



VOLUME 1

LOCAL ADAPTATION PLAN FOR FUTURE FLOODING AND COASTAL RISKS

PELICAN, BLACKSMITHS, SWANSEA,
SWANSEA HEADS AND CAVES BEACH

October 2021



This project has received financial support from the NSW
Government through the Floodplain Grants Program



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List of appendices contained in LAP volume 2 (separate document)

1. Detailed descriptions for each of the 30 LAP actions
2. Community engagement strategy and activities
3. Hazard summaries for LAP areas
4. Summary of Probabilistic Hazards and Damages Assessment
5. Pelican and Blacksmiths LAP working group preliminary options assessment
6. Swansea and surrounds LAP working group preliminary options assessment
7. Summary of multi-criteria analysis and cost-benefit analysis

Acknowledgment of Country

We remember and respect the Ancestors who cared for and nurtured this Country.
Dhumaan ngayin ngarrakalu kirraanan barayidin.

It is in their footsteps that we travel these lands and waters.
Ngarrakalumba yuludaka bibayilin barayida baaduka.

Lake Macquarie City Council acknowledges the Awabakal people and Elders past, present and future.
Lake Macquarie City Council dhumaan Awabakala ngarrakal yalawaa, yalawan, yalawanan.

Wording by the Aboriginal Reference Group and translated by Miromaa Aboriginal Language and Technology Centre.

EXECUTIVE SUMMARY

How can we adapt Pelican, Blacksmiths, Swansea and surrounds to an uncertain climate future?

This Local Adaptation Plan (LAP) is a call for action to help the community plan for the worst and act when necessary in response to flooding and sea level rise. Urgent action is needed to address priority issues identified by the community. For other issues we have time to plan and prepare.

The objective of this LAP is:

"To adapt Pelican, Blacksmiths, Swansea, Swansea Heads and Caves Beach to the projected effects of sea level rise and the compounding issues associated with inundation, flooding, drainage, sewerage and major storm hazards, so that community wellbeing, economic prosperity, and our valuable lake, channel and coastal environment can be protected".

Why adapt?

- Commonwealth, State and local government studies identify the suburbs included in this LAP as extremely vulnerable to the projected impacts of sea level rise
- These impacts include threats to public safety, damage to houses and other private and public assets (roads, drainage, sewerage and other utilities) and threats to our unique coastal environment and lifestyle
- This LAP will help our community to adapt to these impacts in a proactive and timely way as required.

How we approached the LAP?

Council and the community assessed current and projected hazards using flood and coastal studies and the CoastAdapt website. Flooding and sea level rise will impact many people across the LAP area through damage to private and public assets, service and access disruption, increased operational and maintenance costs and threats to the environment.

What are the hazards?

The LAP working group and Council consulted with residents and businesses in the area to identify and assess the following hazards related to flooding and projected sea level rise:

LF Lake flooding
increased extent of flooding caused by rainfall in and around the lake and its catchment

TI Tidal inundation
increased frequency, duration and extent of tidal inundation (fine weather flooding)

ECL East Coast lows and storm surges
increased frequency and intensity of storm events resulting in temporary water level surges and storm damage

CD Channel dynamics
changes in water volumes and behaviour in the channel, erosion of the channel and impact on adjoining land

GW Groundwater
short term and long term increases in the level of underground water

CH Coastal hazard
erosion of beach and dunes, potential wave overtopping and coastal inundation

ER Emergency response
risk of failure of our emergency response systems including storm preparedness and evacuation



Residences adjacent to Black Neds Bay Swansea taken 21 feb 2019 Photo: D. Hanslow NSW DPIE

How did Council and the community assess hazards and options?

Feedback from residents and businesses, collected at workshops and community drop-in sessions, identified more than 180 potential options to manage the impacts of flooding, inundation and sea level rise.



Council and the LAP working group carried out a preliminary assessment of these options to assist with shaping the future adaptation plan.



In 2018, the revised NSW Coastal Management Framework directed Councils to include a more probabilistic (statistical) approach to hazard assessment. This probabilistic hazard assessment (PHA) formed the basis for an economic assessment of options known as a cost benefit analysis (CBA).



The PHA of inundation in and around Swansea Channel was undertaken in 2018-2019 as a basis for a feasibility study (using multi-criteria analysis) carried out in 2019. This assisted Council and the LAP working group to identify options that could proceed directly to the LAP and another subset of high cost/high risk options that could benefit from economic analysis by a CBA carried out in 2020 as part of the broader assessment process.



Members of the LAP working group conducted further hazard and options assessments, and combined this with the findings of the PHA and the CBA to provide valuable insight and direction for the final set of management actions included in the LAP.



When to plan and when to act?

- The LAP includes 30 actions (split into 6 categories) implemented over a 10 year period. It sets the foundation for the long-term adaptation of the area to 2100 and beyond
- The longer-term strategy is based on trigger points e.g. an action is implemented once water levels reach a given height
- The results of the technical studies and community assessments highlighted the need for continued investigation, collection of information, and research to understand acceptable trigger points, longer-term impacts of sea level rise, and how to implement complex adaptation actions
- We aim to plan ahead, act when necessary, and in proportion to the risks faced; avoiding wasted expenditure and maladaptation.



Impacts of East Coast Low Storm - Pelican Foreshore Reserve - June 2016

Snapshot of adaptation actions (from Tables 3.1 to 3.6 of the LAP)

MANAGEMENT ACTION CATEGORIES EXAMPLE ACTIONS

On-ground works	<ul style="list-style-type: none"> • Implement Pelican Foreshore Remediation Project • Complete Swansea tidal gates pilot and, subject to review, extend to priority areas • Maintain and augment, as necessary, channel training walls and lake foreshore protection works
Planning and development controls	<ul style="list-style-type: none"> • Review land-use planning and development controls in collaboration with industry and community as new scientific information comes to hand
Maintenance, monitoring and reporting	<ul style="list-style-type: none"> • Monitoring and reporting of hazards and regular reporting against LAP triggers
Piloting, research and innovation	<ul style="list-style-type: none"> • Research and pilot integrated adaptation strategies addressing properties, drainage, roads and utilities at the local or neighbourhood level
Advocacy and engagement	<ul style="list-style-type: none"> • Enhanced partnerships with utility providers and funding agencies to ensure 'efficiencies of scale' and innovation
Governance and funding	<ul style="list-style-type: none"> • Maintain and enhance community participation and engagement in ongoing planning and implementation • Investigate feasibility of capital reserve and other resourcing measures to support implementation and future adaptation

Acknowledging community contributions to this plan

This LAP for future flooding and coastal risks was prepared as a collaborative endeavour.

Council acknowledges the generous contributions of time and expertise from over twenty community volunteers who have contributed to this LAP's development over the last five years. The passion, determination and teamwork of LAP working group members - both past and present - has resulted in a plan with a high level of community support and commitment. Importantly, this plan will help the community achieve its vision of 'adapting in place' when and where necessary.

Council also thanks the NSW government for funding support under the Floodplain Grants Program and technical support from officers of the NSW Department of Planning, Industry and Environment.

Finally, Council would also like to acknowledge the ongoing support of LAP area residents, businesses, government and community stakeholders in helping to implement, monitor, review and continually improve this LAP well into the future.



Erosion of beach and dune (including vegetation) Blacksmiths Beach near Awabakal Street, May 2021.

SECTION 1: SETTING THE SCENE

1.1 LAP area and background

Areas covered by this Local Adaptation Plan (LAP)

Figure 1.1 shows the area covered by the LAP which includes the suburbs of Pelican, Little Pelican, Blacksmiths, Swansea, Swansea Heads and Caves Beach.

The Pacific Highway runs north to south through the LAP area and is an important regional transport link for residents, industry, business and tourism.

Swansea Channel connects Lake Macquarie and the Pacific Ocean providing navigable access along with state significant environmental assets.

Continuous living history including flooding of the area

Traditional owners, current residents and visitors to the area have embraced the unique environmental values that the lake, channel and open coastline provide.



Figure 1.1: Area covered by the LAP.

The lands around Swansea Channel are home to the Awabakal people attracted to the area by the abundance of local resources including seafood and shelter. The Awabakal name for Swansea is "Galgabba", i.e. a place to rest or a pleasant place to camp.

The area has significant Aboriginal culture and heritage values with middens and significant sites present in a number of coastal and foreshore areas. Aboriginal stories and songlines are still in use as a living history and connection with Country past, present and future.

The European history of the area extends from 1800 when Captain William Reid sailed into the channel and lake when traveling north from Sydney to the Hunter River to load a cargo of coal. The lake was known as Reid's Mistake until about 1826 when it was renamed Lake Macquarie after former Governor Lachlan Macquarie.

Residential and commercial development in the suburbs surrounding the channel and adjacent coastline has increased steadily over the last 200 years. The area has a well documented flooding history and poor drainage as a result of the exposed coastline, channel and low lying nature of much of the land.

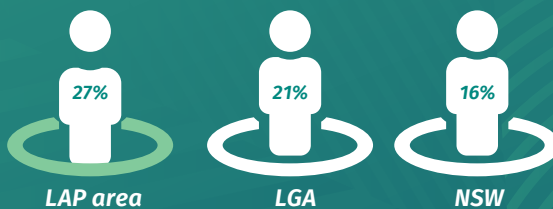
Visit history.lakemac.com.au or Swansea Library for information on the history (including flooding history) of the LAP area. Contact the Bahtabah Local Aboriginal Land Council at Pelican for information on the living Aboriginal heritage of the area.

DEMOGRAPHICS

There are a number of trends evident in the 2016 Australian Bureau of Statistics (ABS) data that influence how the community might adapt to projected changes in flooding behaviour:

Age/residents > 65

The high percentage of older residents in the LAP area, coupled with around 30 per cent of LAP area households being single occupant only, suggests a relatively higher vulnerability of some sectors of the community in the LAP area.

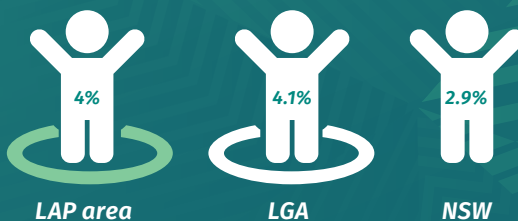


LGA= Local Government Area

Aboriginal and/or Torres Strait Islander residents

The LAP area and LGA have a higher percentage of residents who identify as Aboriginal and/or Torres Strait Islander when compared to the NSW average.

Engagement with traditional custodians and understanding of traditional knowledge is seen as a key element of community resilience and adaptation planning.



Internet access

This influences the communication and engagement approaches in the LAP area.





Pelican Street Swansea during rain event 21 March 2021 looking south towards Charles Street.

1.2 What does the community value about the area?

Volunteer members of the community worked with Council in the LAP process and were called the LAP working group. The LAP working group captured community input on what they valued about the LAP area:



Picturesque

The channel itself is a connection to the picturesque lake and the Pacific Ocean with its idyllic coastline and beaches.



Visual and economic

The Pacific Highway (and Swansea Bridge), service the southern and eastern parts of the City and link the Central Coast to Newcastle.



Relaxed lifestyle

The LAP communities are committed to remaining in their community and continuing the lifestyle they currently enjoy for the foreseeable future.



Close to services

The community enjoy their ease of access to commercial areas and services. The LAP communities wish to keep and improve this aspect of the community.



Community cohesion

Community cohesion is enhanced by shared enjoyment of the beach, foreshore, boating and fishing. The diversity of safe local recreation opportunities is an additional value.



Wellbeing

Community health (physical and mental) is an important wellbeing value.




The environment

State protected wetlands (including mangrove and saltmarsh communities) along with beach, dune, estuarine and terrestrial ecosystems provide visual amenity, biodiversity and inherent environmental value.



Living history and culture

An appreciation of the Aboriginal and European heritage and living history and culture including stories, songlines, artifacts and places of significance.



View of old Swansea Bridge from
Swansea Jetty (circa 1920).

1.3 Our collective challenge – why adapt?

The natural low-lying topography and proximity to the lake and ocean, means that the LAP area is Australia's most exposed estuary to the impacts of sea level rise in terms of properties at risk (Australian Government, Department of Climate Change 2009).

A 2020 community survey of residents found that 24 (15%) of the 156 respondents had experienced flooding or tidal inundation of their property (building/s or land) at some time whilst living in the area.

The area's vulnerability to tidal inundation, lake and catchment flooding and projected sea level rise is also highlighted in:

- The Lake Macquarie Waterway Floodplain Management Study and Plan 2012
- The Lake Macquarie Coastal Zone Management Plan 2015

We are planning now so that we are ready when the time comes to act.

The Council and community working group identified four areas of concern that are expected to be impacted by sea level rise:

Assets impacted

Commercial Business District (CBD), Pacific Highway, residential property, parks, reserves and foreshores, Swansea Bridge, boat ramps, roads and drainage, public land, seawalls and revetments, sewerage and other utilities, car parks, schools, clubs, churches and the Swansea Holiday Park.

Economic impacts

Disruption or damages to Business and Industry, insurance availability and cost, property value, cost of relocation, asset maintenance and repair, erosion of foreshore and seawalls, flood damages and risk to other suburbs in LGA.

Social impacts

Public health, community wellbeing, and lifestyle changes.

Environmental and Cultural Impacts

Loss of biodiversity, natural habitats and species, impacts to heritage buildings, artifacts, and culturally significant sites.

These areas of concern form the basis of our adaptation planning process. They establish a connection between the communities' key values, concerns, and vulnerabilities which are used to assess the risk from the impacts of climate change and sea level rise.

1.4 Regulatory, policy and planning framework

The following international, national, state and local instruments influence the need for a LAP and how it is designed and implemented:

International



The LAP is consistent with the Paris Agreement ratified by Australia in November 2016 which aims to 'strengthen the global response to the threat of climate change'. Local adaptation is a key part of the United Nation's (UN) Sustainable Development Goals and the UN Sendai Framework for Disaster Risk Reduction (2015-2030) which are included in Council's Environmental Sustainability Strategy and Action Plan.

National



The National Climate Resilience and Adaptation Strategy 2015 sets out how Australia is managing the risks of a variable and changing climate and includes principles to guide effective adaptation practice and resilience-building. The LAP is informed by the Strategy and also delivers on key aspects of the National Disaster Risk Reduction Framework and the National Strategy for Disaster Resilience Community Engagement Framework.

Council and the LAP Working Group also used the National Climate Change Adaptation Research Facility (NCCARF) and CoastAdapt resources to help understand and manage the risks associated with sea-level rise, storm surges and other hazards.

State



Council and the LAP Working Group identified over twenty pieces of legislation and policy documents influencing the design and implementation of local adaptation plans. Umwelt (2020) includes a summary of this regulatory framework and highlights:

- The NSW Coastal Management Framework including the Coastal Management Act 2016 and State Environmental Planning Policy (Coastal Management) 2018
- The Environmental Planning and Assessment Act 1979 (and amendments)
- The Local Government Act 1993.

The LAP is also consistent with the NSW Climate Change Policy objective for NSW to be more resilient to a changing climate. The Policy states that effective climate change adaptation occurs at a local level through the actions of individuals, businesses and communities in response to locally-specific climate change impacts.

Local

The need to prepare and implement LAPs is flagged as a priority in Council's 10-year Community Strategic Plan, 4-year Delivery Program and Annual Operational Plan and Budget - under the NSW Integrated Planning and Reporting (IP&R) framework (**Figure 1.2**).



Figure 1.2: How/where the LAP relates to the NSW Integrated Planning and Reporting Framework (IP&R).
*Where the LAP fits

Lake Macquarie City Community Strategic Plan 2017-2027 and Lake Macquarie Local Strategic Planning Statement 2020

"These documents plan the direction of change in Lake Macquarie as a City. The City has an aim to become a City of resilience; an adaptable city that has effective responses to social, climatic and economic change. They have actions to "develop and prepare adaptation plans to address current and emerging climate change risks".

4-year Delivery Program and 1-year Operational Plan and Budget

Local adaptation planning is a key action to support our City value of "Connected Communities". Objective 5.4, Strategy 5.4.1 of Council's Delivery Program and 2020-21 Operational Plan include actions to: "complete and implement the Pelican Blacksmiths and Swansea Local Adaptation Plans".

Lake Macquarie Waterway Flood Risk Management Study and Plan 2012

The 2012 Lake Macquarie Waterway Flood Risk Management Study and Plan (LMWFRMSP 2012) assessed lake flooding risk and evaluated measures to manage lake flooding and tidal inundation. The Study and Plan recommended Council, in consultation with affected communities:

- Undertake detailed assessment for each foreshore management area
- Consider the implications and adaptation measures available to plan for and mitigate the effects of sea level rise (flooding and tidal inundation).

Lake Macquarie Coastal Zone Management Plan (LMCZMP) 2015-2023

A key principle of the LMCZMP 2015-2023 is to: develop resilient coastal landscapes and communities with long-term strategies, including preparing and implementing LAPs. Council has also included local adaptation planning in the 2020 Scoping Report for the Lake Macquarie Coastal Management Program (CMP) currently being prepared.

Lake Macquarie Local Environmental Plan 2014 and Development Control Plan 2014

The Lake Macquarie Local Environmental Plan (LEP) 2014 and Lake Macquarie Development Control Plan (DCP) 2014 set out permissions and controls applying to development in the City as required under the NSW Environmental Planning and Assessment Act 1979. Current and future land use planning needs to be carefully considered in preparing and implementing LAPs.

Lake Macquarie Environmental Management Strategy 2020-27

Council's Environmental Sustainability Strategy and Action Plan (ESSAP) 2020-2027 includes management actions related to LAPs including:

- Develop and implement LAPs to address current and emerging climate change risks
- Through process, identify vulnerability of existing recreational facilities to sea level rise and maintain access to recreation facilities
- Implement actions in the Marks Point and Belmont South LAP.

1.5 Working together to adapt

Planning and acting for timely adaptation requires genuine collaboration with local residents, businesses and other stakeholders taking an active role in developing and implementing the plan. The activities of Council and the LAP Working Group have been

strongly informed by the work of Twyfords (2012)* including the Collaborative Governance Model involving a commitment to ongoing collaboration for Council and the community.

Who collaborated?

-  **5000+** residences and property owners in the LAP area received newsletters and ongoing updates during the period 2016-2021
-  **14,000+** reached via eNewsletters
-  **13,000+** Shape Lake Mac project site visits
-  **11,000+** reached on social media
-  **500+** people shared ideas, issues and values using online interactive maps and surveys
-  **400+** community and business representatives responded to online and mailout community surveys
-  **20+** resident and business representatives joined the joint community and Council working groups preparing the LAP
-  **5+** representatives of the LAP Working Group joined the Steering Committee overseeing the feasibility assessment and cost benefit analysis (2019-2020).

How we collaborated?

-  **200+** attended 3 community drop in sessions for Pelican/Blacksmiths and 4 community drop in sessions for Swansea and surrounds
-  **7** printed community newsletters distributed to residents and businesses: 3 for Pelican/Blacksmiths and 4 for Swansea/Surrounds
-  **50+** local business doorknocks across the 5 suburbs
-  **200+** people attended 4 community wide workshops between 2016 and 2019
-  **200+** attended the 5 "Let's Talk" information sessions held during 2018-2021
-  **10+** site inspections and field trips including a self-guided LAP hazards tour
-  **1** sea level rise and future flooding virtual reality demonstration
-  **10+** hazard fact/summary sheets prepared; posted online or distributed at community workshops and drop in sessions
-  **35+** LAP Working Group meetings held
-  **20+** LAP Subgroup and Steering Committee meetings held
-  **500+** community photographs received and catalogued
-  **5** Local Stories video from past and present community residents produced and distributed
-  **8+** Councillor and LM Coastal Management Committee LAP briefings.



See **Appendix 2** for details of the Council and Working Group's communications and engagement strategy and examples of activities, newsletters and surveys undertaken in preparing the LAP.

What did we find out?

Residents and business owners value their local area – there is a strong desire to stay in the area and adapt to future hazards.

Local people want to be involved in the planning and designing process, and their varied skill sets are priceless resources to these processes.

There is a strong shared belief to plan for the worst and act when necessary.

Current tidal inundation, sewerage, drainage and the threat of climate change and sea level rise are major concerns for the community.

Whilst there are some options that can be implemented now to deal with current inundation hazards, other options will need to be planned and implemented in the lead up to 2050-70 with projected sea level rise.

There are limitations to our knowledge and forecasting abilities. Council and the community need to: continue to strengthen their relationship; monitor, and evaluate hazards, and plan, act and adapt when and where necessary.

Other stakeholders involved in the development or review of this LAP include:

- NSW Department of Planning Industry and Environment (DPIE) staff have worked closely with the LAP working group to develop this Plan
- Consultants including Umwelt, Salients Engineers, and the Centre for International Economics (The CIE) have assisted in technical analysis supporting the LAP
- Utilities providers including Hunter Water, Telstra, and Jemena were provided a copy of the draft LAP for review and comment
- The NSW Department of Education and Transport for NSW were provided with a copy of the draft LAP for review and comment
- NSW State Emergency Service (SES) members contributed generously to the Swansea and Surround Hazard Assessment and provided invaluable community engagement sessions to support the LAP. The SES was provided with a copy of the draft LAP for review and comment.

Community workshop Swansea Centre 2019.





Pelican Blacksmiths Virtual Reality Visualisation Session
June 2016

1.6 LAP Objective and scope

Objective

"To adapt Pelican, Blacksmiths, Swansea, Swansea Heads and Caves Beach to the projected effects of sea level rise and the compounding issues associated with inundation, flooding, drainage, sewerage and major storm hazards, so that community wellbeing, economic prosperity, and our valuable lake, channel and coastal environment can be protected."

In this context, Council is using the 2007 IPCC definition of adaptation as: "action taken to avoid actual or anticipated impacts from climate change, or to attain potential benefits arising from climate change."

This objective is consistent with the Objects (Part 1; Section 3; a) to m.) of the NSW Coastal Management Act 2016 i.e. "to manage the coastal environment of New South Wales in a manner consistent with the principles of ecologically sustainable development for the social, cultural and economic well-being of the people of the State".

Scope

Table 1.1 presents an overview of the LAP scope and process followed by Council and the volunteer community working group developing the LAP. The scope and process looks linear, however in reality it involved a high degree of iteration as Council and the community learned more about emerging hazards and potential solutions requiring assessment before advancing to the plan.



Table 1.1 LAP Scope and community engagement framework.

A. Project foundations	B. Identify options	C. Assess options and prepare draft plan	D. Exhibit, approve, implement and review the plan
What will we do at each stage?			
<ul style="list-style-type: none"> • Involve everyone with a stake in the local area in the planning process • Understand current and future flood risks • Gather information on local assets and their value – physical, social, and environmental • Identify who should contribute to the project and how they will do it • Agree on the objectives of a successful adaptation plan • Develop criteria for a successful adaptation plan 	<ul style="list-style-type: none"> • Decide what options are available to reduce flood risk • Assess what is an acceptable level of risk (threshold) • Estimate when it is time to act (trigger) 	<ul style="list-style-type: none"> • Group and rank the options based on the criteria for successful adaptation • Identify when options should be implemented (link to triggers and thresholds, see left) • Identify the cost of options and who is responsible for implementing them • Prepare a draft LAP 	<ul style="list-style-type: none"> • Exhibit and seek feedback on the draft LAP • Elected Council to adopt the LAP • Allocate responsibility for, and schedule actions from, the LAP • Monitor and update the LAP as new information becomes available
How will we do it?			
<ul style="list-style-type: none"> • Inform and engage residents, property owners, agencies and service providers using a wide range of engagement tools • Provide contact, networking and feedback methods for residents, Council, and other participants • Gather and record information from residents, property owners, agencies and service providers • Make information understandable and available to all participants 	<ul style="list-style-type: none"> • Invite all residents and other participants to suggest options to manage risks • Establish methods of decision making that have community support and credibility • Clearly communicate barriers or limits to proposed options, such as legal and financial constraints 	<ul style="list-style-type: none"> • Make expert advice available on the pros and cons of proposed options • Review by participants of all options and nominate preferred options 	<ul style="list-style-type: none"> • Consider and respond to submissions and feedback, and revise the draft LAP • Ensure the final LAP is readily available and understood by all participants and the wider community • Report implementation of actions to the community • Review and change the LAP, with community input, in response to changes to law, policy, science, community expectations or technology

In addition to these steps, the LAP working group identified the following essential activities in the LAP’s development:

- The need to engage broader community and stakeholders including local residents and businesses to maximise participation and build knowledge both in personal and community sense

- Ensuring the LAP was consistent with the NSW Coastal Management Framework and that state government stakeholders were actively involved
- The need to develop and implement a comprehensive community engagement and communications plan.



SECTION 2: INVESTIGATION AND FINDINGS

2.1 LAP Working Group assessment of community identified hazards

For the most part, living so close to Lake Macquarie, Swansea Channel and our coast is a peaceful and idyllic existence. However, flooding in and around the LAP area has been a recognised hazard for some time as shown by historical records and responses to community surveys conducted as part of this LAP.

Understanding the nature, magnitude and occurrence of hazards will help predict impacts to our community now and into the future.

For our community, this could mean an increase in water levels, an increase in rainfall or storm surges, more regular flooding, and/or greater erosion and even wave overtopping of our channel and/or beaches.



Coastal hazards

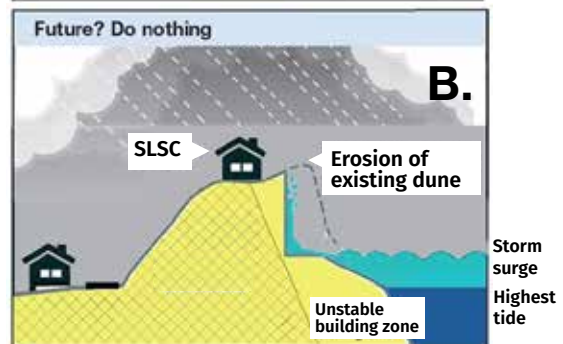
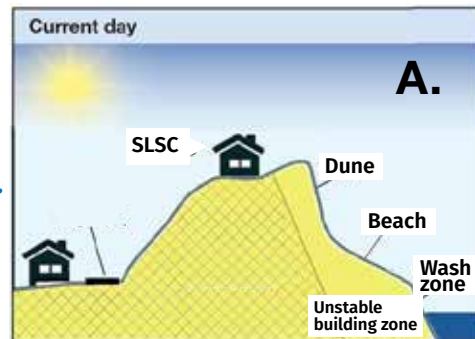
Include beach and dune erosion, recession and wave over-topping potentially leading to coastal inundation and damage to public and private assets. Influenced by a combination of factors including coastal storm events, East Coast Lows (ECLs), tides, sea level rise, beach and dune management.



Damage to Blacksmiths Beach access as a result of storm surge, June 2016. Left unchecked other assets could be damaged or lost.



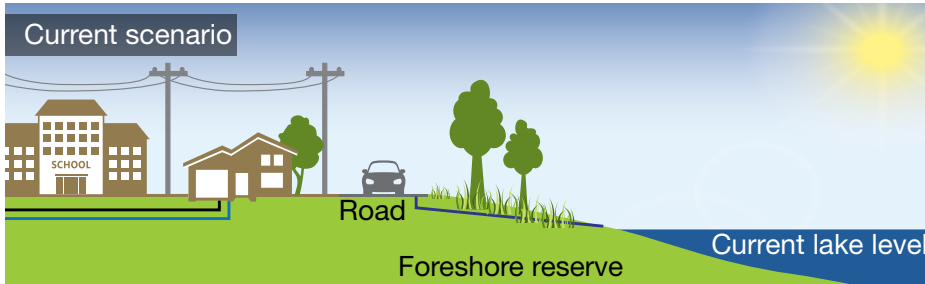
Over time Blacksmiths and Caves Beach Surf Clubs will be subject to coastal hazards and require replacement or relocation.



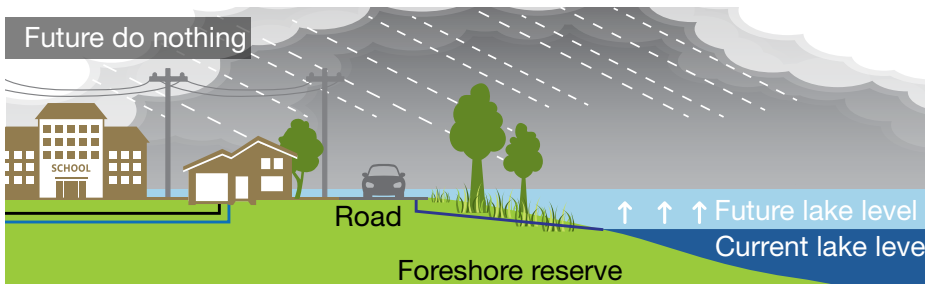


Tidal Inundation

Saltwater inundation of land, roads, assets and/or properties in and around the Swansea CBD and low-lying residential areas. Caused by the periodic rising of the Lake, Channel, and Ocean water levels due to tidal influence including king tides and/or tidal anomalies.



Tidal inundation of shared pathway, Pacific Highway Swansea, December 2018.



Tidal inundation of business entrance and roadway, Wood Street Swansea, January 2019

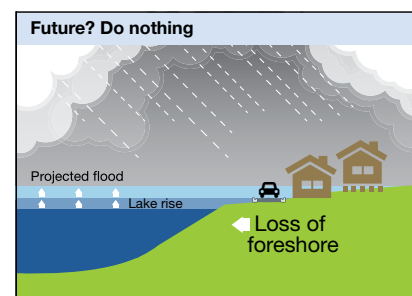
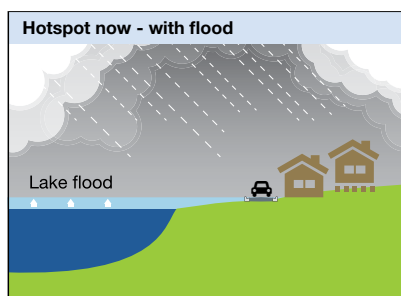
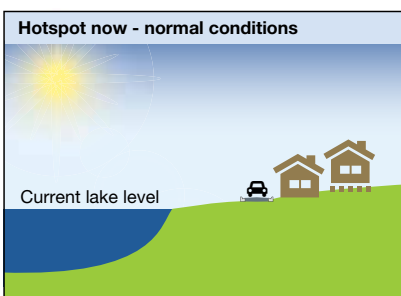


Lake Flooding

Flood waters impacting land, private and public assets. Caused by heavy rainfall on and around the lake and its catchment. Severity influenced by the amount and intensity of rainfall combined with other hazards including off-shore conditions, high tides and East-coast low events.



Burke st Swansea 9 June 2007

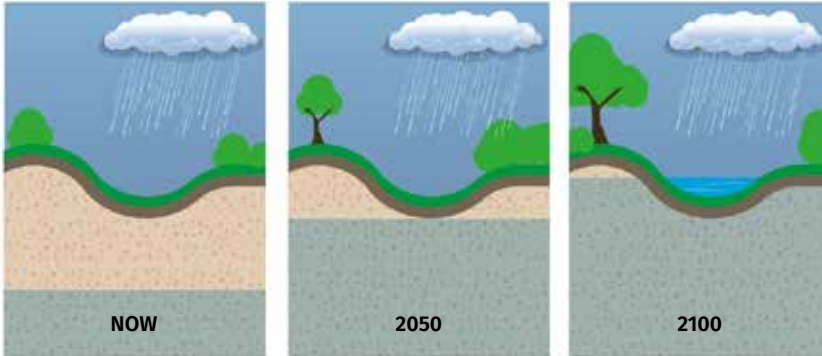


Current and potential impacts of flooding and induction - Pelican residential precinct.

GW

Groundwater

Water that flows below the ground surface, usually recharged through infiltration of rainwater into the ground. Groundwater in the LAP area can rise and fall depending on: 1. The amount of rainfall infiltrating into the ground 2. The water level in the lake, channel and ocean.



Groundwater levels in low-lying areas are projected to rise over time with lake and sea level rise

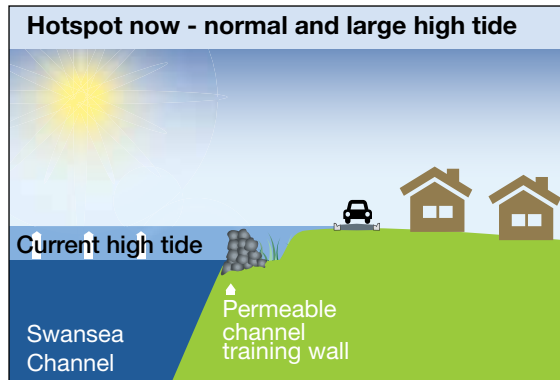


Raised groundwater at Pelican Foreshore Reserve following storm event of April 2015.

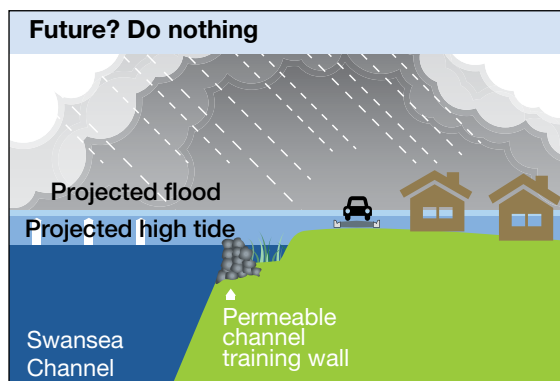
CD

Channel Dynamics

The changing behaviour and movement of Swansea Channel (connecting the Pacific Ocean and Lake Macquarie). The Channel is artificially held open by the breakwaters and will continue to evolve until it reaches a steady state, which is typically achieved by widening and meandering.



Channel evolution resulting in foreshore erosion at Pelican, 2020.



Swansea Wharf closure demonstrates the damage caused to assets by channel dynamics.

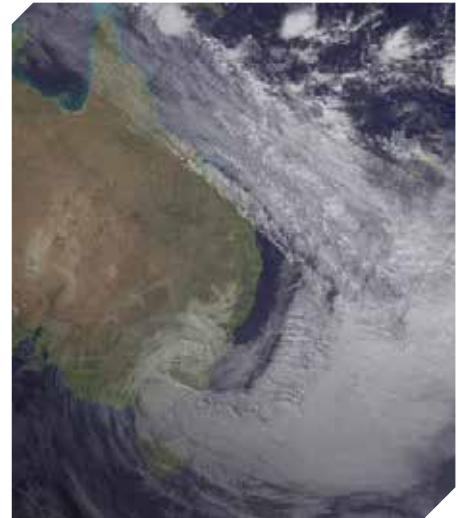
ECL/SS

East Coast Lows/Storm Surges

East coast lows (ECLs) are intense low-pressure systems that occur off the east coast of Australia. ECLs and storm surges can bring damaging winds, heavy rainfall and huge surf often exacerbating other coastal hazards, flooding and inundation.



2007 Superstorm damage.



East Coast Low dominated storm event
June 2007

The 2007 Pasha Bulker Storm was caused by an ECL that resulted in around 340mm of rain falling in some Lake Macquarie suburbs within 24hrs.

An estimated 10,000-15,000 properties were affected by flooding, with an estimated 1000 to 2000 properties experiencing over-floor flooding.

ER

Emergency Response

Whilst not defined as a hazard in the Coastal Management Framework, the LAP Working Group worked closely with the NSW SES to examine the issue. A community's response to flood hazards, especially during a flood event, can have a significant impact on safety for residents and visitors in the area.



SES members at Lake Macquarie community event.



Community and SES collaboration in emergency response planning (2019).

Community Assessment of Hazard Impact

Council and the (then) two LAP working groups assessed the seven hazards illustrated in the previous section for each of their respective areas (Pelican/Blacksmiths and Swansea/Surrounds).

Appendix 3 presents the results of the group's assessments both qualitative and, where possible, quantitative.

The findings of the Pelican/Blacksmiths LAP Working Group were shared with the wider community through community drop-ins, workshops, field trips and fact/hazard sheets described in **Appendix 2** and **Appendix 3.1**.

The findings of the Swansea/surrounds LAP working group assessments were presented at a community workshop at Swansea in August 2019 and hazard summary sheets provided in **Appendix 3.2**.

Figure 2.1 provides an example of the Council and Swansea LAP working group assessment by illustrating tidal inundation (TI) hazard impacts in and around Swansea. In particular, **Figure 2.1** shows how tidal inundation levels increase over time (from 2020 to 2050 to 2100) with corresponding potential increases in the number or extent of public and private assets impacted by projected sea level rise.

The projected water levels and estimated impacts to assets presented in the community hazard summaries was based on the best information available to Council and the working group at the time. The estimates were a "Council and citizen science" interpretation of previously conducted studies, reports and online applications (cited in the references section). As such, the limitations of this analysis are acknowledged. However, the indicative results of the working group hazard assessment met the purpose of the analysis and were an excellent foundation for community engagement activities.










									
	NUMBER OF HOUSES WITH FLOOR LEVELS IMPACTED	OVALS IMPACTED	NUMBER OF SEWER PUMPING STATIONS (15 IN TOTAL STUDY AREA)	NUMBER OF SCHOOLS AFFECTED	CAR PARKS (LISTED LAND AREAS NOT INDIVIDUAL SPACES)	HOLIDAY PARK	NUMBER OF BUILDING FOOTPRINTS AFFECTED	NUMBER OF COMMUNITY BUILDINGS AFFECTED	RESERVE LAND AFFECTED
NOW	0	0	0	0	0	0	0	0	1% affected 2260m ²
2050	1	0.3% affected 214m ² 1 sporting oval	0	1 (Swansea Public School)	6	2% affected 2,329m ²	55	0	51% affected 82,834m ²
2100	148	66% affected 38,255m ² 3 sporting ovals	7	1 (Swansea Public School)	18	64% affected 65,720m ²	1171	11	85% affected 137,717m ²

Figure 2.1: Community assessment of Tidal Inundation (TI) hazard impacts: Swansea and surrounds LAP area.

Note: the number/extent of impacted private and public assets presented above are estimates only and are based on Council's SLR benchmarks, IPCC projections, and Council flooding and coastal studies.

What about the environment?

The LAP working group concluded that sea level rise and associated coastal hazards will threaten wetlands and saltmarsh communities if they are unable to recede or adapt. NSW Coastal Management and Planning legislation recognises and protects State significant wetlands and vegetation. Careful adaptation and management will be required to protect biodiversity in a number of areas in and around the LAP area.

2.2 Modelling hazards and damages

In 2019, Council commissioned a detailed technical assessment of flooding in the LAP area. The assessment assisted in understanding the likelihood of flooding and addressed the requirements of the NSW Coastal Management Framework. This assessment, called a

Probabilistic Hazard and Damages Assessment (PHA) was carried out by Salients Consulting in 2019–20 to determine the probability of inundation hazards around the area from:

- Lake flooding
- Ocean flooding
- The combination of lake and ocean flooding.

The PHA developed a statistical model using historical data and best practice methods for the assessment of catchment flooding and ocean modelling to predict future lake and channel water levels between 2020 and 2120. **Figure 2.2** below (from the PHA report) shows the predicted increase in flood depths (in metres) for the LAP area in 2020 and 2070 for an extreme flooding event (i.e. a 1% Annual Exceedance Probability (AEP) flood = a 1% chance of occurring in any year).

The Salients model provided a list of water levels over time for hydraulically similar areas (termed Precinct Areas). Additionally, potential damages at 2020, 2040 and 2070 were presented for a range of public and private assets. **Appendix 4** includes a summary of the PHA report and a copy of the full report and presentation on the PHA is available at the Shape Lake Mac site Adapting Swansea.

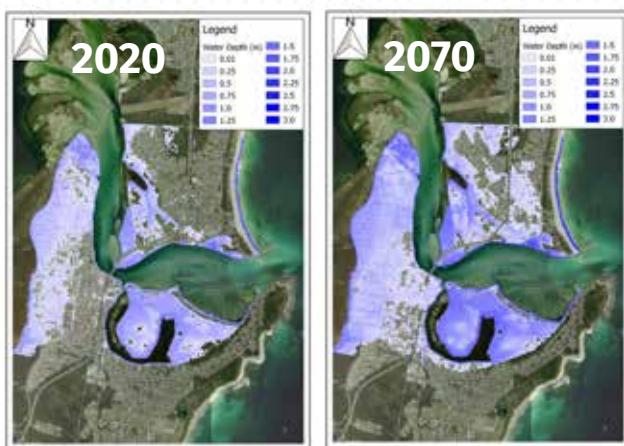


Figure 2.2: 1% Annual Exceedance Probability (AEP) Spatial Plot for the years 2020 and 2070, RCP 8.5.

Note: A 1% AEP event has a 1% chance of occurring in any year.

How does the PHA model compare to the community assessment of hazards?

The scope and process to prepare the LAP incorporated extensive input from, and discussion with, representatives of the community/working group, Council, State Government and consultants/technical advisors.

All provided valuable experience, perspective and professionalism that contributed to productive debate and improved rigor in the hazard assessment process (including the community assessment and PHA model).

Variances in some input parameters and assessment methods were expected because of the wide range of skills and experience of the contributors. As a result, the LAP is a much stronger and well-constructed document.

There was much debate around the community and Council (tidal) model and the technical inundation model produced in the PHA. The results of the PHA inundation model indicated that predicted inundation heights are less than the inundation heights predicted by the community and Council (tidal) model. Although there were variances between these models, both investigations determined that inundation damages are happening now and are increasing over-time, particularly in the years between 2050 and 2070.

The variances in inundation heights was largely due to the PHA model using over 100 years of tidal information from Fort Denison tidal gauge in Sydney plus 20–30 years of more recent data from tidal gauges in Lake Macquarie.

The community and Council tidal inundation assessment (presented in the Tidal Inundation Hazard Summary and **Figure 2.1**) used the Mean High Water Spring (MHWS) tidal data from 2010. This tidal inundation water level was extrapolated to the years 2050 and 2100 using Council sea level rise benchmarks (0.4m in 2050 and 0.9m in 2100) which are reasonably consistent with Intergovernmental Panel on Climate Change (IPCC) benchmarks. As flagged above, Council and some working group members were concerned about the difference in water levels and potential hazards/impacts projected by the two assessment methods. There was further concern that tidal levels used for both hazard assessment methods were 0.2m to 0.3m lower than water levels that had recently been observed/recorded in streets and gutters in the LAP area particularly in late 2017 and early 2018. This reinforced the need for Council and the community to not only monitor changes in water levels, but also put in place measures to enable timely implementation of adaptation measures when required.

It is important to acknowledge the extraordinary work undertaken by members of the LAP working group during their assessment of the hazards. Whilst the outcomes of the community and Council assessment and the consultant’s findings in the PHA vary in some aspects – Council and the community propose to review these variances as further data and scientific information becomes available. This review of information is included as an action in the LAP, and as part of the 10-year review of the LAP (outlined in **Section 3**).



High tide inundation (dry weather flooding) Byrnes Reserve Blacksmiths (circa 2018/19)

2.3 Identifying and assessing adaptation options

Preliminary community assessment

The community submitted over 180 adaptation options for assessment by the LAP working group. These options and the results of the preliminary assessment by the LAP working group are listed in **Appendix 5 and 6** for Pelican/Blacksmiths and Swansea, respectively.

Table 2.1 presents the criteria used by the (then separate) LAP working groups to assess the community adaptation options.

Short-listing and further feasibility and technical assessment of adaptation options

Figure 2.3 summarises the process that the LAP working group/s, consultants and Council used to review, assess and manage the adaptation options proposed by the community.

Council and the LAP working group collated and filtered options before referring them to Umwelt Consulting for more detailed technical assessment and a multi-criteria analysis (MCA).

Many of the community's suggested options were assessed as low risk/regrets options and advanced straight to the draft LAP. However, a small number of high risk/high cost options were recommended for further economic assessment using a cost benefit analysis (CBA).

The intent of the formal feasibility assessment (MCA and CBA), undertaken by Umwelt Consulting and the Centre for Economic Development (CIE) during 2019-20, was to assess working group findings against the NSW Coastal Management framework. This framework comprises the Coastal Management Act 2016, the Coastal Management SEPP 2018, and the NSW Coastal Management Manual (2018).

Table 2.1: Criteria for Preliminary Working Group Assessment

Criteria used by LAP working group to assess adaptation options	Pelican Blacksmiths Working Group Options Assessment	Swansea and Surrounds Working Group Options Assessment
Agreement with group objectives	✓	✓
Technical feasibility	✓	✓
Is it adaptable over time	✓	
Impacts on environment	✓	✓
Impacts on community wellbeing or values	✓	✓
Costs Vs. Benefits	✓	✓
Regulatory constraints		✓
Requirements for additional information or technical advice	✓	
Timing of option implementation	✓	
Responsibility and who pays	✓	

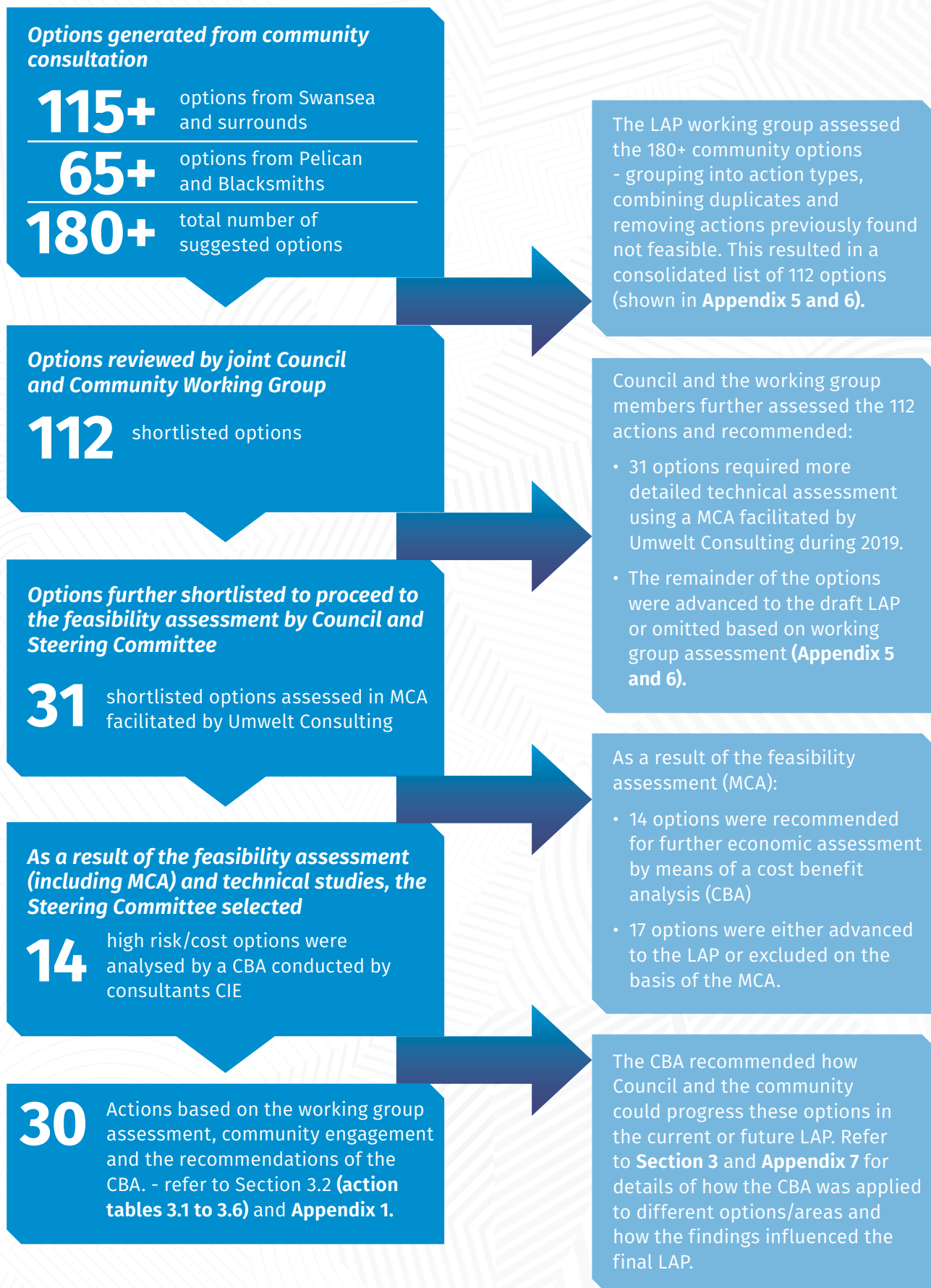


Figure 2.3: Flowchart of adaptation options assessment undertaken by LAP working group, consultants and Council.

The multi-criteria analysis explained

MCA is a tool to support decision making. Council engaged Umwelt Consulting to review the LAP working group's preliminary options assessment and facilitate a technical feasibility assessment and MCA.

The MCA involved assessment of 31 shortlisted adaptation options against 21 criteria derived from working group input and the NSW Coastal Management Framework. Working group members, consultants, Council and state government representatives participated in the MCA.

The MCA provided a way for Council and the Community working group to collaboratively balance these different perspectives to achieve agreement on the best way forward.

Appendix 7 includes a summary/excerpt from the feasibility study (and MCA).

The outcomes of the MCA included:

- Identifying community options that were either business as usual, or managed by other mechanisms such as Council's Coastal Zone Management Plan (2015) or upcoming Coastal Management Plan
- Identifying community options that were advanced to the local adaptation plan as they were considered low risk, or best practice
- A consolidated list of 31 community options assessed for engineering feasibility and a proposed subset of 14 high risk/cost options to be assessed by a CBA in accordance with the NSW Coastal Management Framework.

Detailed economic assessment explained

The economic assessment consisted of a CBA of the 14 'high risk/high cost' options recommended by the MCA, Council and working group members. The CIE carried out the CBA in 2020 under direction of a steering committee consisting of Council, working group and NSW DPIE representatives.

An understanding of the following points is important in interpreting the findings and recommendations of the CBA:

- The CBA methodology was based on NSW Treasury and NSW DPIE CBA guidelines
- The 14 options examined in the CBA are described in the CBA options guide included in **Appendix 7** along with the executive summary of the CBA
- As a result of the large number and diversity of options proposed by Council and the

community the CBA examined each of the options independently/separately rather than in a combined and/or sequenced way as might occur when actually implemented

- The CBA evaluated the economic feasibility of 9 of the 14 proposed options by comparing the present value (PV) costs and benefits of the options compared to a 'base case' (business as usual) scenario. For 5 of the 14 options a detailed quantitative CBA assessment wasn't possible and the assessment was based on a qualitative assessment with recommendations for future analysis
- The geographical scale and other assumptions made for each of the options varies considerably e.g. some relate neighbourhood/hotspot areas, others across the whole of the LAP area. For this reason, and because different options can address different hazards, it is difficult to make direct comparisons between dollar values of costs and benefits. Instead the results presented below focus on the benefit cost ratio (BCR) of each option. A BCR greater than 1 means benefits outweigh costs, a BCR less than 1 means costs outweigh benefits
- The CBA used a first pass of 'trigger values' (further discussed in **Section 2.3**) to assess when high risk/high cost options might be implemented.

Table 2.2: Net benefits and BCRs by option

Option	Description/Comment	Benefit cost ratio BCR
AC1	Raise and fill residential areas (house sites and yards)	0.44
AC2	Raise transport infrastructure (over and above gradual raising of roads through maintenance)	0.1
AC3	Raise other infrastructure (power, water, sewer, stormwater, telecommunications)	0.18
AC4	Raise and fill education land (schools)	0.01
AC5	Raise and fill public recreation land such as foreshore reserves and playing fields	0.34
AC6	Raise and fill Swansea Holiday Park	0.04
AC6B	Relocate Swansea Holiday Park	0.72
AC7	Raise and fill commercial land in the Central Business District (CBD)	0.05
CP4	Inundation protection works (or a levee) inside Black Ned's Bay	0.02
CP8A/ CP14	Staged Raising of Ungala Road, first near the boat ramp	n/a #
RA4, 5, 6	A range of options addressing future management of coastal wetlands	n/a #

Source: CIE. # note: The CBA considered these 5 options qualitatively rather quantitatively as a result of information/data limitations which are taken up in LAP recommendations.

Appendix 7 and the CBA report contain further details of each CBA option including location, scope, data sources, assumptions and costs/benefit values.

The CBA results show that the selected options (without additional sensitivity analysis applied) generate net costs, i.e. the costs outweigh the benefits and all options have BCRs less than 1. This is because the inundation risks are expected to be relatively low in the short term and most options assessed in the CBA require structural works involving a high capital cost that exceeds short term damages.

A key part of the CBA scope was to examine the sensitivity of some of the model constituents to variations that may occur as a result of the lack of data and/or uncertainties in model assumptions.

This is a normal part of CBA analysis and is recommended by the NSW Coastal Management Toolkit.

Sensitivities analysed in the CBA included construction costs and a difference in the future water levels compared to what was predicted in the PHA. **Table 2.3** presents the outcomes of a revised CBA model assuming that water levels in and around the LAP area will rise at a level greater than that predicted in the PHA.

Table 2.3: BCRs for water height sensitivities.

Option	Description/Comment	Benefit cost ratio
		BCR
AC1	Raise and fill residential areas (house sites and yards)	1.55
AC7	Raise and fill commercial land in the Central Business District (CBD)	0.12
CP4	Inundation protection works (or a levee) inside Black Ned's Bay	0.21

Appendix 7 and the CBA report contain further details of each CBA option including location, scope, data sources, assumptions and costs/benefit values.

The sensitivity analysis presented in **Table 2.3** suggests that CBA results are highly impacted by the underlying modelled inundation risk. With a higher water level, there is a BCR greater than 1 for Option AC1 i.e. benefits outweigh the costs.

However, the other two options still deliver a net cost for society under this particular sensitivity analysis.

Lessons learnt from the economic assessment

A significant outcome of the CBA was that it showed higher risk/cost options might not need to be triggered for implementation until they reach a certain 'tipping' point. This trigger for such high risk/cost actions is not expected until after 2050 and/or approaching 2070. As such, the CBA provides an indication of how much time we might have to prepare and how much time we might have to act.

The CBA shows the need to carefully scope, define and present model options (including combinations and sequencing) and to refine model assumptions as new information comes to hand.

The CBA also shows that if international action is not substantive at reducing our impact on the earth's climate, then potential acceleration in sea level rise will cause this 'tipping' point to occur earlier. This suggests the need for the continual review of new information and the regular re-examination of inundation and damages modelling.

In addition, the CBA included a distribution analysis to identify how cost and benefits of various options might be distributed across various parties/stakeholders in the LAP area e.g. Council, the NSW Government and other private and public asset owners and managers including residents, visitors, businesses and utility providers. This work will add to our understanding of the financial implications and potential funding models to support examined options if/when they are required.

Historical flooding, Charles Street, Swansea circa 1940's



2.4 Timing and Triggers

The intent of this LAP is for actions to be **trigger based**, particularly for larger, complex and/or costly actions. That is, actions can be planned and implemented depending on whether they are triggered by an event, such as rising water levels which reach a predefined threshold.

Trigger-based action will avoid maladaptation and actions will be implemented when and where necessary. The preparation for these actions should be completed in advance i.e. ‘shovel’ ready actions.

The LAP includes 30 actions ranging in scale and complexity. Some actions can be managed within Council’s existing operational frameworks while others will require extensive planning, stakeholder engagement, analysis, design and even piloting to understand the technical, social, ecological, and/or economic feasibility and suitability.

Table 2.4: Triggers used in the economic feasibility study.

Option	Trigger to raise land
AC1 - Raise and fill residential areas (house sites and yards)	10% AEP
AC2 - Raise transport infrastructure (over and above gradual raising of roads through maintenance)	This option was not trigger based – requires investigation
AC3 - Raise other infrastructure (power, water, sewer, stormwater, telecommunications)	This option was not trigger based – requires investigation
AC4 - Raise and fill education land (schools)	1% AEP
AC5 - Raise and fill public recreation land such as foreshore reserves and playing fields	This option was not trigger based – requires investigation
AC6 - Raise and fill Swansea Holiday Park	18% AEP
AC7 - Raise and fill commercial land in the Central Business District (CBD)	1% AEP

For further details on **Table 2.4** please see the economic feasibility study (*The CIE, 2020*) and **Appendix 7**.
AEP = Annual Exceedance Probability and means the probability (%) an inundation event (m AHD) would occur in any year.

There are two timescales:

- **A 10-year action plan (Section 3, Tables 3.1 to 3.6):** During the first 10 years of this LAP, there are no actions that are expected to be triggered by rising sea levels. This is mostly because climate change and sea level rise occur over a longer period. This 10-year action plan is the first stage of a longer-term strategic plan to adapt to climate change and sea level rise.
- **A longer-term strategic plan (Figure 2.5, page 27):** In the longer term, trigger values will play an important role in determining when actions will be implemented as rising water levels begin to have a larger impact on these communities.

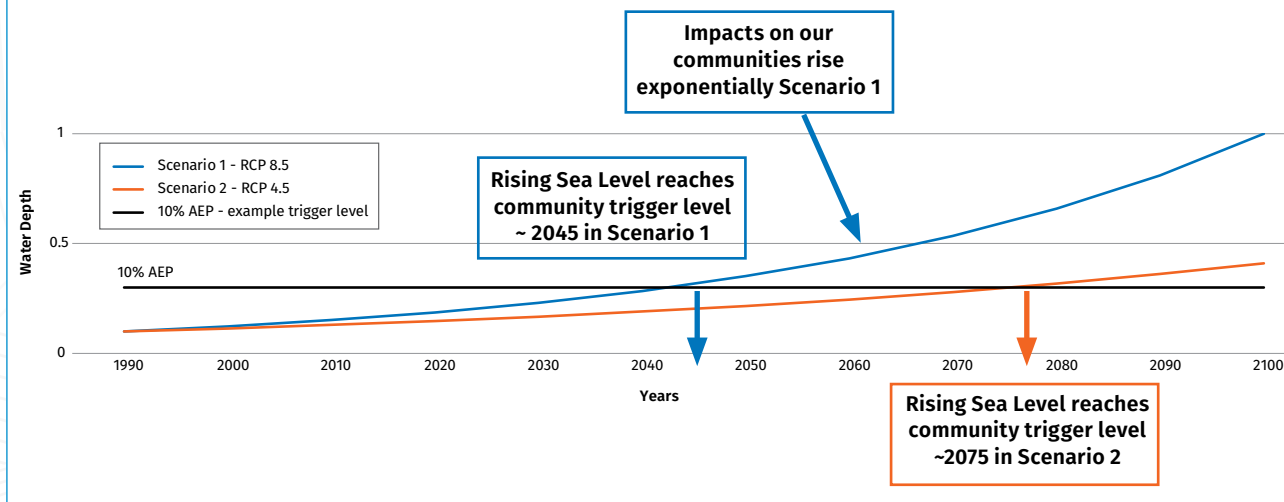
Triggers for the hazard of flooding and sea level rise were adopted for the purposes of the economic feasibility study as shown in **Table 2.4**. In the future, if a specific flood event (e.g. 10% AEP, 1% AEP etc.) reaches the base of a property or asset, this would trigger an action to raise the land and asset. The triggers used in the economic feasibility study will be reviewed and updated as part of the 10-year action plan.

The timing of the 10-year action plan has been based on internal and external discussions with key stakeholders during the drafting of this LAP and the estimated scheduling of works can be seen in **Section 3, Tables 3.1 to 3.6** with additional details shown in **Appendix 1**.

Figure 2.5 below provides an indication of the longer-term adaptation strategy and shows a simplified version of two sea level rise scenarios. Scenario 1 is the predicted sea level rise scenario adopted by Council and based on IPCC projections. Scenario 2 is an example of a possible trend if greater action is taken internationally to address climate change issues. **Figure 2.5** below is provided as an example of the variability in sea level rise based on potential international cooperation to tackle climate change, and does not reflect any modelling completed during the LAP.

This LAP attempts to address existing issues and future impacts due to climate change and sea level rise. By setting actions based on trigger levels then the proposed timeframes shown in **Figure 2.5** are fluid and will likely be updated pending new information and/or advances in science and technology.

Figure 2.5: Longer term strategic plan - driven by triggers



Simplified Long-term Adaptation Strategy	1	Implement actions in this 10-year LAP								
	2		Every 10 years: review LAP and develop updated 10-year Plan							
	3	Further research and planning 'shovel ready' projects								
	4		Implement 'shovel ready' projects as necessary							
	5		Damages to properties begin to increase significantly; review updated sea level rise projections and implement raise and fill projects as required and begin to implement hard protection measures.							
Dates		2020s	2030s	2040s	2050s	2060s	2070s	2080s	2090s	2100s

LAP Implement, Monitor and Review

- For each decade the LAP will have a series of actions that are to be implemented. The first 10-year LAP action plan can be seen in **Section 3**. There are actions that will be implemented within 10 years while there are other actions that will support/inform future actions in successive LAPs.
- The LAP will be reviewed every 10 years. This review will include information collected over the previous 10 years and any updated information. Furthermore, additional consultation with the community and other stakeholders will be undertaken to update the LAP and implement actions, based on the best available information, for another 10 years.

Shovel Ready Projects

- During the 10-year LAP implementation, there will be a number of actions that include pilot projects, research opportunities and areas for innovation. This information will be regularly monitored and reviewed. The information gained during these 10 years will supply the backbone to support 'shovel ready' projects.
- Following the 10-year review of the LAP, it is expected that there will be several 'shovel ready' projects that may need to be implemented when necessary. These projects would only be implemented when water levels reach a trigger level. Some of these trigger points for implementation of projects were identified in the economic feasibility study (see **Table 2.4**).

Increasing Damages Past 2050

- Based on the results of the Council and Community hazard analysis, the PHA and the economic feasibility study, it is expected that damages begin to increase significantly after 2050 and dramatically as we approach the year 2070. These dates can be used as a 'litmus' type indicator of when more costly adaptation measures might be implemented. These 'big ticket' actions are expected to be 'shovel ready' by the time they need to be implemented. Securing adequate funding for these adaptation actions is an essential action of the LAP.



SECTION 3: RECOMMENDATIONS AND PLAN



3.1 Recommendations

A significant early finding of this LAP is that the LAP communities are committed to continuing the lifestyle that they currently enjoy for the foreseeable future. Their focus is adaptation in place. This highlights the need for recommendations that help to maintain and enhance community resilience – the ability to prepare for, adapt to, and recover from uncertainty and adversity.

The following recommendations are provided on the basis of extensive hazard and options assessment activities undertaken by Council, community members and professional experts in coastal planning and management. Many of these activities incorporate a high degree of co-design or collaboration between Council, the community and other stakeholders.

It is important to recognise that this ongoing relationship will be crucial for the implementation, review and improvement of this LAP and our shared adaptation pathways.

The economic feasibility study (CBA) analysed a number of high risk/high cost options and provided several recommendations that are relevant for most actions within this LAP. Whilst the results of the CBA did not support the immediate implementation of high risk/high cost options, it is important that this is not interpreted as encouraging Council and the community to 'do nothing'.

The results highlight that there is time to conduct further robust planning to ensure that the future actions provide the best 'value for money' for the community.

Trigger based implementation of actions

1. Technical modelling and community assessments demonstrate that the level of risk and damage related to inundation increases substantially after 2050. It is recommended that trigger levels be further developed as the driver for LAP actions including programed maintenance and high cost/high risk actions. Trigger levels and LAP actions need to be well understood and 'shovel ready' before 2050.

Enhanced monitoring to respond and adapt to inundation risks

2. Water level data is updated regularly and techniques for modelling catchment and ocean processes are continuously improved. As such, it is recommended that water levels are regularly monitored and reviewed while updating modelling and actions accordingly.

Continued planning of actions

3. Existing data could be improved with additional assessments and research. This may include such things as elevation data, financial data, recreational land use data, wetland retreat or accretion research and an assessment of the community values of wetlands.
4. There needs to be consideration of when approvals are required from relevant authorities and agreements in principle from property owners affected (including where access to a property is required for construction works).

Interlinkages between the different actions

5. At the neighbourhood scale, the interlinkages of actions will be important and it is recommended that piloting of sequenced actions be undertaken at a high-risk area i.e. at a street, block or neighbourhood level which faces a high risk.
6. Given that different assets are owned by different service providers (e.g. Hunter Water, Telstra and others) this will further complicate the coordination/sequencing of options to manage inundation risk. It will be important to work closely with these authorities to understand the risks to the different properties/assets and potential solutions to manage the risks. This will ensure alignment with the capital works programs of the different asset owners.

Funding and governance

7. Funding of short, medium and long term adaptation actions is critical. The staging and sequenced integration of actions will be undertaken to spread costs over several years. The NSW Coastal Management Framework reflects a beneficiary pays approach to coastal management, and by definition, sea level rise and climate change adaptation. Council and the community have identified that further work is required on funding models and determining distribution aspects of adaptation measures. Council will investigate funding models including capital reserves or pooled funds to minimise 'spikes' in funds required in any particular year. Council will also lobby State and Federal Governments to help mitigate climate change impacts and provide funding support.

3.2 The 10-year Action Plan

The LAP action plan (Tables 3.1 to 3.6) includes the 10-year implementation plan outlining agreed 30 actions requiring attention in the next decade (2021-31). These options were co-designed by the Community and Council and are based on the premise of prepare now; act when necessary.

There are actions in this 10-year LAP that have already commenced and actions that build upon existing Council management and maintenance.

Appendix 1 presents more detailed descriptions of each of the 30 LAP actions.

The 6 LAP actions tables have been grouped as:

- 3.1: On Ground Works Actions
- 3.2: Policy, Planning and Development Actions
- 3.3: Maintenance Monitoring and Reporting
- 3.4: Piloting Research and Innovation
- 3.5: Advocacy and Engagement
- 3.6: Governance and Funding

Hazards Addressed = summary of identified hazards

- LF** Lake flooding
- TI** Tidal inundation
- ECL** East Coast lows and storm surges
- CD** Channel dynamics
- GW** Groundwater
- CH** Coastal hazard
- ER** Emergency response

10-year Action Plan, i.e. key stages/timeline:

- Commenced = action started in some way e.g. start planning, research, pilot, education or on-ground works
- Implement = working on action
- Ongoing/monitor/maintain/review = action completed and/or being monitored, maintained, reviewed
- Completed = action completed.

Description of Action

ID# = Identification number

Summary of 10-year action plan key stages

ID #	Management Action Summary (further detail of actions presented in Appendix 1)	Hazard/s Addressed	Location	Cost	Responsibility	10-year action plan (2021/22-2031/32)			
OG-1	Implement Pelican Foreshore Remediation Project (Naru Point to Pelican Groynes) - pending approval and funding	CD TI LF	Pelican, channel	\$10M-\$20M	Council, Crown, NSW MIDO, private and/or public asset owner/manager	○ Commenced action (if not already commenced) ▨ Detailed scoping and design/approval ▩ Implement ▧ Ongoing/monitor/maintain/review ● Completed			
OG-2	Complete Swansea CBD tidal gates pilot and subject to review extend to priority drains in Swansea CBD and other impacted areas	TI ECL	Swansea CBD, others as prioritised	\$50K - \$100K Pilot; \$200K-\$500K dependent on outcomes of Pilot	Council, private and/or public asset owner/manager				
OG-3	Maintain and augment as necessary Channel and lake foreshore protection works	CD TI ECL LF	Various - lake and channel	\$0.1M - \$0.4M PA	Council, Crown, NSW MIDO, private and/or public asset owner/manager				
OG-4	Raise residential floor levels and fill property to maintain floor and ground levels above lake, channel and groundwater	CD TI LF GW ECL CH	Various - lake and channel	>\$400,000 from cba for one high risk area	Council, Utilities, private and/or public asset owner/manager				
OG-5	Raise and improve the design and functionality of roads and drainage in impacted areas as lake, channel and sea levels rise	TI ECL GW TI	Swansea CBD, Swansea Residential, others as prioritised	>\$35,000,000 from cba (gradual raising of multiple roads across LAP area)	Council and utilities				
OG-6	Raise and fill CBD to ensure access and functionality and ensure social and economic sustainability	LF ECL	Swansea CBD	>\$380,000 from cba	Council, Crown, private and/or public asset owner/manager				
OG-7	Actively manage beach and dune integrity. Implement stabilisation works in accordance with LMCZMP (2015), CMP (currently being prepared) and monitoring	CH ECL	Blacksmiths, others as identified by monitoring and reporting	\$0.2M - \$0.5M PA TBC	Council, Crown, private and/or public asset owner/manager				
Approximate Timeline									
						1-year	4-year	10-year	2031+(review)
Summary									
Total number of commenced actions						7	0	0	
Total number of actions undergoing detailed scoping and design/approval						2	1	3	
Total number of actions being implemented						1	2	2	
Total number of actions with ongoing maintenance, monitoring, and/or review						0	1	2	
Total number of actions completed						0	0	2	
						1-year	4-year	10-year	
Commentary Two options have already commenced site specific actions (OG-1 and OG-2) and Council aims to construct/implement these hard measures within 4-years. Ongoing monitoring or maintenance will be required for most on-ground works. Actions for raising and filling of land require additional information, particularly regarding the concurrent raising of properties, assets, and roads in targeted high risk areas.									
KEY LF Lake flooding TI Tidal inundation ECL East Coast Lows and storm surges CD Channel dynamics GW Groundwater CH Coastal hazard ER Emergency response									

Indicators of progress for 10-year action plan

Overview of the current status of the actions in this category

Table 3.1: On-ground works action plan

ID #	Management Action Summary (further detail of actions presented in Appendix 1)	Hazard/s Addressed	Location	Cost	Responsibility	10-year action plan (2021/22-2031/32)				
						1-year	4-year	10-year	2031+(review)	
OG-1	Implement Pelican Foreshore Remediation Project (Naru Point to Pelican Groynes) - pending approval and funding	CD TI LF	Pelican, channel	\$10M-\$20M	Council, Crown, NSW MIDO, private and/or public asset owner/manager	○	▨	▨	▨	▨
OG-2	Complete Swansea CBD tidal gates pilot and subject to review extend to priority drains in Swansea CBD and other impacted areas	TI ECL	Swansea CBD, others as prioritised	\$50K - \$100K Pilot; \$200K-\$500K dependent on outcomes of Pilot	Council, private and/or public asset owner/manager	▨	▨	▨	▨	●
OG-3	Maintain and augment as necessary Channel and lake foreshore protection works	CD TI ECL LF	Various - lake and channel	\$0.1M - \$0.4M PA	Council, Crown, NSW MIDO, private and/or public asset owner/manager	▨	▨	▨	▨	▨
OG-4	Raise residential floor levels and fill property to maintain floor and ground levels above lake, channel and groundwater	CD TI LF GW ECL CH	Various - lake and channel	>\$400,000 from cba for one high risk area	Council, Utilities, private and/or public asset owner/manager	○				▨
OG-5	Raise and improve the design and functionality of roads and drainage in impacted areas as lake, channel and sea levels rise	TI ECL GW TI	Swansea CBD, Swansea Residential, others as prioritised	>\$35,000,000 from cba (gradual raising of multiple roads across LAP area)	Council and utilities	○				▨
OG-6	Raise and fill CBD to ensure access and functionality and ensure social and economic sustainability	LF ECL	Swansea CBD	>\$380,000 from cba	Council, Crown, private and/or public asset owner/manager	○				▨
OG-7	Actively manage beach and dune integrity. Implement stabilisation works in accordance with LMCZMP (2015), CMP (currently being prepared) and monitoring	CH ECL	Blacksmiths, others as identified by monitoring and reporting	\$0.2M - \$0.5M PA TBC	Council, Crown, private and/or public asset owner/manager	○				▨
Approximate Timeline										
						1-year	4-year	10-year	2031+(review)	

Summary

Total number of commenced actions	7	0	0
Total number of actions undergoing detailed scoping and design/approval	2	1	3
Total number of actions being implemented	1	2	2
Total number of actions with ongoing maintenance, monitoring, and/or review	0	1	2
Total number of actions completed	0	0	2
	1-year	4-year	10-year

Commentary Two options have already commenced site specific actions (OG-1 and OG-2) and Council aims to construct/implement these hard measures within 4-years. Ongoing monitoring or maintenance will be required for most on-ground works. Actions for raising and filling of land require additional information, particularly regarding the concurrent raising of properties, assets, and roads in targeted high risk areas.

Table 3.3: Maintenance, monitoring and reporting action plan

ID #	Management Action Summary (further detail of actions presented in Appendix 1)	Hazard/s Addressed	Location	Cost	Responsibility	10-year action plan (2021/22-2031/32)				
						1-year	4-year	10-year	2031+(review)	
MMR-1	Monitor and review new scientific evidence and data/information on flooding, sea level rise risk and other coastal hazards in order to review/revise Local Adaptation Plan as necessary	<div style="display: flex; flex-wrap: wrap; gap: 5px;"> <div style="background-color: #0070c0; color: white; padding: 2px;">CD</div> <div style="background-color: #0070c0; color: white; padding: 2px;">TI</div> <div style="background-color: #0070c0; color: white; padding: 2px;">LF</div> <div style="background-color: #0070c0; color: white; padding: 2px;">GW</div> <div style="background-color: #0070c0; color: white; padding: 2px;">ECL</div> <div style="background-color: #0070c0; color: white; padding: 2px;">CH</div> </div>	All	\$0.1M-\$0.2M	Council, NSW DPIE					
MMR-2	Undertake a detailed survey of Swansea Channel morphology and asset condition every 5 years (2025/26 and 2030/31) to monitor channel dynamics and the impact of channel management practices including dredging	<div style="display: flex; flex-wrap: wrap; gap: 5px;"> <div style="background-color: #0070c0; color: white; padding: 2px;">TI</div> <div style="background-color: #0070c0; color: white; padding: 2px;">ECL</div> <div style="background-color: #0070c0; color: white; padding: 2px;">CH</div> </div>	All	\$0.1M-\$0.2M	Council, Crown/MIDO TBC					
MMR-3	Adjust programmed monitoring and maintenance of Council roads, stormwater/drainage infrastructure, channel revetments and other assets to ensure asset condition is maintained and consistent with agreed adaptation triggers	<div style="display: flex; flex-wrap: wrap; gap: 5px;"> <div style="background-color: #0070c0; color: white; padding: 2px;">TI</div> <div style="background-color: #0070c0; color: white; padding: 2px;">LF</div> <div style="background-color: #0070c0; color: white; padding: 2px;">CH</div> <div style="background-color: #0070c0; color: white; padding: 2px;">ECL</div> </div>	All	\$0.1M-\$0.5M PA	Council, Crown, NSW MIDO, private and/or public asset owner/manager					
MMR-4	Targeted monitoring and reporting of hazards and regular comparison to existing triggers for action e.g. monitoring and reporting of water levels in ocean, lake and channel; inundation frequency, extent and duration	<div style="display: flex; flex-wrap: wrap; gap: 5px;"> <div style="background-color: #0070c0; color: white; padding: 2px;">CD</div> <div style="background-color: #0070c0; color: white; padding: 2px;">TI</div> <div style="background-color: #0070c0; color: white; padding: 2px;">LF</div> <div style="background-color: #0070c0; color: white; padding: 2px;">GW</div> <div style="background-color: #0070c0; color: white; padding: 2px;">ECL</div> <div style="background-color: #0070c0; color: white; padding: 2px;">CH</div> </div>	All	\$0.1M-\$0.2M	Council					
Approximate Timeline						1-year	4-year	10-year	2031+(review)	

Summary

Total number of commenced actions	0	0	0	0
Total number of actions undergoing detailed scoping and design/approval	0	0	0	0
Total number of actions to be implemented	0	0	0	0
Total number of actions with ongoing maintenance, monitoring, and/or review	4	4	4	4
Total number of actions completed	0	0	0	1
	1-year	4-year	10-year	10-year

Commentary The general aim with monitoring, maintenance, and reporting is to adapt existing measures and introduce some new measures above what is currently being conducted at Council. Ensure monitoring and reporting initiatives are effective in driving implementation of actions tied to early intervention/established triggers. There will be some planning and site specific investigations required to ensure that any adjustment/improvement to maintenance, monitoring and reporting actions are effectively established in Council programming.

KEY LF Lake flooding TI Tidal inundation ECL East Coast Lows and storm surges CD Channel dynamics GW Groundwater CH Coastal hazard ER Emergency response

Table 3.4: Piloting, research and innovation action plan

ID #	Management Action Summary (further detail of actions presented in Appendix 1)	Hazard/s Addressed	Location	Cost	Responsibility	10-year action plan (2021/22-2031/32)				
						1-year	4-year	10-year	2031+(review)	
PRI-1	Regularly review research outcomes, case studies and actions arising from adaptation programs in other locations to consider and incorporate where possible those feasible for application in our local setting	CD TI LF GW ECL CH	All	\$0.1M - \$0.2M	Council	○				
PRI-2	Further investigate the feasibility of options to protect wetland assets in the LAP area by such means as: raising wetlands in-situ, allowing wetlands to move landward and offsetting wetlands elsewhere in response to projected sea level rise	CD TI LF ECL	All	\$0.1M - \$0.5M	Council	○	●	●		
PRI-3	Further investigate the usage and values of the diverse recreational land assets that are subject to flooding and sea level rise. Ensure that future management of recreational land in the area considers LAP hazards and adaptation options	CD TI LF GW ECL	All	\$0.1M - \$0.2M	Council	○	●	●		
PRI-4	Council consider the outcomes of the options assessment (MCA and CBA) undertaken on Swansea Holiday Park in its current and future strategic planning for management of holiday park assets in the LAP area	CD TI LF GW ECL CH	Swansea	\$0.1-\$0.5M	Council	○	●	●		
PRI-5	Further investigate adaptation options for Black Ned's Bay foreshore at the vulnerable residential area between Black Ned's Bay and the Pacific Highway	TI ECL LF	Black Ned's Bay	\$0.1-\$0.5M	Council, Crown, private and/or public asset owner/manager	○	●	●		
PRI-6	Promote research, development and piloting of flood resilient and adaptable design and construction methods to support residential and business development in the area. Particular focus on collaboration with Hunter Water and the University of Newcastle to investigate adaptation pilots	CD TI LF GW ECL	All	\$0.1M - \$0.5M	Council, Hunter Water, University of Newcastle, private and/or public asset owner/managers	○	●	●		
PRI-7	Continue to investigate the suitability of existing, new and/or revised trigger levels to inform the timely implementation of agreed adaptation actions	LF GW ECL CH	All	\$0.1-\$0.2M	Council	○	●	●		
Summary						Approximate Timeline				
Total number of commenced actions						5	2	0		
Total number of actions undergoing detailed scoping and design/approval						4	3	0		
Total number of actions being implemented						0	3	4		
Total number of actions with ongoing maintenance, monitoring, and/or review						0	1	3		
Total number of actions completed						0	1	5		
						1-year	4-year	10-year		

Commentary Research, piloting, and innovation actions aim to: 1. Expand our knowledge and understanding to assist with establishing "shovel-ready" projects, and; 2. Facilitate innovative adaptation such that future actions not only decrease risk but improve the liveability, functionality, resilience and sustainability of the LAP areas. Many of these options will comprise of reviewing or researching specific actions that might lead to small pilot projects. This information will develop a large body of literature that fill data gaps and assist with the review of the LAP in 10-years.

Table 3.5: Advocacy and engagement action plan

ID #	Management Action Summary (further detail of actions presented in Appendix 1)	Hazard/s Addressed	Location	Cost	Responsibility	10-year action plan (2021/22-2031/32)				
						○ Commence action (if not already commenced)	▨ Detailed scoping and design/approval	▨ Implement	▨ Ongoing/monitor/maintain/review	● Completed
AE-1	Enhance collaboration with Transport for NSW regarding potential upgrades of Pacific Highway to ensure accessibility of the area, and consistency with other LAP actions.	TI GW ECL	Swansea	<\$0.1M	Council, Transport for NSW	○	▨	▨	▨	▨
AE-2	Enhance collaboration with utility providers such as Hunter Water, Origin Energy, AGL, and Telstra ensuring that infrastructure potentially affected by SLR is identified and considered in forward planning to ensure timely adaptation.	CD TI LF GW ECL CH	All suburbs	<\$0.1M	Council, Utilities	○	▨	▨	▨	▨
AE-3	Targeted advocacy for community and industry to take up of flood resilient and adaptive residential and commercial buildings design and construction in the area and promote pilots and case studies	CD TI LF GW ECL CH	All suburbs	\$0.1-\$0.2M	Council, Utilities, private and/or public asset owner/manager	○	▨	▨	▨	▨
AE-4	Enhance collaboration with the community, State agencies and NGO's to build community resilience including but not limited to emergency preparedness and response to ensure community resilience is maintained and enhanced	CD TI LF GW ECL CH ER	All - particularly in locations and community sectors more vulnerable to flooding and sea level rise hazards	\$0.1M-\$2M	Council	○	▨	▨	▨	▨
Approximate Timeline						1-year	4-year	10-year	2031+(review)	

Summary

Total number of commenced actions	3	1	0	
Total number of actions undergoing detailed scoping and design/approval	0	4	2	
Total number of actions being implemented	0	0	2	
Total number of actions with ongoing maintenance, monitoring, and/or review	0	0	0	
Total number of actions completed	0	0	0	
1-year				
4-year				
10-year				

Commentary Advocacy and engagement options are to ensure that Council will continue to (and improve) collaboration, coordinated action and advocacy for action with key stakeholders such as Utility providers, Transport for NSW, other State agencies and NGO's.

KEY LF Lake flooding TI Tidal inundation ECL East Coast Lows and storm surges CD Channel dynamics GW Groundwater CH Coastal hazard ER Emergency response

Table 3.6: Governance and funding action plan

ID #	Management Action Summary (further detail of actions presented in Appendix 1)	Hazard/s Addressed	Location	Cost	Responsibility	10-year action plan (2021/22-2031/32)				
						1-year	4-year	10-year	2031+(review)	10-year+(review)
GF-1	Maintain and enhance community participation and engagement measures to ensure an ongoing two-way relationship with Council and the community in the implementation and review of the LAP	<div style="display: flex; flex-wrap: wrap; gap: 5px;"> <div style="background-color: #0070C0; color: white; padding: 2px 5px; margin: 2px;">CD</div> <div style="background-color: #0070C0; color: white; padding: 2px 5px; margin: 2px;">TI</div> <div style="background-color: #0070C0; color: white; padding: 2px 5px; margin: 2px;">LF</div> <div style="background-color: #0070C0; color: white; padding: 2px 5px; margin: 2px;">GW</div> <div style="background-color: #0070C0; color: white; padding: 2px 5px; margin: 2px;">ECL</div> <div style="background-color: #0070C0; color: white; padding: 2px 5px; margin: 2px;">CH</div> </div>	All	0.1M-\$0.2M	Council, others TBC	●	●	●	●	●
GF-2	In accordance with the NSW Coastal Management Framework, ensure ongoing coordination between all levels of Government for consistent and uniform management of coastal resources to enable LAP implementation	<div style="display: flex; flex-wrap: wrap; gap: 5px;"> <div style="background-color: #0070C0; color: white; padding: 2px 5px; margin: 2px;">CD</div> <div style="background-color: #0070C0; color: white; padding: 2px 5px; margin: 2px;">TI</div> <div style="background-color: #0070C0; color: white; padding: 2px 5px; margin: 2px;">LF</div> <div style="background-color: #0070C0; color: white; padding: 2px 5px; margin: 2px;">GW</div> <div style="background-color: #0070C0; color: white; padding: 2px 5px; margin: 2px;">ECL</div> <div style="background-color: #0070C0; color: white; padding: 2px 5px; margin: 2px;">CH</div> </div>	All	Various as per CMP	Council, others TBC	●	●	●	●	●
GF-3	Investigate the feasibility of establishing a capital reserve and/or other funding or resourcing measures consistent with the NSW Local Government Act and Coastal Management Program to meet current and emerging LAP recommendations and future climate change adaptation programs	<div style="display: flex; flex-wrap: wrap; gap: 5px;"> <div style="background-color: #0070C0; color: white; padding: 2px 5px; margin: 2px;">CD</div> <div style="background-color: #0070C0; color: white; padding: 2px 5px; margin: 2px;">TI</div> <div style="background-color: #0070C0; color: white; padding: 2px 5px; margin: 2px;">LF</div> <div style="background-color: #0070C0; color: white; padding: 2px 5px; margin: 2px;">GW</div> <div style="background-color: #0070C0; color: white; padding: 2px 5px; margin: 2px;">ECL</div> <div style="background-color: #0070C0; color: white; padding: 2px 5px; margin: 2px;">CH</div> </div>	All	TBC	Council	●	●	●	●	●
Approximate Timeline										
Summary						1	1	1	0	
Total number of commenced actions						1	1	1	0	
Total number of actions undergoing detailed scoping and design/approval						0	1	1	1	
Total number of actions being implemented						1	1	1	2	
Total number of actions with ongoing maintenance, monitoring, and/or review						0	0	0	1	
						1-year	4-year	10-year	10-year	

Commentary These actions are to ensure that Council establish and improve community engagement, involvement of the community in Council Governance, enhance cross-departmental coordination and communication, and research into innovative mechanisms for funding future climate adaptation in the LAP area; particularly investigating and establishing funding for 'shovel-ready' projects.

KEY LF Lake flooding TI Tidal inundation ECL East Coast Lows and storm surges CD Channel dynamics GW Groundwater CH Coastal hazard ER Emergency response

3.3 Monitoring, evaluation, reporting and improvement

Regular review and improvement of this LAP is essential to ensure our community and the built and natural assets of the area are resilient to the projected impacts of flooding and sea level rise.

The 10-year action plan includes clear indicators that will be used to monitor and evaluate the progress of actions, shown on **Tables 3.1 to 3.6**.

In addition, the co-design approach can continue during the monitoring, research and evaluation of the 10-year action plan. It is part of Council's community engagement planning to include the community in such works. Council actions in the LAP will be reviewed as a normal part of Council's IP&R framework.

Progress will be tracked and reported as part of key Council documents including:

- Council's four-year delivery program and annual operational plan and performance report
- The Lake Macquarie Environmental Sustainability Strategy and Action Plan and the Lake Macquarie State of the Environment Report.

A major review of the LAP is scheduled within the first 10 years (in 2030/31). In addition, the plan will also be reviewed, if required, as Council becomes aware of significant changes to scientific information, legislation or policy on flood risk management and climate change adaptation.

It is a requirement of the NSW Government that flood risk management plans and coastal zone management plans should be reviewed and updated every 10 years. This requirement enforces the need for a 10-year review of this LAP.

Changes to the LAP can be made at any time by a decision of Council, and community members are free to raise issues and concerns with staff, with Councillors and through the community representatives on Council committees.

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List of abbreviations

AE action	LAP action related to advocacy and engagement
AEP	Annual Exceedance Probability e.g. a 1% AEP storm event has a 1% probability of occurring in any given year ie: 1 in 100
AHD	Australian Height Datum (measured in metres)
CBA	Cost Benefit Analysis
CIE	Centre for International Economics
Council	Lake Macquarie City Council
DPIE	NSW Department of Planning, Industry and Environment
ECL	East Coast Low (low pressure storm system)
ERF	Lake Macquarie City Council's Enterprise Risk Management Framework ensuring relevant risks are identified, assessed, controlled and regularly reviewed
GF action	LAP action related to governance and funding
HW	Hunter Water
IPCC	The Intergovernmental Panel on Climate Change (IPCC) is the United Nations body for assessing the science related to climate change: https://www.ipcc.ch/
IP&R	Integrated Planning and Reporting Framework underpinning community and Council planning for a period of at least 10 years (incl. 10, 4 and 1 year plans)
LAP	Local adaptation plan
LGA	Local Government Area
LM DCP	Lake Macquarie Development Control Plan
LM ESSAP	Lake Macquarie Environmental Sustainability Strategy and Action Plan
LM LEP	Lake Macquarie Local Environmental Plan
MCA	Multi-criteria Analysis
MERI	Monitoring, evaluation, review and improvement
MMR action	LAP action related to maintenance, monitoring and reporting
OGW action	LAP action related to on-ground works
PPC action	LAP action related to planning and development control
PRI action	LAP action related to piloting, research and innovation
RCP	Representative Concentration Pathway. IPCC uses 4 different greenhouse gas emission scenarios (RCP2.6, RCP4.5, RCP6.0 and RCP8.5) as the basis for climate predictions/projections: https://www.ipcc-data.org/guidelines/pages/glossary/glossary_r.html
SS	Storm Surge
Sycle	Reference to Lake Macquarie Council's project management support tool and framework
TRIM document number and/or PM folder number	Reference to Council's Electronic Document Management System
UoN	University of Newcastle
WG	The LAP working group – consisting of resident volunteers, Council and NSW Department of Planning, Industry and Environment staff representatives

For more information



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