat requirements for on-ground works.			
Energy costs increase	NSW 2012 - 20% renewable energy by 2020 Investigate the use of solar and wind power as alternate sources of energy for use at: Holiday Haven, Nowra Admin and Shoalhaven Entertainment Centre (2.4.4.1) Implement energy and water saving initiatives at Aquatic and Leisure facilities (2.3.2.3) Integrate energy efficiency initiatives in the investigation, design, costing and delivery of		136. Review and amend building design specifications to reduce vulnerability i.e. reduce reliance on air-conditioning; improve water use, increase service lifetime.			

Issue	Adaptations activities in Delivery Program	Adaptation actions in progress but not in Delivery Program	Adaptation actions not in delivery program	Short	Med	Long
	<p>infrastructure projects (2.4.4.3).</p> <p>Determine suitability of existing buildings to incorporate energy and water savings measures and incorporate specific measures into asset management plans. (2.3.2.2)</p> <p>DCPs and Policies address the principles of ESD and legislative compliance (4.4.3.1.)</p>		137. Develop a Social Infrastructure Development Control Plan Chapter			
SOE fails to indicate decline in environmental health.			138. Review and identify monitoring strategies to indicate whether change is occurring (e.g. event based monitoring)			
Prime agriculture land not being used for food production.		Identify industry champions and key stakeholders to develop and undertake community visioning framework.	139. Develop and implement a Sustainable Agricultural Land Use Strategy.			

ATTACHMENT A

CONSEQUENCE DESCRIPTORS

USED IN THE RISK ASSESSMENT PROCESS

Success Criteria	Consequence Rating				
	Insignificant	Minor	Moderate	Major	Catastrophic
A Maintain public safety	Appearance of a threat but no actual harm	Serious near misses or minor injuries	Small numbers of injuries	Isolated instances of serious injuries or loss of life	Large numbers of serious injuries or loss of lives
B Protect and enhance the local economy	Minor shortfall relative to current forecasts	Individually significant but isolated areas of reduction in economic performance relative to current forecasts	Significant general reduction in economic performance relative to current forecasts	Regional stagnation such that businesses are unable to thrive and employment does not keep pace with population growth	Regional decline leading to widespread business failure, loss of employment and hardship
C Protect existing community structures and the lifestyle enjoyed by the people of the region	There would be minor areas in which the region was unable to maintain its current services	Isolated but noticeable examples of decline in services	General appreciable decline in services	Severe and widespread decline in services and quality of life within the community	The region would be seen as very unattractive, moribund and unable to support its community
D Sustain and enhance the physical and natural environment	No environmental damage	Minor instances of environmental damage that could be reversed	Isolated but significant instances of environmental damage that might be reversed with intensive efforts	Severe loss of environmental amenity and a danger of continuing environmental damage	Major widespread loss of environmental amenity and progressive irrecoverable environmental damage
E Ensure sound public administration and governance	There would be minor instances of public administration being under more than usual stress but it could be managed	Isolated instances of public administration being under severe pressure	Public administration would be under severe pressure on several fronts	Public administration would struggle to remain effective and would be seen to be in danger of failing completely	Public administration would fall into decay and cease to be effective

ATTACHMENT B

Using the tables below, responsible staff need to assess each adaptation measure assigned to their group against the tables below to help expand on the possible response required. This will help identify the 'first steps' – e.g. are we lacking capacity within the organisation to respond? Is the problem lack of funding?

Table 3 Criteria to assess barriers to implementing adaptation options

Criteria	Description
No regrets	The option is beneficial in the absence of climate change
Non-statutory	The option can take place without any policy or legislative changes
Community	The option is likely to be perceived to be amendable to community members
Environmental	The option is not likely to have any adverse environmental impacts
Financial	The option can be implemented within current budgets. No external funding will be sought
Cost benefit	The long term benefits of adaptation clearly exceed its upfront costs (strategic estimate only)
Organisational capacity	The option can be implemented based on current staff capacity and resourcing.

Table 4 Guide to allocating ratings in the barrier analysis

Criteria	1	2	3
No regrets	The option only contributes to climate change adaptation	Contributes in part to development as well as climate change	Will greatly contribute to development in addition to climate adaptation
Non-statutory	Significant changes to statutory requirements are needed	Minimal changes to statutory requirements are needed	No changes to statutory requirements are needed
Community	The option will not be amenable to community members	The option should be amendable to community members	The option will be amendable to community members
Environmental	Potential for high impact on the environment	Minor impact on the environment	No environmental impact
Financial	The option would require major inclusion in budget: > 1 year to receive funding	May be covered by next financial year budget	Can be covered under existing financial budgets
Cost benefit	The upfront costs exceed the future benefits	The upfront costs are equal to the future benefits	The future benefits exceed the upfront costs
Organisational capacity	Staff do not have the necessary skills and/or capacity to implement the option	Staff have some ability to implement the option, but may require limited external support	Staff have the skills and capacity to take action required to implement the option