CLIMATE ADAPTATION MANUAL FOR LOCAL GOVERNMENT

Embedding resilience to climate change

VOLUME 1

ACELG
Australian Centre of Excellence for Local Government

City of Canada Bay

RPS

ACKNOWLEDGEMENTS

This guidance manual has been prepared by Dr Jane Inglis and Stella Whittaker from RPS, Andrew Dimitriadis from the City of Canada Bay Council (CCBC), and Stefanie Pillora from The Australian Centre of Excellence for Local Government (ACELG).

The authors would like to take this opportunity to thank all research partners for their active contributions in the preparation of individual case studies and in providing guidance to the overall direction of the research project. Special mention is made of Andrew Dimitriadis from the City of Canada Bay Council for providing extensive support in reviewing, editing and preparing the finalised manual.

Acknowledgement also needs to be given to the councils who provided in-kind support (see Appendix 4) and to the State Local Government Associations and to the National Climate Change Adaptation Research Facility (NCCARF) for funding and supporting a number of the initiatives referenced in this manual.

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CITING THIS REPORT

Inglis, J., Whittaker, S., Dimitriadis, A. and Pillora, S. 2014. *Climate Adaptation Manual for Local Government – Embedding resilience to climate change*. Australian Centre of Excellence for Local Government, University of Technology, Sydney.

ISSN 1838-2525

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The City of Canada Bay is an award-winning and leading City when it comes to sustainability and our environment. We recognise the challenges and impacts of climate change on Australia and have implemented a range of initiatives to protect our local environment and preserve it for future generations.

Our commitment to the environment starts at the top with innovative strategies, developing partnerships and working together with key stakeholders to realise this vision. It is a key theme in our *Futures Plan 20* planning document, which is our blueprint for the future of the City of Canada Bay.

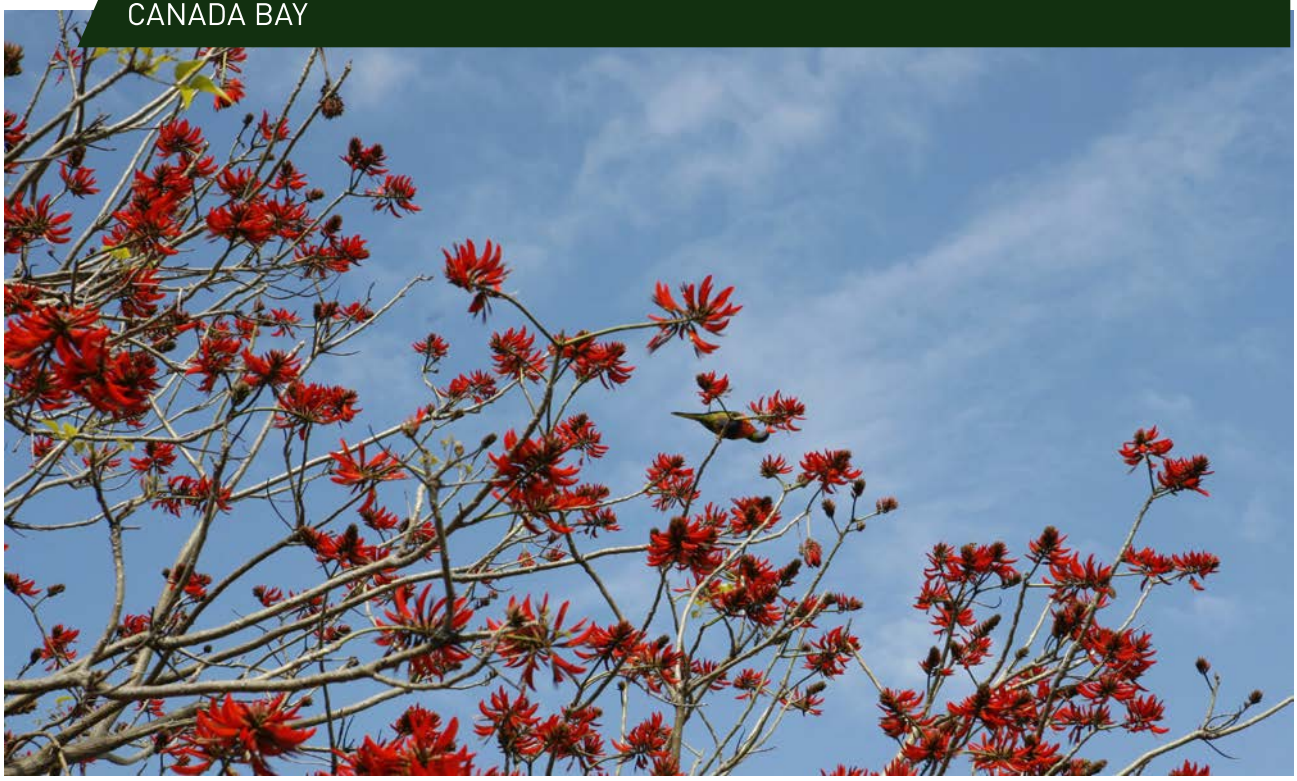
Working in collaboration with Australian Centre for Excellent in Local Government and a number of other Councils around Australia, we have taken the lead in developing this guidance manual*, Climate Adaptation Manual For Local Government – Embedding resilience to climate change.* The manual will become a practical tool for local government across Australia to facilitate change and take the lead in their own community.

We are proud to have played an important role in developing this manual and believe the case studies we have provided will allow others to make practical and important changes to protect their own environment and communities.

Mayor Angelo Tsirekas

City of Canada Bay, New South Wales

CANADA BAY



MESSAGE FROM THE ACELG DIRECTOR

A key aim of the Australian Centre of Excellence for Local Government (ACELG) is to support informed debate on key policy issues. We recognise that many councils and other local government organisations are not always able to undertake sufficient background research to underpin and develop evidence-based and practice-oriented policy. ACELG's research papers and guidance materials seek to address this deficit.

This guidance manual, *Climate Adaptation Manual For Local Government – Embedding resilience to climate change*, adds to a suite of work sponsored by ACELG to support councils in addressing climate change risks and sustainability, including the report *Local Action for a Low Carbon Future*.

The City of Canada Bay in NSW applied to ACELG for a 2013 research partnership on behalf of several Australian councils in order to help councils embed climate risk planning and resilience into every day operations and to complement local efforts aimed at reducing greenhouse gas emissions. With the financial support of the City of Geelong, City of Greater Geraldton, City of Onkaparinga, City of Port Phillip, Clarence City Council, Pittwater Council and Randwick City Council, the firm RPS was engaged to lead the preparation of the manual.

ACELG welcomes feedback on this manual and strongly encourages local governments across the country to learn from the experiences of other councils nationally and internationally in their climate risk planning and management. For more information, please contact the ACELG Program Manager, Research: stefanie.pillora@acelg.org.au; Andrew Dimitriadis, Project Manager, City of Canada Bay: andrew.dimitriadis@canadabay.nsw.gov.au; or Dr Jane Inglis, Executive Manager of Infrastructure Sustainability, RPS Group: jane.inglis@rpsgroup.com.au.

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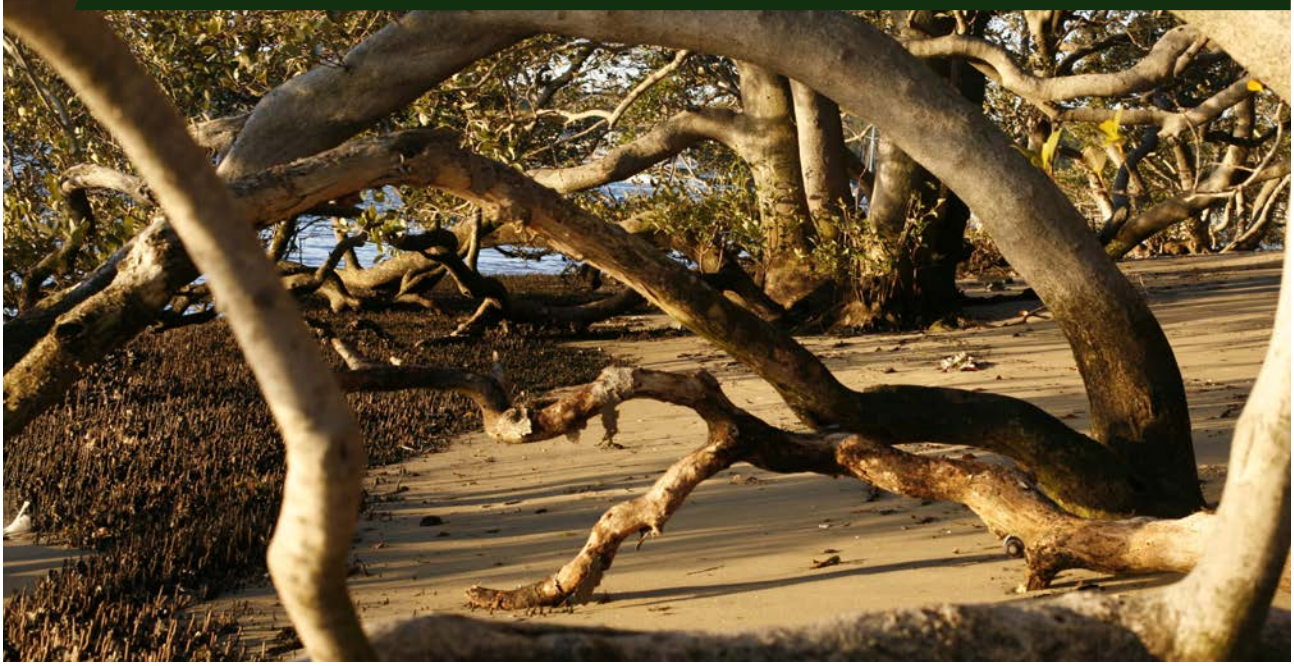


Mayor of Randwick, Cr Scott Nash

"There are short and long term risks from climate change that cannot be ignored. For the future of the local communities we represent, we need to plan ahead, taking on board scientific and technical considerations and ensuring the assets and infrastructure we are responsible for are protected now and into the future. This toolkit and case studies are important and innovative examples we can all learn from to improve how we plan and implement the changes and adjustments necessary as we continue gaining more data and information on the impacts of climate change over coming decades."

Fremantle Mayor, Dr Brad Pettitt

"Planning for climate change impacts is of paramount importance to the City of Fremantle. We recognise the role of best practice land-use planning in addressing these impacts and have made positive steps towards ensuring our City has policies in place for a climate resilient future.

"The City of Fremantle sees proactive urban density and transport planning as a practical application of adaptation policy. We will continue to implement policies that support innovative approaches to affordable living."

City of Marion Mayor, Felicity-Ann Lewis

"Having the tools to better manage how we water our parks and reserves, and make them more attractive for residents, means we're able to save water and reduce the costs to the community."

City of Greater Geelong Mayor, Darryn Lyons

"The City of Greater Geelong's Climate Change Adaptation Strategy since its adoption in 2011 has provided a clear statement of intent and framework for our organisation to address climate change risks. Geelong has identified and will continue to assess exposures to climate change impacts such as an increase in heat waves and many kilometres of coastline that may be impacted by sea level rise. Key to the success of the Strategy has been the involvement of all areas of Council from the fellow Councillors Executive Management Team, corporate planning, to managers of our many Council assets and community services."

General Manager Willoughby City Council, Nick Tobin

"Willoughby City Council is working collaboratively across our organisation to respond to climate risk management. Council endorsed Willoughby's Climate Change Risk Assessment and Adaptation Report; and Council's integrated planning documents and the Willoughby City Strategy are now embedded with adaptation terminology, targets and key actions specifically tailored and relevant to each of our core business areas. This ensures that adaptation is considered in our everyday operations and planning across all sectors of Council."

1. ABOUT THIS GUIDE

1.1. PURPOSE AND OBJECTIVES

In December 2011, there were 565 Australian local governments in urban, rural, inland and coastal areas (ABS 2012). The responsibilities of councils across Australia vary across the states and territories, reflecting their different legislative and regulatory frameworks. As a result, Australian local governments are characterised by a high degree of diversity in terms of their functions and revenue bases.

Despite these variations in local government, a common and significant challenge exists in understanding and managing complex, uncertain and changing climatic conditions. As key asset owners, service providers and decision-makers, understanding how and when to adapt to potential increased risks from climate change is essential. Decision-makers need methodologies to determine if, when and how assets, services and communities will be impacted.

While there exists a number of useful resources for undertaking climate risk assessment and adaptation planning, to date there has been a gap in practical guidance for embedding, mainstreaming or systematising (referred to collectively as 'embedding') climate risk planning into council business. In recognition of this gap, ACELG in consultation with key stakeholders determined that a guidance manual that includes real-life practical examples of embedding activities would enable a 'step change' in how climate risk is being addressed within local government.

As such this manual includes:

- a step-by-step process in applying the manual to effectively embed climate resilience.
- case studies from councils leading the way in climate adaptation across Australia (including councils in the reference and in-kind support groups), and internationally
- transferable embedding products (toolkits, checklists, systems, processes and other resources) that could be adopted or adapted for use within a council.

The key objective of this manual is to enable more and better adaptation activity for a 'step change' in how councils manage climate risk in Australia, through international and Australian case studies which describe:

- the steps or processes undertaken in the embedding activity
- transferable products (such as checklists) that can be utilised by other councils.

The project underpinning the development of the manual was unique as it involved ACELG, councils from different states and territories across Australia, local government associations, local government experts, academics/researchers and local government bodies such as IPWEA – all working together to understand local government's precise requirements and identify practical strategies for incorporating climate risk considerations into councils' current practices relating to their assets and services.

1.2. WHO SHOULD USE THIS MANUAL?

The target audience for the manual is anyone involved in climate risk assessment and adaptation planning in a council, and as such the manual does not go into significant detail on the issue of climate risk and local government, pointing instead to existing useful publications.

The manual will also be useful to a wide range of internal stakeholders from across a council including: executives, councillors, asset managers, planners, corporate services, community services, engineers, environment staff and risk managers. In implementing the manual guidance, some of these stakeholders may require assistance from a colleague or specialist versed in climate risk, particularly if the earlier steps of climate risk assessment or adaptation planning have yet to be been undertaken within that council.

This manual will also be useful to other levels of government and agencies involved in partnerships, regulation and oversight roles for local government. The case studies – by demonstrating leading practice – will work to build the capacity within the local government sector across multiple disciplines. It was created with an Australian context in mind but the content is likely to have broader relevance.

1.3. BRIEF METHODOLOGY

This manual has been developed using case study methodology to produce practical guidance. It collates locally generated knowledge from councils that have embedded climate resilience into an aspect of their organisation and operations, or (in a few instances) within their organisation in totality.

This knowledge and experience has then been analysed in the context of climate adaptation literature and stakeholder expertise to develop:

- a categorisation and definition of five different embedding approaches or models, and
- a step-by-step framework for effectively embedding resilience to climate change into council operations (the 'theory' of how to embed climate resilience).

In gathering leading practice embedding activities within local government, a variety of data collection methods were used including:

- a review of international and national literature.
- a survey of international and Australian councils.
- interviews with councils and other stakeholders.
- reference group meetings.
- consultation on draft material.

There is a plethora of inspiring activity in local government across Australia and internationally (the search for case studies was expanded to address some gaps in activity) and it is not possible to represent the full breadth of this activity in this manual. Instead, representative and inspiring case studies (and shorter paragraph descriptors of council activity) across all the functional areas of a council and across each key climate hazard have been selected (see Section 3). Details of the approach and results can be found in APPENDIX 5.

1.4. SCOPE OF THIS GUIDANCE MANUAL

The manual focuses on the activity councils can take once they have completed their climate risk assessment and adaptation planning exercises (i.e. once they have produced their adaptation plan) – noting that the approach taken to developing their adaptation plan can also specifically consider embedding requirements from the initiation stage. However, in Section 2.2 a framework for adaptation planning is provided as background and context, including useful resources.

The manual then presents:

- five different embedding approaches or models, as developed through this research (Section 2.3).
- a four-step process for using the manual – i.e. a process to step councils through a series of decisions to determine a fit-for-purpose approach to embedding (Section 3).
- the full case studies and shorter partial case studies – separated into i) different council function areas and ii) climate hazards (direct and indirect), and iii) approaches. Products have been selected for inclusion based on their transferability. These products are i) included in this document, or ii) accessible via a web link or iii) can be made available by the associated council via contact details provided. The preference has been to include the products in the document.

What will I find in this manual?

- guidance on effective climate adaptation including resources
- five different embedding models to choose from
- processes for using the manual to effectively embed climate resilience
- local and international case studies on embedding activity to support implementation.

Importantly, the manual can be read from start to finish or the reader can jump to different sections. A user can navigate through the content by council function or by climate hazards – whatever way works best for their circumstances.

1.5. SOME IMPORTANT OBSERVATIONS

The guidance in this manual presents an important next stage to the adaptation work already being undertaken by many councils across Australia, including climate vulnerability and risk assessments, and producing an adaptation plan.

This is particularly pertinent and timely as many councils stop their adaptation work after doing vulnerability/risk assessments and producing an adaptation plan (which are often mandated by state governments). Once councils have this completed they often think the job is done, and do not realise they have to continue much further on this path to achieve climate change adaptation. Obvious operational areas highly exposed to climate risk – and gaps in organisational oversight of these risks – need to be tackled with a renewed sense of urgency (e.g. land use planning decisions made today that could commit a council to patterns of coastal development that may be highly exposed to future sea level rise).

Embedding adaptation activity into council business requires creating a culture shift throughout the council so that climate adaptation is seen as urgent and important – this is a challenge. Guidance on how to do effective adaptation will of course help but the key essential ingredient, given climate adaptation needs to be internally driven, is to create a culture shift in the council starting from the top – from the council and the executive. In recognition of this, the manual contains case studies on cultural change.

1.6. LIMITATIONS AND GAPS

This manual is not an adaptation planning guide and nor does it intend to provide an analysis of the effectiveness and usefulness of adaptation tools. There are many other tools and guidance documents on how to undertake adaptation planning (see Section 2.2 below and APPENDIX 1).

Limitations to this manual include resource and time constraints in its development phase, which reduced the time available to search for leading practice examples. As such it is acknowledged that not all examples of leading embedding activity within councils are incorporated. There is also a great deal of fluidity and flux in the climate change policy, funding and legislative frameworks across Australia that create a challenge for projects of this nature.

There were also constraints in obtaining adequate information from some councils and online. In some cases a leading practice was identified but there was insufficient information to include it as a full case study. These cases have been listed as partial case studies in Volume 2 with references to further information.

2. BACKGROUND

2.1. CLIMATE CHANGE RISK AND ADAPTATION

Local governments across Australia are confronted with the challenge of responding to the effects of a changing climate, with droughts, flooding, sea level rise and heatwaves impacting both built and natural ecosystems. The limited resilience in communities has been witnessed across Australia with recent extreme events (Climate Commission 2013), and this clearly demonstrates the need for councils to provide leadership in this area, building climate resilience into the operations and services that they provide.

Observational data from the past century reveals significant changes in Australia and surrounding regions, with the climate system changing faster than expected. Although weather varies from day to day, month to month and year to year, it is clear that the overall average global temperature trend is upward.

The dynamic nature of our climate system indicates a need to focus attention on how to adapt to these changes and understand the implications. Figure 1 outlines the interrelationships between primary climate and secondary climate effects and illustrates how the primary climate effects of temperature, precipitation and sea level rise can collectively act as catalysts for extreme weather events such as floods, winds, droughts, bushfires and cyclones. As evidence continues to demonstrate, these events are becoming more intense and more frequent. A large number of publicly available studies provide detailed scientific explanations of climate risk, and demonstrate that a number of changes in the climate have already occurred. With a number of climatic changes already occurring, the CSIRO and the Bureau of Meteorology *State of the Climate* report notes that:

- Australian annual average daily mean temperatures have increased by 0.9 °C since 1910.
- The global average mean sea level for 2011 was 210 mm above the level in 1880.
- Sea surface temperatures have increased by about 0.8 °C since 1910.
- The main cause of the observed increase in carbon dioxide concentration in the atmosphere is the combustion of fossil fuels since the industrial revolution.
- Australian average temperatures are projected to rise by between 1.0 °C and 5.0 °C by 2070 when compared with the climate of recent decades.
- CSIRO and the Bureau of Meteorology also produce projections of Australia's future climate. The most recent projections were released in 2007 and are available from http://www.climatechangeinaustralia.gov.au/.

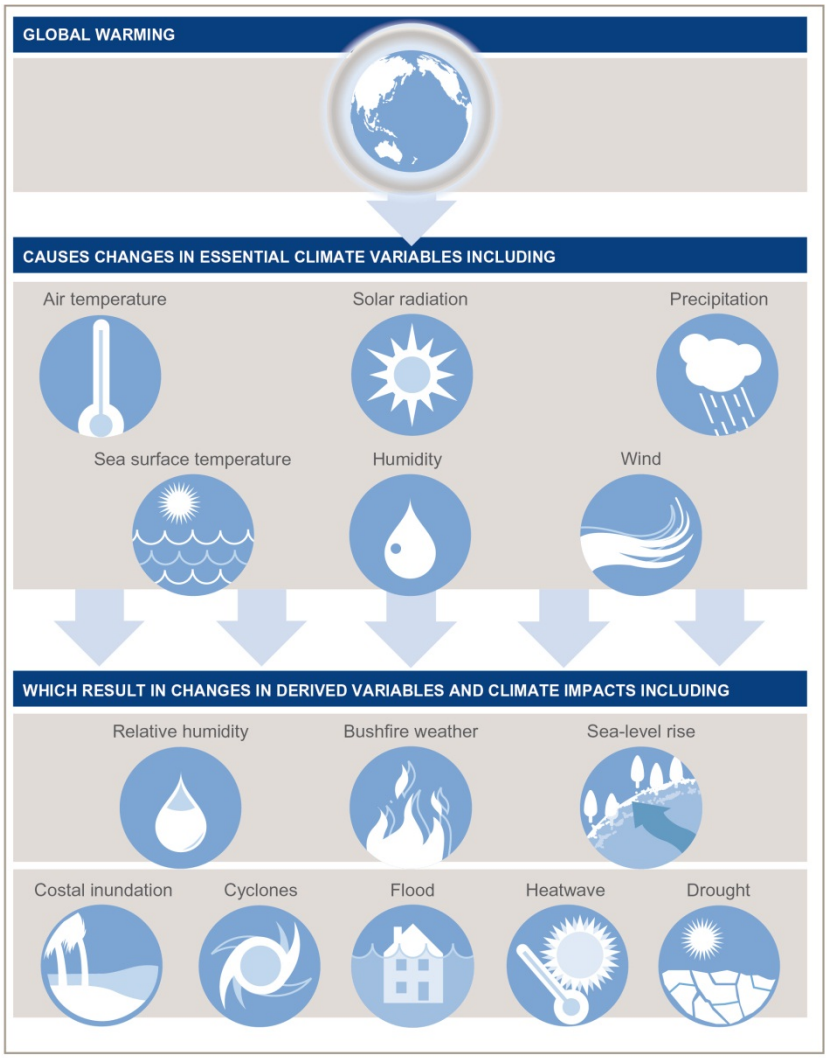


Figure 1: Primary and secondary climate effects

Climate adaptation is the adjustment to climate change that seeks to reduce the vulnerability and increase the resilience of natural or human systems to climate change effects. Within the context of local government, adaptation specifically refers to the anticipatory plans and actions developed and implemented by councils to avoid or reduce the negative impacts of climate effects, including periods of extreme temperatures, droughts, flooding, storm surges and sea level rise (Mukheiber et al. 2013).

What is the difference between adaptation planning and embedding climate resilience?

- 'Adaptation planning' focuses on the process and strategy for addressing climate resilience.
- 'Embedding' is where adaptation planning and action on climate risk and resilience is integrated into an organisation (or specific function within an organisation) to become 'business as usual'.
- An indicator that embedding has taken place successfully is the presence of demonstrated adaptation outcomes.
- It is however important to note:
  - » Some embedding activities happen through a 'bottom up' approach without a clear adaptation agenda or plan, and then set the scene for further action.
  - » Embedding can take place at different stages of the adaptation planning exercise (see Section 2.2).
- The case studies in Volume 2 provide examples of embedding activities within different functional areas.

2.2. DEVELOPING A CLIMATE CHANGE ADAPTATION PLAN

Given that the effects of climate change are dependent upon geographical locations, there is no one way in which to approach climate adaptation. The development of a climate change adaptation plan must therefore be tailored to an individual council and its community.

Notwithstanding the above, the suite of Building Adaptive and Resilient Communities (BARC) resources (including *Changing Climate, Changing Communities: Guide and Workbook for Municipal Climate Adaptation*) developed by the International Council for Local Environmental Initiatives (ICLEI) may be useful. These resources can be accessed via the ICLEI BARC website at www.icleicanada.org/programs/adaptation. Essentially, ICLEI BARC is a milestone-based framework to assist local governments in the creation of adaptation plans. Considered leading practice in adaptation, the ICLEI Guide is particularly recommended for councils wanting to make a start in climate adaptation as it contains more than seventeen practical tools to guide each adaptation step.

ICLEI's framework has been included and embellished for the purposes of this manual (see Figure 2). It comprises five key steps: (1) initiate, (2) research and model, (3) planning, (4) implement and (5) monitor and review.

Although climate adaptation is a complex process, the ICLEI BARC framework provides a straightforward methodology to adaptation planning. It should be noted that whilst this framework is presented sequentially, it is not necessarily linear; rather, it can be an iterative process and councils can, and have been found to, commence their adaptation process at any step. An additional tool that may be used is the United Kingdom Climate Impacts Programme (UKCIP) *Adaptation Wizard* (UKCIP 2012), which provides a framework and associated resources needed to prepare an adaptation strategy, taking an organisation through a five-step process that is very similar to the ICLEI Guide. APPENDIX 1 includes a list of other relevant adaptation planning frameworks and guidelines, and APPENDIX 3 includes a list of principles for undertaking robust adaptation planning.

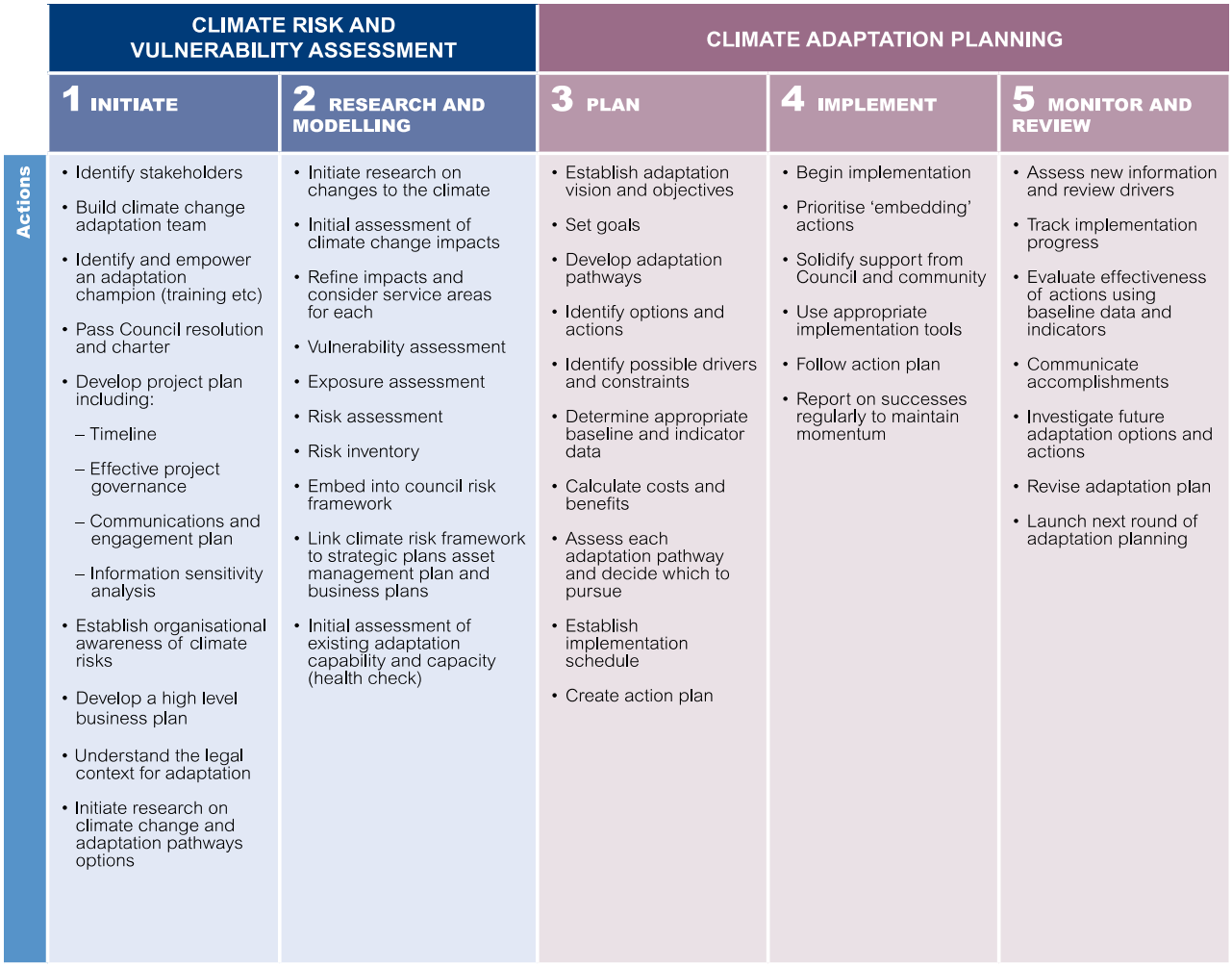


Figure 2: Framework for adaptation planning

Source: Modified from ICLEI BARC (2010), National Oceanic and Atmospheric Administration (NOAA) (2012) and UKCIP (2012).

2.3. APPROACHES FOR EMBEDDING CLIMATE RESILIENCE IN LOCAL GOVERNMENT

Councils can choose from a range models for embedding climate resilience across an organisation. Each model has its own focus and purpose. The choice will depend on: i) the types of climate issues impacting or projected to impact a local area, ii) the severity of potential effects, and iii) the internal resources available to a council to progress climate adaptation planning. One of the following five key approaches may be considered and employed:

- **Full council approach**
- **Issue approach**
- **Department approach**
- **Hybrid approach**
- **Transformational approach.**

FULL COUNCIL APPROACH

While only a few councils in Australia have adopted the 'full council' approach, this model of embedding ensures that climate adaptation measures are integrated across a wide range of existing operations undertaken by the organisation. The implementation of this approach typically requires an organisation to garner available resources within their corporate services division to review established processes, and where appropriate integrate climate change findings into existing corporate structures. Adopting this approach is recommended to those councils who wish to maximise the process of embedding climate resilience across a wide range of daily operating activities.

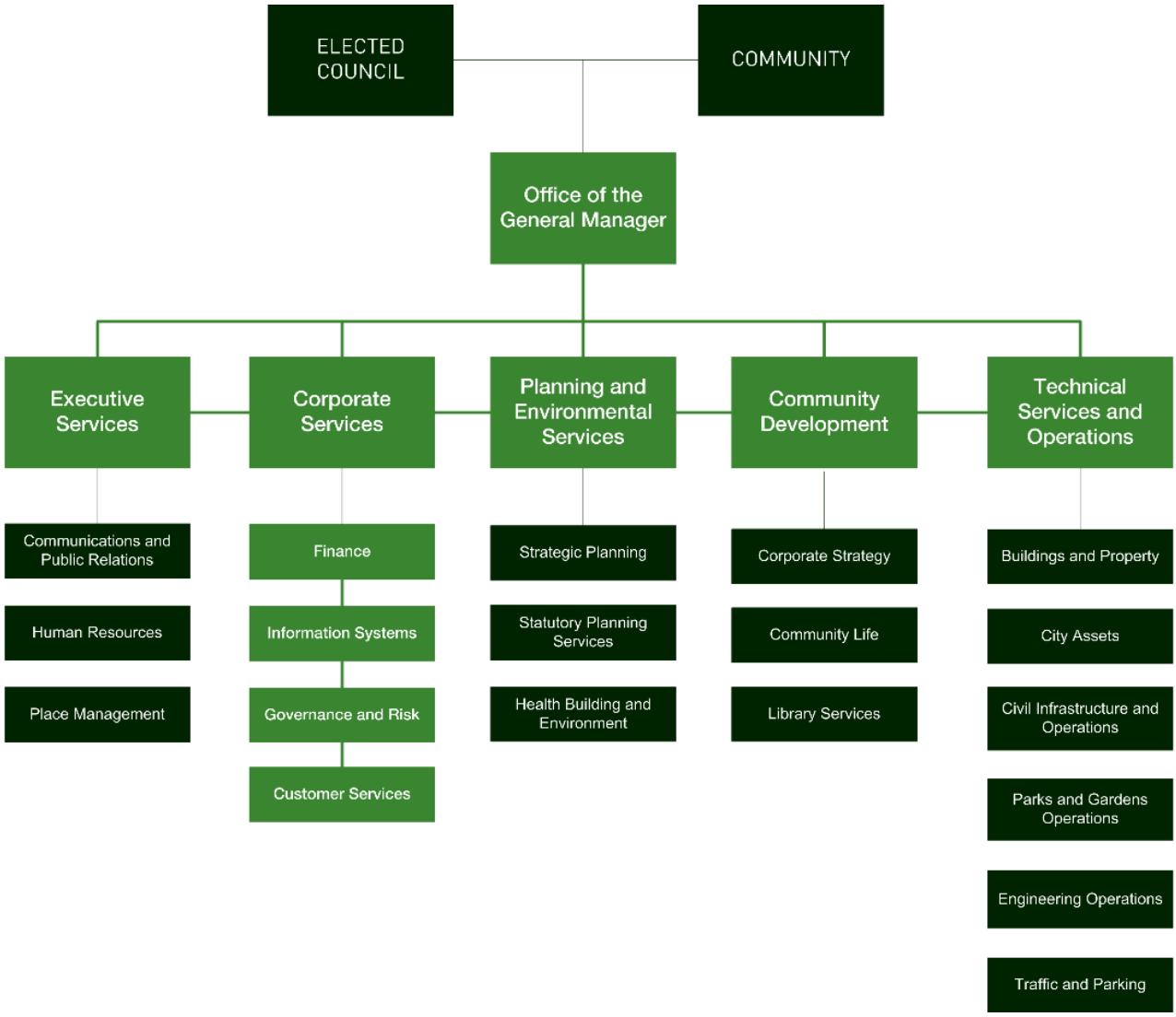


Figure 3: Visual representation of the full council approach to embedding climate resilience in local government. *Note: this model uses City of Canada Bay Council's organisational structure.*

KEY FEATURES	ADVANTAGES	DISADVANTAGES
• Council-wide for all departments • Top-down	• Comprehensive approach • Executive and/or council endorsement/ engagement • Likely to be resourced • Upskills entire council	• Efforts may be spread too thinly • Highly resource intensive

ISSUE APPROACH

A significant number of councils across Australia have taken an issues-based approach to drive action on climate adaptation, where the climate adaptation agenda is typically driven by a key climate concern. The issues-based approach often involves more than one department within a council, as the responsibilities for the issue of concern tend to span over multiple areas of a council.

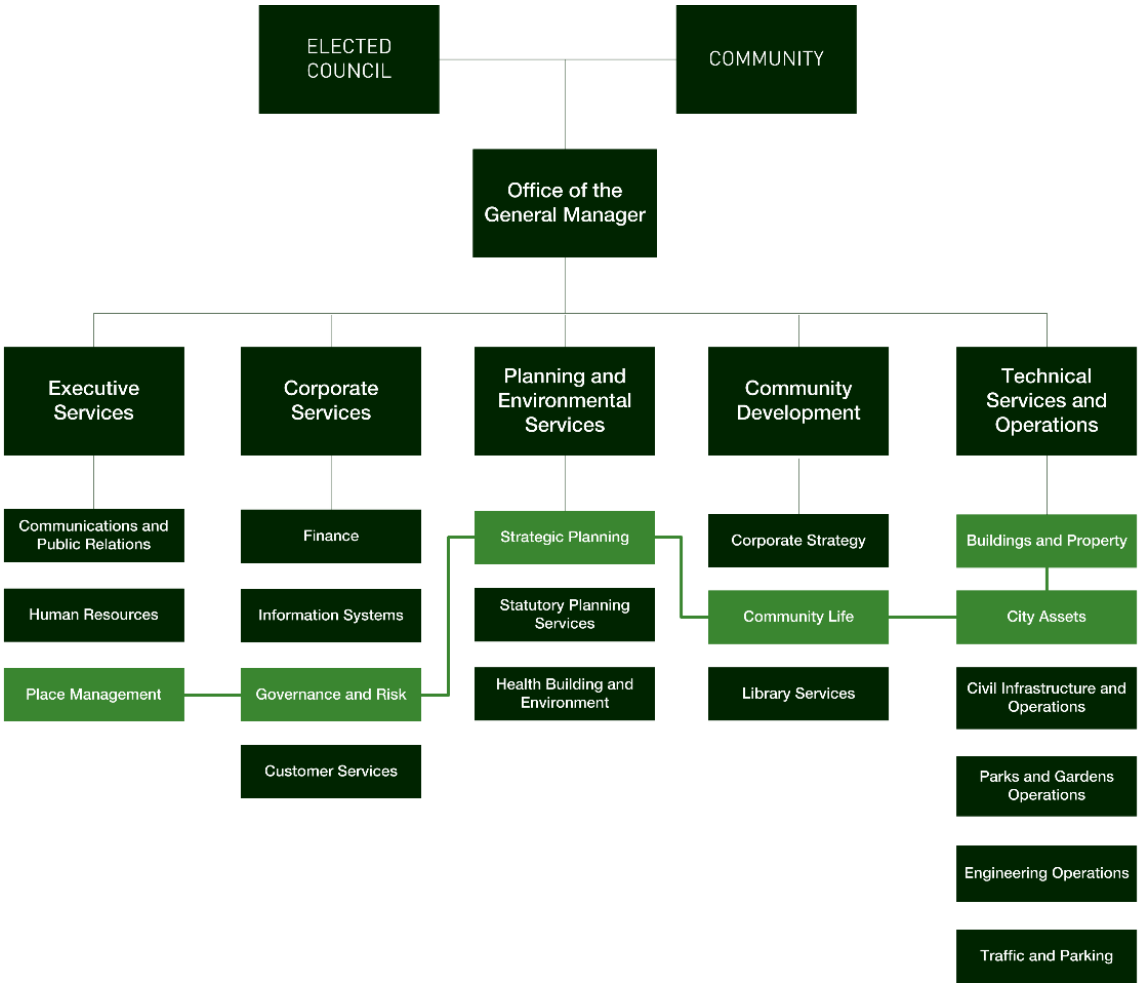


Figure 4: Visual representation of the issue approach to embedding climate resilience in local government. *Note: this model uses City of Canada Bay Council's organisational structure.*

KEY FEATURES	ADVANTAGES	DISADVANTAGES
• Initiated from prioritisation of effort on a specific climate impact (e.g. bushfire, sea level rise, coastal impacts) • Driven by an extreme climate event (i.e. flooding) • Involves multiple impacted council departments	• Focused effort/ resources • Ease of communication • Competency can be built in one area first • Able to pilot approach in key area	• Partial coverage • Focused on one/two areas only • Dominated by one/two disciplines

DEPARTMENT APPROACH

Similar to the issue-based approach, the department-based approach takes a more practical approach – by addressing systems and plans in one department and in turn taking incremental steps. The department may have a climate change champion, or may be the custodian of planning and services that are likely to be deeply impacted by climate change (e.g. an asset management division). This approach may also extend across the entire council once a suitable level of traction has been secured through initial work.

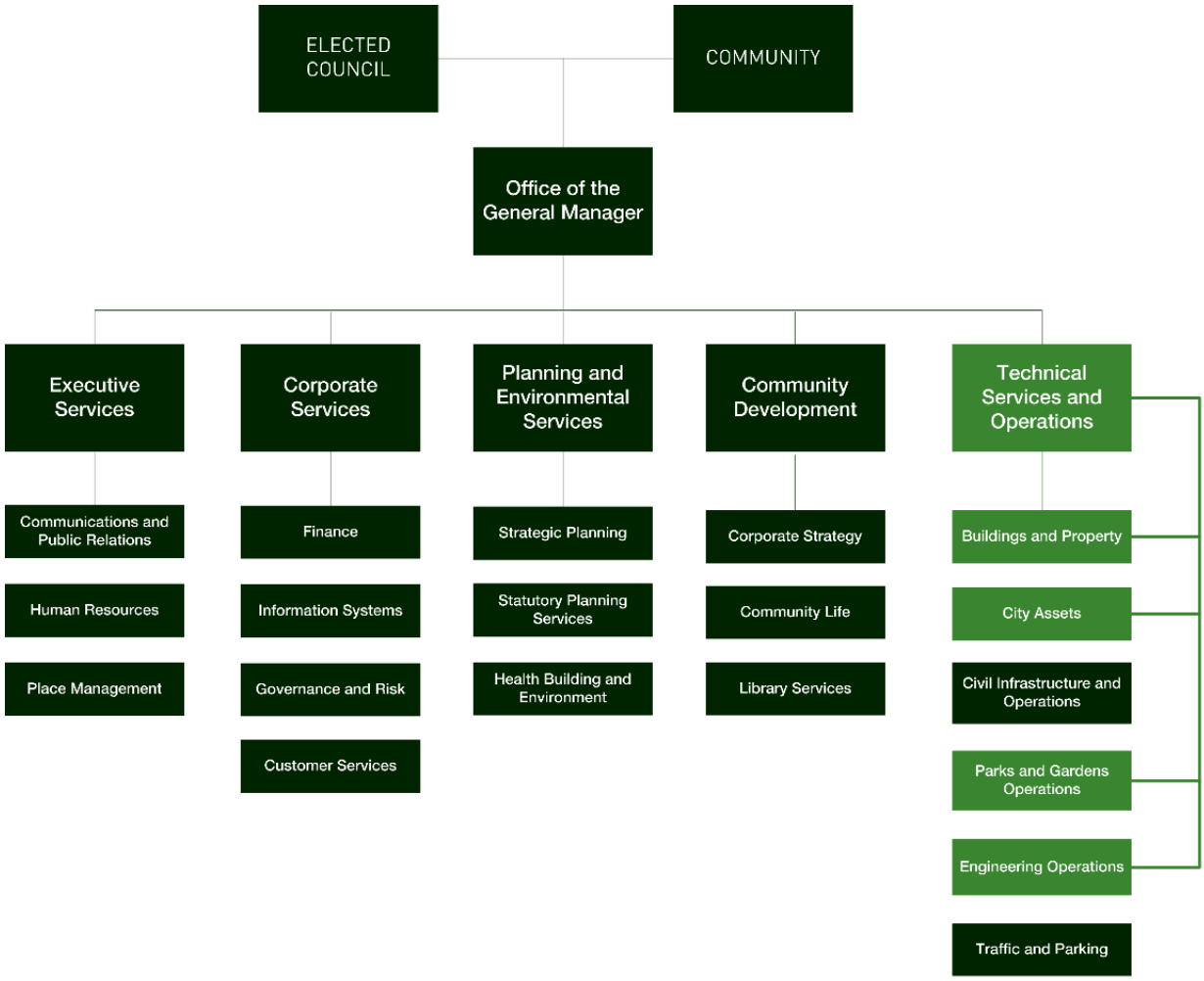


Figure 5: Visual representation of the department approach to embedding climate resilience in local government. *Note: this model uses City of Canada Bay Council's organisational structure.*

KEY FEATURES	ADVANTAGES	DISADVANTAGES
• Initiated by a single department • May expand into council-wide initiative • Bottom-up	• Focused effort/resources	• Partial coverage • Focused in one/two areas only • Dominated by one/two disciplines only • Internally focused • Key risks not addressed

HYBRID APPROACH

As one of the most widely used embedding approaches, the hybrid approach involves cross-departmental concern and action on broader infrastructure development and planning pathways, in the context of the full array of climate hazards and risks, rather than one climate issue or event.

The hybrid approach may also comprise bottom-up activities in one department or it may be based on a climate issue that was not initially driven by or seen as climate adaptation activity, but which was later picked up as such and incorporated as part of adaptation planning exercises.

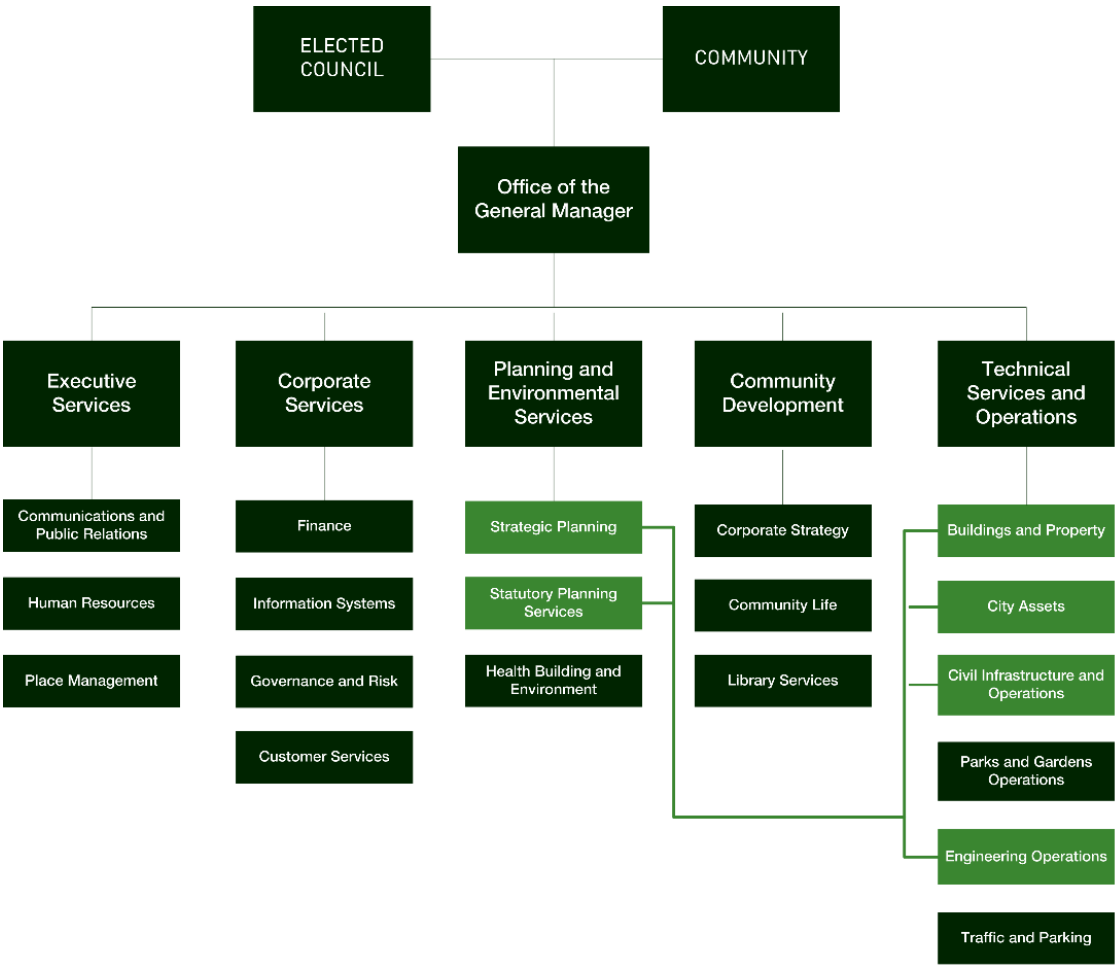


Figure 6: Visual representation of the hybrid approach to embedding climate resilience in local government. *Note: this model uses City of Canada Bay Council's organisational structure.*

KEY FEATURES	ADVANTAGES	DISADVANTAGES
• Initiated due to cross-departmental concern • Could start with an effective 'incidental' adaptation activity that leverages further adaptation planning • Bottom-up	• Pragmatic approach • Most cost efficient • Relative ease of implementation	• Partial coverage • Focused on one/two areas or disciplines •

TRANSFORMATIONAL APPROACH

The 'transformational approach' employs change management practices to tackle deeply engrained behaviours and bring about lasting and meaningful change. A council that plans to take this approach must craft and implement a change management strategy that spans across both the organisation and community to ensure that climate adaptation is integrated in all existing systems, including planning, environmental, community and financial services.

Implementing this approach may involve a number of different methods and tools, including system redesign, experiential learning, future envisioning, collective social learning, community-based social marketing and so on. The approach will however allow for council to fully integrate sustainability into the wider agenda of the organisation and community rather than introduce it as a stand-alone initiative.

Given that there are only a limited number of examples of this approach in Australia, very few research projects have focused on the tools and techniques used in behaviour change programs and applied them to climate adaptation. Whilst it is unfortunately not possible to include detail on these tools and techniques in this manual, it is strongly recommended that future research and capacity-building projects.

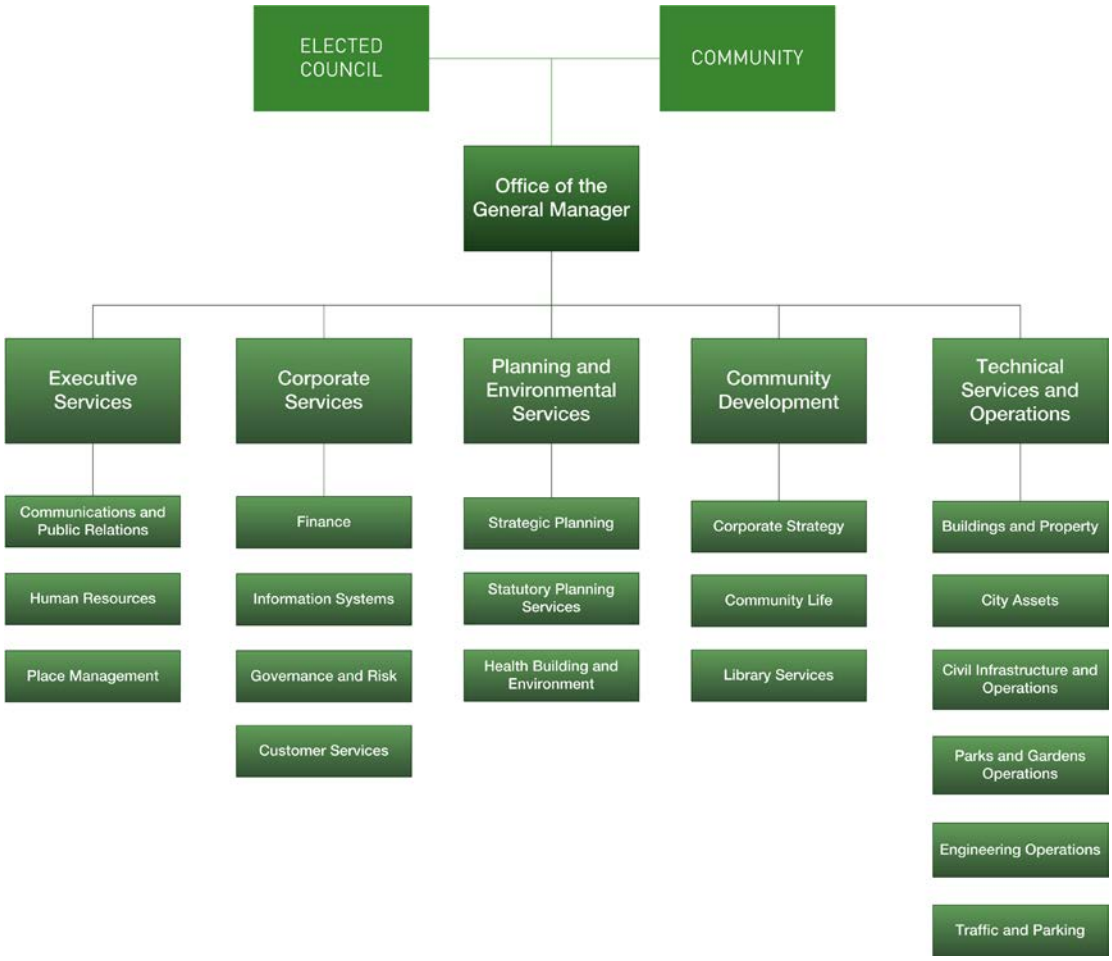


Figure 7: Visual representation of the transformational approach to embedding climate resilience in local government. *Note: this model uses City of Canada Bay Council's organisational structure.*

KEY FEATURES	ADVANTAGES	DISADVANTAGES
• Likely to be community & multi-stakeholder focused • Seeks behaviour or transformational changes in the community and then in council • Externally driven	• Community buy-in • Most effective in long term • Behaviour change more likely to endure	• Lengthy commitment • More resource intensive • Dependent on individuals/teams with right 'character' to drive change

3. HOW TO USE THIS GUIDANCE MANUAL

3.1. IDENTIFYING CURRENT CLIMATE ADAPTATION POSITIONS

To effectively use this manual, it is recommended that all local government organisations begin by reviewing their initial climate adaptation activities – identifying organisational strengths and weaknesses, together with successes and difficulties encountered in addressing climate risk to date.

The four-step framework detailed in Figure 8 below has been developed to guide councils through this process of review, and aims to assist them in deciding where and how to further embed adaptation measures across council operations. Identifying and recruiting an effective 'champion' to drive the overall adaptation embedding effort and individual embedding activities is of particular importance.

When completing this exercise it is critical that a council selects an approach or model to embedding that is suited to both their local circumstances and internal organisational resources (refer Section 2.3). The approach provides both the 'lens' and the structure through which to progress specific embedding activities.

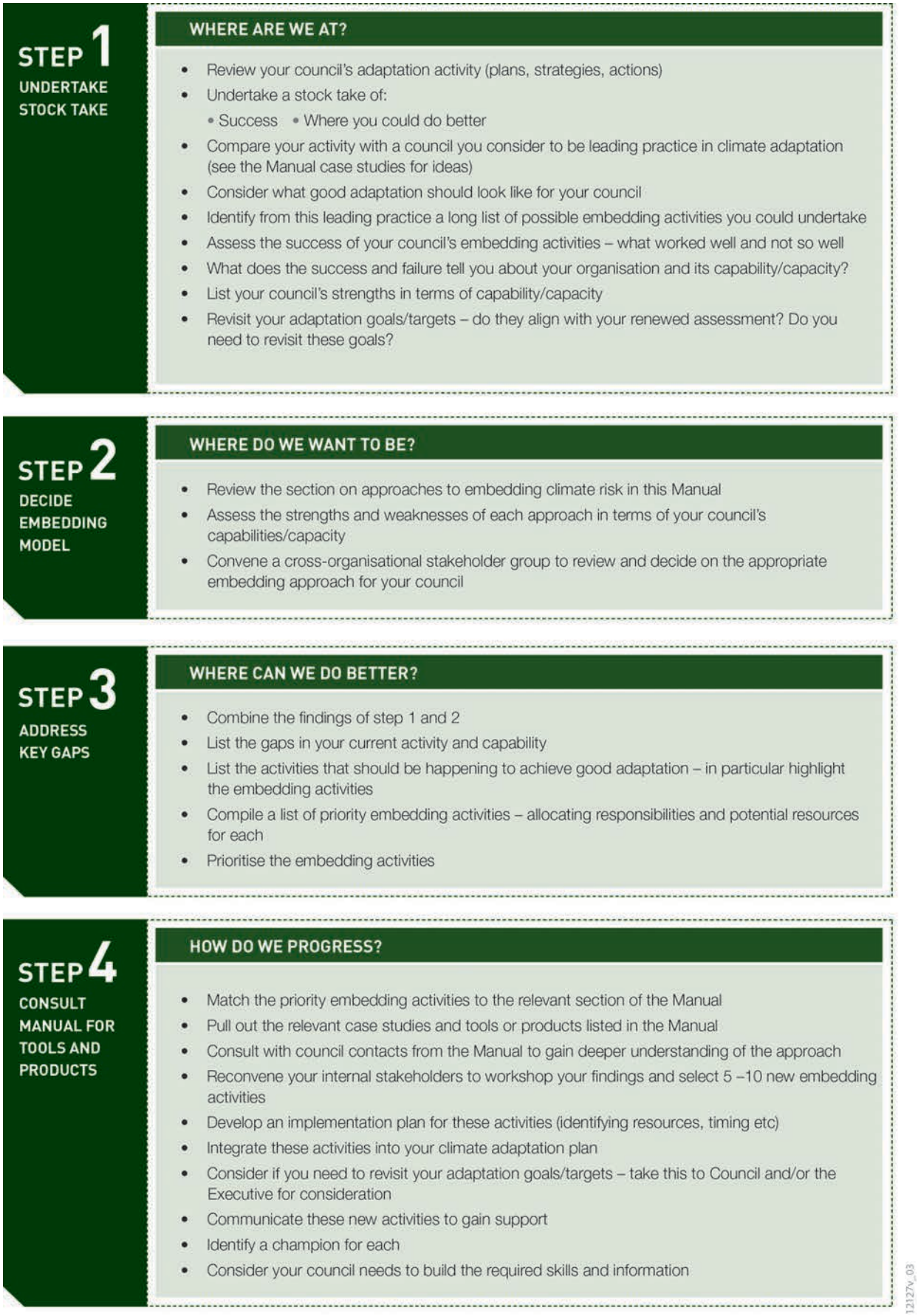


Figure 8: Four-step process for utilising this manual to embed climate risk into a council business.

3.2. REVIEW AND CONSIDERATION OF CASE STUDIES

Once a council has identified how it may further embed climate adaptation measures across its operations, case studies which include: i) processes for embedding, ii) lessons learnt, and iii) products (e.g. tools) may be referred to, providing councils with insightful, practical and transferable climate adaptation information that they may then adopt and utilise to embed climate resilience within their own organisations.

FUNCTIONAL AREA

Identifies which one of the 6 functional areas that a specific case study refers to, allowing for users to determine the area that they want to focus on.

The following six functional areas have been used to categorise all case studies presented:

- corporate services (CS)
- land use planning (including coastal management) (LUP)
- works, assets and engineering (water and sewerage, waste, road, and property) (W)
- community services (including emergency services) (CES)
- environment (including biodiversity and open space management) (E)
- economic development (ED).

FUNCTION

Identifies relevant tasks and processes belonging to key function areas, e.g. 'Council Meetings / Reports' are a task of 'Council Services'. (This is used for the 'Council Services' functional area only.)

CASE STUDY

Identifies the specific case studies contained within Volume 2 of the manual.

HAZARD CODE

Users may refer to this column to identify the specific climate issues addressed in each case study. This will be particularly useful for those interested in adopting an issue embedding approach.

CODING BY HAZARD:

Bushfire	Sea level rise/flooding
Heat	Drought
Severe weather (cyclones etc.)	All/general

CASE STUDY TYPE

An '**F**' in this column indicates that a full case study is presented in this manual.

An '**P**' indicates that only a partial case study has been presented due to a lack of detail and information. These partial case studies provide an overview and references to publicly available information.

ABSTRACT

Provides an overview of each case study, allowing users to decide whether they want to explore the case study further.

PRODUCT

Identifies the specific product (framework or tool) that has been developed within the case study. Products have been included in full in the manual where possible. However, some case studies include only snippets of product information. All case studies present the process for developing the product

Table 1: Case studies included in Volume 2 of this report.

CS – CORPORATE SERVICES					
Function	**Case Study**	**Hazard Code**	**Full (F) / Partial (P) Case Study**	**Abstract**	**Product**
CS1 Council Meetings / Reports	CS1.1 ICLEI BARC Council Resolution Worksheet 5 – Canada		P	The Building Adaptive & Resilient Communities (BARC) Tool offered by ICLEI Canada is an interactive web-based tool that takes users through a Five Milestones process with the aim of facilitating the implementation of the ICLEI Canada climate change adaptation framework.	*Interactive web-based climate adaptation tool*
	CS1.2 West Coast Environmental Law (WCEL) Checklists for Local Government – British Columbia		P	British Columbia (BC) in Canada developed a series of checklists to assist local governments in exploring ways to integrate climate change adaptation into policy and operations, whilst allowing for the identification of key functions that will be affected by climate change.	*Climate Change Adaptation Checklists*
	CS1.3 CSIRO Boardroom Directors		P	CSIRO and partner researchers in 2012 undertook a research project that set out to communicate adaptation to climate change to the 'big end of town' (that is boardrooms and CEOs). As part of the materials developed a series of checklists for board members was developed.	*Checklists for Boards Members*

CS – CORPORATE SERVICES

Function	Case Study	Hazard Code	Full (F) / Partial (P) Case Study	Abstract	Product
CS2 Policy / Procedures / Systems	CS2.1 Climate Adaptation Strategy – City of Vancouver, Canada		P	The City of Vancouver has included a detailed action matrix in their Adaptation Strategy which details key policies, procedures and accountability across departments. The main aim of the matrix is to integrate climate adaptation measures into business, risk management and project planning functions across the council.	*Cross-Departmental Adaptation Action Matrix*
	CS2.2 King County Adaptation Strategy – U.S.		P	King County has developed a Climate Plan incorporating climate adaptation responsibilities throughout all the organisation's departments, whilst referencing the adaptation actions that need to be included in the County's long term strategies.	*King County Climate Plan*

CS – CORPORATE SERVICES

Function	Case Study	Hazard Code	Full (F) / Partial (P) Case Study	Abstract	Product
	CS2.3 Climate Action Programme – Mexico City, Mexico		P	Mexico City has established The Interagency Commission on Climate Change. Comprising a wide range of government representatives, the group is in charge of coordinating and evaluating the Mexico City Climate Change Action Program (MCAAP). The creation of the Interagency Commission on Climate Change has resulted in the institutionalisation of public policies to address climate change and encouraged active participation of citizens, academia, NGOs and industry.	*Interagency Commission on Climate Change*
	CS2.4 Utilising the risk management process to embed climate adaptation into council operations – Melton City Council, VIC		F	Melton City Council implemented its existing risk management process, to effectively mainstream climate adaptation across various council departments	*Climate Change Risk Approach*
	CS2.5 Creating a Climate Adaptation and Mitigation Policy in a Regional Local Government – City of Greater Geraldton, WA		F	The City of Greater Geraldton adopted a partnership framework to identify 70 key actions relating to climate change adaptation and mitigation, which were subsequently integrated into a Climate Adaptation Action Plan.	*Climate Change Adaptation Approach*

CS – CORPORATE SERVICES

Function	Case Study	Hazard Code	Full (F) / Partial (P) Case Study	Abstract	Product
	CS2.6 Council Resilience Health Check – Barwon South West, VIC		F	Made up of 10 councils and the Victorian Government, *The Barwon South West Climate Resilient Project (CRC)* aims to assist municipalities and key partners to understand and respond to risks and opportunities presented by future climatic changes and extreme weather events. One of the key outcomes of the partnership was the development of a unique climate change health check tool which evaluates five key elements of climate adaptation – complying, engaging, assessing, responding, and monitoring, and is intended to be used at regular intervals to assess each council's capacity and capabilities for responding to climate change.	*Climate Change Resilience Health Check tool*
	CS2.7 Climate Change Adaptation Strategy – City of Geelong, VIC		F	The City of Geelong's Climate Change Adaptation Strategy recognises that climate change issues are uncertain in nature, and provides a framework for organisational change, allowing for climate risks to be embedded into organisational decision-making.	*Climate Change Adaptation Approach*

CS – CORPORATE SERVICES

Function	Case Study	Hazard Code	Full (F) / Partial (P) Case Study	Abstract	Product
	CS2.8 ICLEI Building Adaptive and Resilience Communities Tool (BARC) – Canada		P	ICLEI Canada developed an interactive web-based tool which takes users through a Five Milestone process (as outlined in the ICLEI Cana da Changing Climate, Changing Communities: Guide and Workbook for Municipal Climate Adaptation), to assist communities in adapting to the impacts of climate change through the development of a municipal climate change adaptation plan.	*Interactive web-based climate adaptation tool*
CS3 Roles / responsibilities / Chain command	CS3.1 Dedicated Climate Adaptation Staff – New York City, U.S.		F	The City of New York has established a Climate Change Advisory Task Force (CCATF). This cross-departmental group focuses on identifying and assessing key climate change risks, which are then integrated into the City's long term strategic documentation, (e.g. The 2013 Plan 'A Stronger, More Resilient New York')	*Cross-departmental adaptation task force*

CS – CORPORATE SERVICES

Function	Case Study	Hazard Code	Full (F) / Partial (P) Case Study	Abstract	Product
	CS3.2 Climate Change Advisory Task Force – Miami-Dade County, U.S.		F	Miami-Dade County appointed a Climate Change Advisory Task Force (CCATF). Comprises both government and community stakeholders. The main function of the group is to provide the County with recommendations that may be implemented to respond to climate change challenges.	*Cross-stakeholder adaptation task force*
	CS3.3 Climate Change KPIs/PDs – Mornington Peninsula Shire Council, VIC		P	Following a review of the key climate change issues impacting Mornington Peninsula Shire Council, climate change responsibilities and key performance indicators have been integrated into existing positions, to ensure climate impacts are addressed by key staff.	*Organisational Position Description*
	CS3.4 Climate Adaptation Coordinator – City of Greater Geraldton, WA		P	Identifying the growing need to address climate change, The City of Greater Geraldton created a position for a Climate Change Coordinator. The intent of this position is to effectively implement programs related to the management of climate issues across the local government area.	*Climate Change Position Description*

CS – CORPORATE SERVICES

Function	Case Study	Hazard Code	Full (F) / Partial (P) Case Study	Abstract	Product
	CS3.5 Partnerships – City of Rotterdam, Netherlands		P	The Rotterdam Climate Change Initiative (RCI) is a partnership of four key parties, and combines key stakeholders into a single, permanent body with authoritative power and political mandate. As a result of this partnership, climate change projects and plans that are put forward by the RCI receive widespread support, with the partnership also able to draw on its large pool of resources to implement key programs.	*Cross-departmental partnership and authority*
	CS 3.6 Manager and Directorates Requirements and Staff Training – Kent County Council, U.K.		F	Kent County Council devised a series of training resource packs and workshops which have been systematically rolled out across the organisation. The main aim of this training is to increase climate change awareness across the organisation and facilitate the integration of climate adaptation actions into daily operations.	*Manager Requirements and Training Framework*
CS4 Strategy alignment & Embedded in operational documents	CS4.1 City Strategy and Operational Plan Alignment with Climate Change Considerations – Willoughby Council, NSW		F	Through the implementation of the organisation's Risk Management Framework, Willoughby City Council has integrated climate adaptation into its long-term planning strategies and operational documents.	*Approach to Embed Climate Risk into Operational Plans*

CS – CORPORATE SERVICES

Function	Case Study	Hazard Code	Full (F) / Partial (P) Case Study	Abstract	Product
	CS4.2 Preparation of Public Health Plans alongside Climate Adaptation Plans – City of Port Adelaide Enfield, SA		F	Port Adelaide Enfield Council has integrated its public health planning and climate change adaptation actions to ensure the two planning processes and their outcomes are closely aligned and coordinated.	*Approach to Integrate Climate Risk and Health Planning*
	CS4.3 New York City Panel on Climate Change – New York City Council, U.S.		P	The City of New York commissioned the New York City Panel on Climate Change (NPCC), to develop a plan and series of tools to aid climate adaptation. At the centre of the plan is a mechanism known as Flexible Adaptation Pathways, which aims to strategically integrate and continuously adjust resilience actions across critical key infrastructure within the city.	*Flexible Adaptation Pathways*

CS – CORPORATE SERVICES

Function	Case Study	Hazard Code	Full (F) / Partial (P) Case Study	Abstract	Product
	CS4.4 Multi-Criteria Analysis Framework – Sydney Coastal Councils		P	Central to the Sydney Coastal Councils – Infrastructure Business Case Guidelines, is the development of a multi-criteria analysis framework (MCA) to support consideration of diverse adaptation management alternatives around future protection, development or redevelopment of coastal lands. The MCA has been linked to a Geographic Information System (GIS), providing for a powerful visualisation tool to understand and assess potential adaptation options.	*Multi-Criteria Analysis Framework*
CS5 Budget and budget alignment	CS5.1 Resourcing Climate Change Adaptation – City of Onkaparinga, SA		F	The City of Onkaparinga has established The Climate Change Response Fund to finance a number of climate change projects, under the categories of adaptation, carbon neutrality, low carbon city and strategy. The development and implementation of this financial mechanism has subsequently led to climate considerations being embedded into Council's long term financial planning documentation and annual budget review processes.	*Climate Change Response Fund*

CS – CORPORATE SERVICES

Function	Case Study	Hazard Code	Full (F) / Partial (P) Case Study	Abstract	Product
	CS5.2 Climate Change Prioritisation Tool – City of Melbourne, VIC		F	Following the development of City of Melbourne's Climate Change Adaptation Strategy which identified over two hundred adaptation actions, Council developed a *Climate Change Prioritisation Tool* allowing for all actions to be prioritised through a process of filtering and weighting each action. This robust approach has allowed for Council's Sustainability Team to work with other teams across Council to prioritise and sequence actions whilst facilitating the integration of climate adaptation work into each of Council's individual departmental work plans.	*Climate Change Prioritisation Tool*
	CS5.3 Climate Societal Cost Benefit Analysis – City of Rotterdam, Netherlands		F	The City of Rotterdam has created the Societal Cost Benefit Analysis Tool. This tool allows users to assess investments in infrastructure and development from a whole of society perspective.	*Societal Cost Benefit Analysis Tool*
CS6 Contracts / Procurement	CS6.1 Changes to Maintenance Contracts to Account for Climate Change – Mornington Peninsula Shire Council, VIC		F	Following a review of key climate change information (including flood mapping), Mornington Peninsula Shire Council has updated a number of existing maintenance service contracts to account for climate change.	*Changes to Maintenance Service Contracts*

CS – CORPORATE SERVICES

Function	Case Study	Hazard Code	Full (F) / Partial (P) Case Study	Abstract	Product
	CS6.2 Embedding Climate Risk Considerations into the Procurement and Contracts Process – Kent County Council, U.K.		P	Kent County Council has embedded climate risk into its procurement and contracts process, with suppliers asked to provide evidence that they have considered the implications of climate change in the delivery of their services. Responses are subsequently ranked against a climate change scorecard, the results of which form part of their overall tender rating.	*Climate Change in Procurement Approach*
	CS6.3 UKCIP Procurement Guidelines – U.K.		F	Contained within the UK Climate Impacts Programme is extensive guidance on the role that procurement could play in Council and the impacts of all projected changes in the climate on any goods and services procured by Council.	*Procurement Guidance*
CS7 Change management	CS7.1 Resistance to Resilience – A Collaborative Model for Integrating and Addressing Climate Change – City of Townsville, QLD		F	The City of Townsville has developed a city-wide and transformative capacity-building method to help the City move 'from resistance to resilience' – a collaborative model of sustainability. The approach is designed for accelerating thinking and action on climate adaptation and fostering city-wide resilience.	*Transformational Change Approach*

CS – CORPORATE SERVICES

Function	Case Study	Hazard Code	Full (F) / Partial (P) Case Study	Abstract	Product
	CS7.2 Staff Engagement in Climate Adaptation and Corporate Responsibility Training – Shoalhaven City Council, NSW		F	Shoalhaven City Council has integrated the issues of climate change, adaptive management and resilience planning into its compulsory Annual Corporate Responsibilities Training Framework, to increase staff awareness of climate change issues and facilitate cultural change within the organisation.	*Annual Corporate Responsibilities Training Package*
CS8 Training, awareness raising, internal communications	CS8.1 Staff including Coastal Planners Training – King County, U.S.		P	King County Council has developed a climate adaptation training pack called Managing Climate Risk, designed to enable Council officers to carry out a self-facilitated workshop with their colleagues in order to identify, plan and reduce the service vulnerability to climate impacts.	*Managing Climate Risk Action Pack*
	CS8.2 Green Development Standard Training – City of Toronto, Canada		P	Following the development of The City of Toronto's Climate Change Strategy (*Ahead of the Storm: Preparing Toronto for Climate Change in 2008*), a climate change training course was created and disseminated across the organisation to increase staff awareness of the risks of climate change whilst aiming to facilitate a shift in the organisation's corporate culture.	*Standard and Training Package*

CS – CORPORATE SERVICES

Function	Case Study	Hazard Code	Full (F) / Partial (P) Case Study	Abstract	Product
	CS8.3 Education for Elected Members – Onkaparinga City Council, SA		P	During the development of Onkaparinga's Climate Change Strategy 2008–2013, a number of educational programs were delivered (including presentations from the Science Panel Experts and Community Representatives), to ensure that staff and elected members were well informed when making both strategic and operational decisions relevant to climate change issues.	*Educational Programs*
	CS8.4 Practical Steps for Engaging Engineers on Issues of Climate Change – City of Canada Bay, NSW		F	Following the development of The City of Canada Bay Council's Climate Adaptation Plan, Council developed and implemented a change management framework to facilitate the effective communication and engagement of Council engineers. Reframing the issues surrounding climate change from a risk perspective and increasing dialogue around climate change resulted in the integration of climate considerations into existing daily activities.	*Change Management Framework*

CS – CORPORATE SERVICES

Function	Case Study	Hazard Code	Full (F) / Partial (P) Case Study	Abstract	Product
	CS8.5 Staff Training in Managing Climate Risk – Kent County Council, U.K.		P	Kent County has created a 2 to 3-day climate adaptation training pack called Managing Climate Risk. The pack of resources is designed to enable council members to carry out self-facilitated workshops with their colleagues. The output plan is to reduce service vulnerability to climate impacts.	*Climate Adaptation Training Pack*

P – LAND USE PLANNING

Case Study	Hazard Code	Full (F) / Partial (P) Case Study	Abstract	Product
LP1 Green Roof Bylaw – City of Toronto, Canada		P	Toronto City Council adopted The Green Roof Bylaw in May 2009, requiring green roofs to be built on all new commercial, institutional and residential developments/additions that have a gross floor area of over 2000m^2. To facilitate developers in determining whether a green roof is required, Council developed the Green Roof Screening Form. The Green Roof Statistics Template was also developed to facilitate compliance with building permit applications	*Green Roof Screening Form Green Roof Statistics Template*
LP2 The Toronto Green Standard – City of Toronto, Canada		P	The Toronto Green Standard (TGS) was an initiative developed following the creation of Toronto's Climate Adaptation Strategy. TGS is a two-tiered set of performance measures with guidelines supporting sustainable site and building design for new public and private development, and aims to increase energy efficiency of buildings, reduce greenhouse gas emissions, reduce the urban heat island effects, conserve water, reduce storm water runoff and enhance neighbourhood green space. TGS includes standards, checklists, and templates for differing development types that ensure sustainable and adaptive actions are incorporated in all development projects.	*Toronto Green Standard*

P – LAND USE PLANNING

Case Study	Hazard Code	Full (F) / Partial (P) Case Study	Abstract	Product
LP3 Surging Sea Risk Finder – New York City, U.S.		P	Climate Central has created an online tool to assess the vulnerability of communities in New York, Florida and New Jersey to sea level rise impacts. The development of this tool has provided local communities with vital information on where to prioritise action and what steps to take to protect their communities from surging seas.	*Surging Seas Risk Finder*
LP4 Land Use Planning Climate Game – City of Rotterdam, Netherlands		P	The City of Rotterdam commissioned the development of the Rotterdam Climate Game. This interactive computer game helps key stakeholders in incorporating climate change adaptation in land use planning.	*The Rotterdam Climate Game*
LP5 Coastal Erosion Hazard Overlay for Development Application Assessments – Clarence City Council, TAS		F	Clarence City Council has developed a Planning Framework for assessing development applications in the face of current and future coastal climate change impacts. The framework uses a set of guiding principles to create a Coastal Erosion Hazard Overlay, and has now become a requirement in all hazard zone development applications.	*Costal Erosion Hazard Overlay*
LP6 Embedding Sea Level Rise Adaptation into Land-use Policies and Procedures – Lake Macquarie City Council, NSW		F	To ensure that planning decisions are made to reduce flood risk in the future, Lake Macquarie City Council incorporated sea level rise adaptation into key Council policies and procedures (including Council's Floodplain Management Plan), using guidelines developed by DECC and the NSW State Department sea level rise benchmark to inform their policy updates and requirements	*Sea Level Rise in Policy and Procedures*

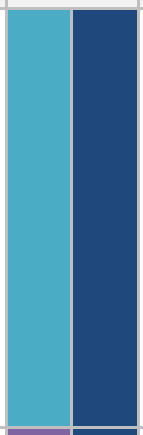
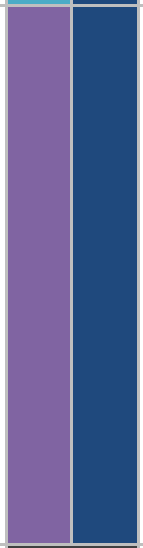
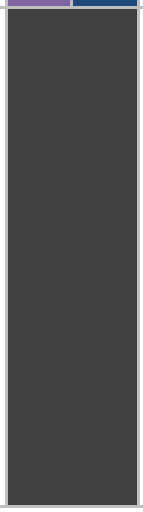
P – LAND USE PLANNING

Case Study	Hazard Code	Full (F) / Partial (P) Case Study	Abstract	Product
LP7 Small Secondary Dwelling Planning as a Climate Adaptation Measure – City of Fremantle, WA		F	The City of Fremantle has devised and implemented the Small Secondary Dwelling Planning Scheme Amendment, which changes the occupancy restriction of dwellings to address population growth and reduce developments in vulnerable coastal areas.	*Small Secondary Dwelling Planning Scheme Amendment*
LP8 Embedding Climate Change into Floodplain Risk Management Plan Development – Randwick City Council, NSW		F	Council is investigating and developing comprehensive floodplain risk management plans for major catchment areas throughout the City. The flood studies that are carried out as an integral step in the final risk management plans incorporate sea level rise estimates into the flood modelling.	*Floodplain Risk Management Plan*
LP9 Policy on Sea Level Rise – Eurobodulla Shire Council, NSW		P	Eurobodalla Shire Council has adopted The Interim Sea Level Rise Adaptation Policy, which now requires properties within investigation areas to provide Council with additional information (including a Statement of Environmental Effects) when lodging a development application.	*Interim Sea Level Rise Adaptation Policy*

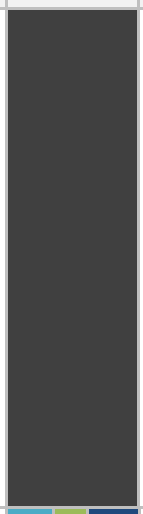
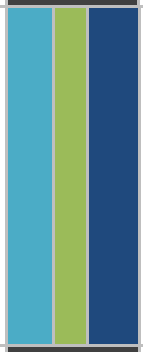
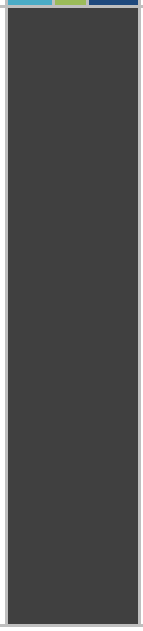
P – LAND USE PLANNING

Case Study	Hazard Code	Full (F) / Partial (P) Case Study	Abstract	Product
LP10 Decision Support for Adaptation: The Handbook – Hunter HCCREMS		P	Having identified the need for a consistent and transparent decision-making processes to manage existing and future coastal hazards, seven coastal councils of the Hunter, Central, and Lower North Coast region of New South Wales developed a comprehensive coastal management handbook. Contained within the handbook is a series of tools to assist decision-makers in implementing the appropriate management strategies for coastal hazard risks which are anticipated to worsen due to climate change.	*Coastal Management Handbook*

W – WORKS, ASSETS, ENGINEERING

Case Study	Hazard Code	Full (F) / Partial (P) Case Study	Abstract	Product
W1 Holistic inundation modelling and integrated climate adaptation planning – City of Port Phillip, VIC		F	Following the development of holistic catchment and coastal inundation modelling, the City of Port Phillip is now in the process of developing a range of tools (including a dynamic spatial model), to test likely adaptation infrastructure solutions that are best suited in managing the impacts during future inundation scenarios.	*Holistic Catchment and Coastal Inundation Tools*
W2 Climate Change Impacts Financial Simulation Model – University of South Australia		P	The University of South Australia has developed the Climate Change Impacts Financial Simulation Model (the Model), which quantifies the change in road asset useful life and corresponding maintenance and repair costs as a result of future climatic changes. Incorporated into the latest edition of the Institute of Public Works and Engineering Australia (IPWEA), this model may be used to assist councils in planning future road maintenance programs, prioritising works and estimating potential changes of the lifespan of an asset.	*Climate Change Impacts Financial Simulation Model*
W3 Climate Adaptation Toolkit to Embed Climate Resilience in Decision-Making – City of Greater Geelong, VIC		F	To embed climate adaptation into Council's existing delivery processes, the City of Greater Geelong has developed an interactive webPbased Climate Adaptation Toolkit. Made publicly available on Council's website, the tool may be used by other local governments to address climate change in a practical way. Specifically designed to be used once a council has identified priority climate risks, the toolkit allows for councils to explore the climate risk context, develop adaptation actions, and screen for climate change interactions.	*Web-based Climate Adaptation Toolkit*

W – WORKS, ASSETS, ENGINEERING

Case Study	Hazard Code	Full (F) / Partial (P) Case Study	Abstract	Product
W4 Infrastructure Development Guidelines for Embedding Climate Adaptation into Asset Management – City of Greater Geelong, VIC		F	To embed climate adaptation into asset management, the Greater Geelong City Council has incorporated climate change considerations into infrastructure development guidelines for new and existing developments.	*Infrastructure Development Guidelines*
W5 Council Water and Sewer Assets - Adapting to Climate Change – Gosford City Council, NSW		F	Gosford City Council has developed a Water and Sewer Master Plan to strategically manage existing water and sewer assets to the year 2050. Central to this plan is the identification of future climate change scenarios, the resulting impacts on existing assets, and the range of actions to be implemented to increase the resilience of the assets in this class.	*Water and Sewer MasterPlan*
W6 The Role of the IS Rating Scheme in Embedding Climate Adaptation into Infrastructure Delivery – Infrastructure Sustainability Council of Australia (ISCA)		F	The Infrastructure Sustainability (IS) Rating Scheme provides local governments with a framework for embedding sustainability including climate adaptation into the planning, design, delivery and operation of infrastructure assets. Along with the IS scheme, ISCA has produced a climate adaptation guideline to inform industry on climate risks and opportunities for new projects.	*Infrastructure Sustainability (IS) Rating Scheme*

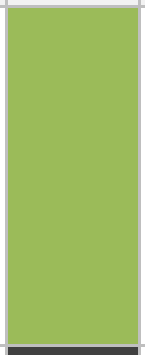
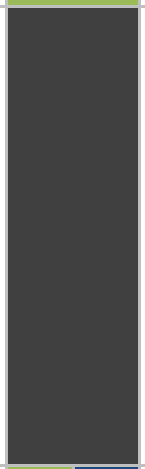
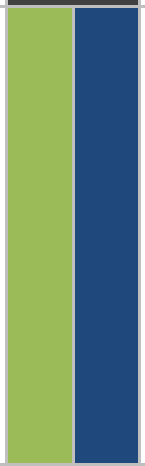
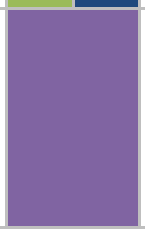
W – WORKS, ASSETS, ENGINEERING

Case Study	Hazard Code	Full (F) / Partial (P) Case Study	Abstract	Product
W7 Council Building Vulnerability Assessment Tool – City of Whitehorse Council, VIC		P	The City of Whitehorse has developed an approach to assess the vulnerability of existing buildings to climate change, identifying actions and recommendations that may be implemented across the organisations existing asset management program.	-
W8 Embedding Climate Change Resilience into Asset Management – City of Canada Bay, NSW		F	The City of Canada Bay Council (CCBC) has developed a Climate Resilience Assessment Tool, in order to gain a deeper understanding of the exposure, sensitivity and adaptive capacity of built and natural assets to a changing climate. Integrating this tool into Council's existing Asset Management Strategy will enable Council to proactively increase the resilience of key assets across the local government area (LGA).	*Climate Change Resilience Assessment Tool*

E – ENVIRONMENT (PARKS & RECREATION, OPEN SPACES, BIODIVERSITY MANAGEMENT)

Case Study	Hazard Code	Full (F) / Partial (P) Case Study	Abstract	Product
E1 High Performance Landscape Guidelines – New York City, U.S.		P	New York City Department of Parks and Recreation has developed The High Performance Landscape Guidelines, which provides users with comprehensive guidance and checklists on park planning, design, construction and maintenance, with particular focus placed on ways in which to mitigate and adapt to climate change.	*High Performance Landscape Guidelines*

E – ENVIRONMENT (PARKS & RECREATION, OPEN SPACES, BIODIVERSITY MANAGEMENT)

Case Study	Hazard Code	Full (F) / Partial (P) Case Study	Abstract	Product
E2 Irrigation Management Framework and Decision Support Tool – City of Marion, SA		F	The City of Marion has developed an Irrigation Management Framework, which includes an Irrigated Public Open Space Decision Support tool. This tool asks users a series of questions in relation to the function and use of irrigated landscapes in order to systematically prioritise irrigation scheduling.	*Irrigated Public Open Space Decision Support Tool*
E3 Weed Management Program – City of Latrobe, VIC		P	Given the limited resources available for weed management within local government, The City of Latrobe Council used key information provided by the Department of Primary Fisheries to determine the key weeds likely to be problematic in the municipality based on future climate change scenarios. This information has subsequently informed operational decisions, and has resulted in the prioritisation of weed management programs.	-
E4 Wetland Construction – Salisbury City Council, SA		P	In order to secure a reliable water supply and manage flooding impacts, Salisbury City Council has constructed wetlands, which form an integral part of the City's stormwater drainage system. This strategy has resulted in greater flood control and harvesting of water for reuse and aquifer recharge, whilst demonstrating the importance of managing climate change holistically in order to identify and implement win-win adaptation options.	-
E5 Modelling Future Heatwave Risks – City of Port Phillip, VIC		P	The City of Port Phillip has captured aerial maps of urban heat island effects and how they impact the local area. These maps are assisting Council in future street and park planning decisions.	*Urban Heat Island Aerial Mapping*

CES – COMMUNITY SERVICES & EMERGENCY MANAGEMENT

Case Study	Hazard Code	Full (F) / Partial (P) Case Study	Abstract	Product
CES1 Coastal Storm Education Strategy to increase Community Awareness and Responsiveness – Pittwater Council, NSW		F	Pittwater, Warringah and Manly Councils, in partnership with State Emergency Services (SES) have devised a Flood and Coastal Storm Education Strategy. Central to the strategy is increasing the level of stakeholder awareness in relation to flooding and coastal storm hazards on the northern beaches, whilst ensuring that communities are adequately prepared in the event of flooding and coastal storms.	*Flood and Coastal Storm Education Strategy*
CES2 Regional Hazard Mitigation Plan – King County, U.S.		P	King County Council has integrated the observed and projected climate change impacts associated with severe weather, flooding, drought, fire, landslides, etc. into emergency management planning and programs, including the 2014 King County Regional Hazard Mitigation Plan.	*2014 King County Regional Hazard MItigation Plan*
CES3 Targeted Community Engagement – Mornington Peninsula Shire Council, VIC		P	Mornington Peninsula Council has undertaken a number of community engagement sessions on climate change, with each session tailored to a specific audience and climate change issue.	*Community Engagement Programs*
CES4 Support for Vulnerable Community Members during Heat Wave Events (Community Care Program) – City of Marion, SA		F	The City of Marion has established a Home and Community Care Program, providing services to people who are frail, aged or have a disability, and their carers. The services provided are in response to identified issues that would be encountered by vulnerable community groups during heat wave periods.	*Home and Community Care Program*

CES – COMMUNITY SERVICES & EMERGENCY MANAGEMENT

Case Study	Hazard Code	Full (F) / Partial (P) Case Study	Abstract	Product
CES5 Community Survey – Bass Coast Shire Council, VIC		P	Bass Coast Shire Council developed and undertook a survey to determine community perceptions in relation to key climate change issues, risks, hazards etc. The results will be used to inform the community education that is required in relation to climate change in the future.	*Climate Change Community Survey*

ED – ECONOMIC DEVELOPMENT

Case Study	Hazard Code	Full (F) / Partial (P) Case Study	Abstract	Product
ED1 Business Climate Toolkit and Checklist for Engaging SMEs in Climate Resilience – Sefton Council, U.K.		F	Sefton Council has developed a series of tools, including a Business Climate Checklist, to assist small businesses in building climate change resilience.	*Business Climate Checklist*
ED2 Community Ecosystem-based Adaptation Options for Employment and Upskilling – eThekwini Municipality, South Africa		F	To alleviate poverty with employment and the creation of upskilling opportunities in the local Durban communities, Community Ecosystem-based Adaptation programs are developed with public–private partnerships. Habitats are restored, local communities are empowered and business organisations are given the opportunity to demonstrate social and environmental responsibility by sponsoring these projects.	*Community Ecosystem-based Adaptation Planning*

APPENDIX 1: REFERENCES AND LINKS

A1.1 USEFUL RESOURCES AND LINKS

NATIONAL

Australian Government 2013, Australian Standard – Climate adaptation for settlements and infrastructure, AS 5334-2013, Standards Australia, Sydney.

Australian Green Infrastructure Council 2011, *ACIG Guideline for Climate Change Adaptation*, Infrastructure Sustainability Council of Australia, Sydney, <http://www.isca.org.au/images/pdf/cca_guideline_v2.1.pdf>.

Australian Greenhouse Office 2006, *Climate Change Impact & Risk Management: A Guide for Business and Government*, Department of the Environment, Canberra, <http://www.climatechange.gov.au/sites/climatechange/files/documents/03_2013/risk-management.pdf>.

Cummings, P., Gordon, A., Lord, D., Mariani, A., Nielsen, L., Panayotou, K., Rogers, M. & Tomlinson, R. 2012, *Climate change adaptation guidelines in coastal management and planning*, Engineers Australia, Canberra.

Gurran, N., Norman, B., Gilbert, C. & Hamin, E. 2011, *Planning for climate change adaptation in coastal Australia: state of practice*, Report No. 4 for the National Sea Change Taskforce, National Sea Change Taskforce, <http://www.seachangetaskforce.org.au/Publications/Planning%20for%20climate%20change%20in%20coastal%20Australia%20%20State%20of%20Practice.pdf>.

Hunter and Central Coast Regional Environmental Management Strategy (HCCREMS) 2013, *Decision support for adaptation: The handbook*, HCCREMS, Thornton, <http://www.hccrems.com.au/hccrems/media/RESOURCES/Climate%20Change/Project_Factsheet.pdf>.

International Council for Local Environmental initiatives (ICLEI) Canada 2012, *What is the Building Adaptive & Resilient Communities (BARC) Program?*, ICLEI Canada, viewed 17 April 2014, <http://www.icleicanada.org/programs/adaptation/barc>.

Kember, O. & Watts, C. 2012, *Coming ready or not: managing climate risks to Australia's infrastructure*, Climate Institute, Sydney, <http://www.climateinstitute.org.au/verve/_resources/TCI_ComingReadyorNot_ClimateRiskstoInfrastructure_October2012.pdf>.

Marsden Jacob Associates 2012, *Deciding for the coast: a guide for decision-making on cost effective adaptation*, Guide and Workbook, National Climate Change Adaptation Research Facility (NCCARF), <http://www.nccarf.edu.au/localgov/examples/deciding-coast-guide-decision-making-cost-effective-adaptation>.

Standards Australia 2009, *Risk management – principles and guidelines*, AS/NZS ISO 31000:2009, Standards Australia, Sydney.

UKCIP 2012, *About the Wizard*, UKCIP, viewed 17 April 2014, <http://www.ukcip.org.uk/wizard/about-the-wizard/>.

Victorian Centre for Climate Change and Adaptation Research (VCCAR) 2012, *Climate change adaptation navigator*, RMIT and VCCAR, viewed 17 April 2014, <http://www.adaptation-navigator.org.au/>.

Webb, R. & Beh, J. 2013, *Leading adaptation practices and support strategies for Australia: An international and Australian review of products and tools*, Final report, NCCARF, <http://www.nccarf.edu.au/sites/default/files/attached_files_publications/Webb_2013_Leading_adaptation_practices_support.pdf>.

STATE

Office of Environment and Heritage NSW (OEHNSW) 2013, *Guide to integrated regional vulnerability assessment for climate change*, Office of Environment and Heritage, Sydney, <http://www.environment.nsw.gov.au/resources/climatechange/130016IRVAguide.pdf>.

LGASA 2012b, *A guide for developing a climate change adaptation plan and undertaking an integrated climate change vulnerability assessment*, LGASA, Adelaide, <http://www.lga.sa.gov.au/webdata/resources/files/Guidelines_for_Developing_a_Climate_Change_Adaptation_Plan.pdf>.

Local Government Association of New South Wales (LGNSW) n.d., *Planning for climate change*, viewed 16 April 2014, <http://www.lgnsw.org.au/policy/climate-change/planning-for-climate-change>.

A1.2 REFERENCES AND BIBLIOGRAPHY

Australian Bureau of Statistics (ABS) 2012, *1301.0 – Year Book Australia, 2012*, ABS, Canberra, viewed 16 April 2014, <http://www.abs.gov.au/ausstats/abs@.nsf/mf/1301.0>.

Australian Centre of Excellence for Local Government (ACELG) 2011, *Local Government Climate Change Roundtable*, viewed 16 April 2014, <http://www.acelg.org.au/events/local-government-climate-change-roundtable>.

Australian Government 2010, *Adapting to Climate Change in Australia – An Australian Government Position Paper*, Department of Climate Change, Canberra, <http://www.climatechange.gov.au/sites/climatechange/files/documents/03_2013/adapt-climate-change-position-paper.pdf>.

Department of the Environment 2012, *Roles and responsibilities for climate change in Australia*, viewed 16 April 2014, <http://www.climatechange.gov.au/roles-and-responsibilities-climate-change-australia>.

Australian Government 2013a, *Barriers to Effective Climate Change Adaptation*, Australian Government response to the Productivity Commission report, Department of the Environment, Canberra, <http://www.climatechange.gov.au/sites/climatechange/files/documents/03_2013/ag-inquiry-response.pdf>.

Australian Government 2013b, *Climate Adaptation Outlook: A Proposed National Adaptation Assessment Framework*, Department of Industry, Innovation, Climate Change, Science, Research, and Education, Canberra.

Australian Green Infrastructure Council 2011, *ACIG Guideline for Climate Change Adaptation*, Infrastructure Sustainability Council of Australia, Sydney, <http://www.isca.org.au/images/pdf/cca_guideline_v2.1.pdf>.

Australian Greenhouse Office 2006, *Climate Change Impact & Risk Management: A Guide for Business and Government*, Department of the Environment, Canberra, <http://www.climatechange.gov.au/sites/climatechange/files/documents/03_2013/risk-management.pdf>.

Booth, P. 2012, Case Studies of climate change adaptation tools and application processes used by Local Government Practitioners, Final Stage 1 Report, University of New South Wales, Sydney.

Climate Commission 2013, *The Angry Summer*, Cool Australia, <http://coolaustralia.org/wp-content/uploads/2013/09/AngrySummerreport-March2013.pdf>.

Cummings, P., Gordon, A., Lord, D., Mariani, A., Nielsen, L., Panayotou, K., Rogers, M. & Tomlinson, R. 2012, *Climate change adaptation guidelines in coastal management and planning*, Engineers Australia, Canberra.

Daze, A., Ambrose, K. & Ehrhart, C. 2009, *Climate vulnerability and capacity analysis handbook*, CARE International, <http://www.careclimatechange.org/cvca/CARE_CVCAHandbook.pdf>.

Department of Climate Change and Energy Efficiency (DCCEE) 2012, *Community discussion: Roles and responsibilities for climate change adaptation in Australia*, Department of the Environment, viewed 16 April 2014, <http://www.climatechange.gov.au/government/initiatives/sccc/discussion.aspx>.

Eyre, S., Niall, S., Silke, F. & Young, S. 2012, *Climate change adaptation toolkit*, Municipal Association of Victoria, Melbourne, <http://www.sustainability.mav.asn.au/content/upload/files/publications/Climate_Change_Adaptation_Tool6541.pdf>.

Government of South Australia 2012, *Government of South Australia submission: Submission Productivity Commission – Barriers to effective climate change adaptation*, Productivity Commission, Canberra, <http://www.pc.gov.au/__data/assets/pdf_file/0013/117400/subdr088.pdf>.

Gurran, N., Norman, B., Gilbert, C. & Hamin, E. 2011, *Planning for climate change adaptation in coastal Australia: state of practice*, Report No. 4 for the National Sea Change Taskforce, National Sea Change Taskforce, <http://www.seachangetaskforce.org.au/Publications/Planning%20for%20climate%20change%20in%20coastal%20Australia%20%20State%20of%20Practice.pdf>.

Hinkel, J., Bharwani, S., Bisaro, A., Carter, T., Cull, T., Davis, M., Klein, R., Lonsdale, K., Rosentrater, L. & Vincent, K. 2013, *PROVIA Guidance on assessing vulnerability, impacts, and adaptation to climate change*, Consultation Document, United Nations Environment Programme, Nairobi, <http://www.unep.org/provia/Portals/24128/PROVIA_guidance_report_low_resolution.pdf>.

Hunter and Central Coast Regional Environmental Management Strategy (HCCREMS) 2013, *Decision support for adaptation: The handbook*, HCCREMS, Thornton, <http://www.hccrems.com.au/hccrems/media/RESOURCES/Climate%20Change/Project_Factsheet.pdf>.

International Council for Local Environmental Initiatives (ICLEI) n.d., *Changing climate, changing communities: guide and workbook for municipal climate adaptation*, ICLEI Canada, Toronto, <http://www.icleicanada.org/images/icleicanada/pdfs/GuideWorkbookInfoAnnexes_WebsiteCombo.pdf>.

ICLEI Oceania 2008, *Local government climate change adaptation toolkit*, ICLEI Oceania, Melbourne, <http://archive.iclei.org/fileadmin/user_upload/documents/ANZ/CCP/CCP-AU/Projects/AI/AdaptationToolkit/Toolkit_CCPAdaptation_Final.pdf>.

International Panel on Climate Change (IPCC), *Glossary A-D*, viewed 17 April 2014, <http://www.ipcc.ch/publications_and_data/ar4/wg2/en/annexessglossary-a-d.html>.

Kember, O. & Watts, C. 2012, *Coming ready or not: managing climate risks to Australia's infrastructure*, Climate Institute, Sydney, <http://www.climateinstitute.org.au/verve/_resources/TCI_ComingReadyorNot_ClimateRiskstoInfrastructure_October2012.pdf>.

Lim, B. & Spanger-Siegfried, E. (eds.) 2004, *Adaptation policy frameworks for climate change: developing strategies, policies and measures*, United Nations Development Programme, New York.

Local Government Association of New South Wales (LGNSW) n.d., *Planning for climate change*, viewed 16 April 2014, <http://www.lgnsw.org.au/policy/climate-change/planning-for-climate-change>.

Local Government Association of South Australia (LGASA) 2012a, *Climate Adaptation Programme*, Final Report, LGASA, Adelaide, <http://www.lga.sa.gov.au/webdata/resources/files/LGA-99812(3).pdf>.

LGASA 2012b, *A guide for developing a climate change adaptation plan and undertaking an integrated climate change vulnerability assessment*, LGASA, Adelaide, <http://www.lga.sa.gov.au/webdata/resources/files/Guidelines_for_Developing_a_Climate_Change_Adaptation_Plan.pdf>.

LGASA & Department of Environment, Water and Natural Resources (DEWNR) (SA) 2013, *Science to solutions: State-wide capacity to undertake effective and integrated adaptation to climate change*, Consultants' Brief, LGASA, Adelaide.

Local Government Association of Tasmania (LGAT) 2010, *Local Government Climate Change Adaptation Forum outcomes*, LGAT, Hobart, <http://www.lgat.tas.gov.au/webdata/resources/files/Local_Government_Climate_Change_Adaptation_Forum_outcomes.pdf>.

Moser, S.C. & Ekstrom, J.A. 2010, 'A framework to diagnose barriers to climate change adaptation', *Proceedings of the National Academy of Sciences of the United States of America*, <http://www.pnas.org/cgi/doi/10.1073/pnas.1007887107>.

Mukheibir, P., Kuruppu, N., Gero, A. & Herriman, J. 2012, *Cross-scale barriers to climate change adaptation in local government, Australia*, Workshop Three Report, UTS Institute for Sustainable Futures, Sydney, <http://cfsites1.uts.edu.au/find/isf/publications/mukheibretal2012climatebarrierslocalgovworkshop3.pdf>.

Mukheibir, P., Kuruppu, N., Gero, A. & Herriman, J. 2013, *Cross-scale barriers to climate change adaptation in local government, Australia*, Final Report, UTS Institute for Sustainable Futures, Sydney, <http://www.nccarf.edu.au/sites/default/files/attached_files_publications/Mukheibir_2013_Cross-scale_barriers_to_climate_change.pdf>.

Municipal Association of Victoria (MAV) 2012, *Productivity Commission – Barriers to Effective Climate Change Adaptation*, MAV Submission, Productivity Commission, Canberra, <http://www.pc.gov.au/__data/assets/pdf_file/0017/115307/sub079.pdf>.

National Climate Change Adaptation Research Facility (NCCARF) 2010, *Climate Change Action for Local Government*, NCCARF, <http://www.nccarf.edu.au/localgov/resources/climate-change-adaptation-actions-local-government>.

NCCARF, DCCEE & Australian National University (ANU) 2012, *Informing Adaptation Policy*, Report for Policy Makers, NCCARF, <http://www.nccarf.edu.au/sites/default/files/attached_files/Policy%20Makers%20report_NCCARF%20V4_photo%20inc.pdf>.

NCCARF 2013, *Challenges of adaptation for local governments*, Policy Guidance Brief 5, NCCARF, <http://www.nccarf.edu.au/sites/default/files/attached_files_publications/GOVERNMENT_A4Printable_0.pdf>.

Office of Environment and Heritage NSW (OEHNSW) 2013, *Guide to integrated regional vulnerability assessment for climate change*, Office of Environment and Heritage, Sydney, <http://www.environment.nsw.gov.au/resources/climatechange/130016IRVAguide.pdf>.

Pillora, S. 2010, Australian local government and climate change, Working Paper No.1, Australian Centre of Excellence for Local Government, University of Technology, Sydney, <http://www.acelg.org.au/news/australian-local-government-and-climate-change>.

Productivity Commission 2012, *Barriers to effective climate change adaptation*, Report No. 59, Final Inquiry Report, Productivity Commission, Canberra, <http://www.pc.gov.au/__data/assets/pdf_file/0008/119663/climate-change-adaptation.pdf>.

Standards Australia 2009, *Risk management – principles and guidelines*, AS/NZS ISO 31000:2009, Standards Australia, Sydney.

Standards Australia 2011, *Climate change adaptation for settlements and infrastructure*, DR AS 5334, Standards Australia, Sydney, <http://www.asbec.asn.au/files/DR_AS_5334_Draft_Adaptation_Standard_8Sept2011.pdf>.

United Kingdom Climate Impacts Programme (UKCIP) 2009, *A local council local impacts profile: how to do an LCLIP*, UKCIP, <http://www.ukcip.org.uk/wordpress/wp-content/PDFs/LCLIP_guidance2009.pdf>.

UKCIP 2012, *About the Wizard*, UKCIP, viewed 17 April 2014, <http://www.ukcip.org.uk/wizard/about-the-wizard/>.

Victorian Centre for Climate Change and Adaptation Research (VCCAR) 2012, *Climate change adaptation navigator*, RMIT and VCCAR, viewed 17 April 2014, <http://www.adaptation-navigator.org.au/>.

Webb, R. & Beh, J. 2013, *Leading adaptation practices and support strategies for Australia: An international and Australian review of products and tools*, Final report, NCCARF, <http://www.nccarf.edu.au/sites/default/files/attached_files_publications/Webb_2013_Leading_adaptation_practices_support.pdf>.

APPENDIX 2: GLOSSARY

TERM	MEANING
ADAPTATION	Adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities (IPCC 2007).
ADAPTIVE CAPACITY	The ability of a system to design or implement effective adaptation strategies to adjust to information about potential climate change (including climate variability and extremes), to moderate potential damages, to take advantage of opportunities, or to cope with the consequences (modified from the IPCC to support project focus on management of future risks).
ADAPTATION COSTS AND BENEFITS	These cover the costs of planning, preparing for, facilitating, and implementing adaptation measures, including transition costs. The avoided damage costs or the accrued benefits following the adoption and implementation of adaptation measures.
ADAPTATION PATHWAYS	The steps necessary for adaptation, including understanding how different stakeholders make decisions about adaptation, developing adaptation options suited to different regions and communities, and analysing the benefits of adaptation and key policy actions through modelling.
ASSET MANAGEMENT	The combination of management, financial, economic, engineering, and other practices applied to physical assets with the objective of providing the required level of service in the most cost-effective manner.
AUTONOMOUS ADAPTATION	Adaptation that does not constitute a conscious response to climatic stimuli but is triggered by ecological changes in natural systems and by market or welfare changes in human systems. Also referred to as spontaneous adaptation.
CLIMATE CHANGE	Climate change refers to any change in climate over time, due to either natural variability or as a result of human activity.

TERM	MEANING
CLIMATE ADAPTATION	A common understanding of adaptation is that it is the process of reducing vulnerability to climate risks and impacts, where the impact will be determined by the climate hazard and the vulnerability of a system or part of a system, such as an asset, organisation, or place. Adaptation strategies and actions can range from short-term coping to longer-term, deeper transformations. They aim to meet more than climate change goals alone, and may or may not succeed in moderating harm or exploiting beneficial opportunities. There are many different types of adaptation determined by factors like scale, timing, and who is involved. Given the multifaceted nature of adaptation, numerous types of adaptation actions or approaches are possible as represented by adaptation pathways.
CLIMATE EFFECTS/ VARIABLES	Includes temperature, humidity, atmospheric pressure, wind, precipitation, atmospheric particle count and other such meteorological variables. The change in conditions that results in heat waves, drought, flooding, wind, hail, cyclones, bushfires, and relative humidity (also referred to as secondary climate effects).
CLIMATE HAZARD	This is where hazard is defined as the occurrence of a fault on the electricity network caused by weather and vulnerability as the magnitude of impact on the network measured in the numbers of customers whose supplies are interrupted by the fault.
CLIMATE RISK	Many organisations define 'climate risk' as comprising both risks associated with the physical impacts of climate change and risks associated with emissions reduction policy. For the purpose of this project, 'climate risk' refers to the first category, with the second category defined as 'carbon risk'.
CLIMATE RESILIENCE	The Intergovernmental Panel on Climate Change (IPCC) defines climate resilience as, "the ability of a social or ecological system to absorb disturbances while retaining the same basic structure and ways of functioning, the capacity for self-organisation, and the capacity to adapt to stress and change."
HAZARD MAP	A map that shows information about the extent, likelihood, nature or magnitude of natural hazards, or some combination thereof.
IMPACT	Impact is an effect of climate change on the socio-bio-physical system (e.g. flooding, transmission line sagging, pole fires etc.).
INTER-DEPENDENCIES	The relationship between an event or organisation with another event or organisation.

TERM	MEANING
LIKELIHOOD	This is a general concept relating to the chance of an event occurring. Generally this is expressed as a probability or frequency.
RESILIENCE	The ability to manage and be prepared for impacts.
SEA LEVEL RISE	The sea level at any point in time is determined by the mean sea level, the state of the tide, wave set-up and responses to air pressure, and may sometimes be affected by additional flows of water from on shore. Long term increases in mean sea level refers to anticipated sea level changes due to the greenhouse effect and associated global warming.
VULNERABILITY	Climate vulnerability is the extent to which a system is susceptible to, or unable to cope with, adverse effects of climate change including climate variability. It is influenced by its adaptive capacity.

APPENDIX 3: PRINCIPLES OF ROBUST ADAPTATION PLANNING

These principles are:

- Clear, shared framing of climate adaptation challenges for a council starting with a climate adaptation vision and climate change adaptation goals, targets and objectives.
- Key strategic documents reflect and incorporate the climate adaptation vision/goals and they don't conflict.
- Clear roles and responsibilities for delivery of the adaptation plan activities.
- Time and resources allocated specifically to climate adaptation tasks and activities.
- Time and resources invested in planning, preparing and ensuring the right mix of skills and knowledge are applied to the process.
- Take a risk-based approach – involving all parts of council.
- Address risks associated with today's climate variability and extremes as a starting point towards taking anticipatory actions to address risks and opportunities associated with longer-term climate change.
- Manage climate and non-climate risks using a balanced approach – assess and implement your approach to adaptation in the context of overall sustainability and development objectives that includes managing climate and non-climate risks.
- Focus on actions to manage priority climate risks – identify key climate risks and opportunities and focus on actions to manage them.
- Identify champions.
- Communicate effectively with key internal stakeholders.
- Work in partnership – identify and engage your community and ensure they are well informed.
- Gain high-level support for the process from key internal stakeholders. Implement 'low' and 'no regret' embedding actions now where possible.
- Use adaptive management to cope with uncertainty – recognise the value of a phased approach to cope with uncertainty.
- Recognise the value of no/low regrets and win-win adaptation options in terms of cost effectiveness and multiple benefits.

- Avoid actions that foreclose or limit future adaptations or restrict the adaptive actions of others.

- Review the continued effectiveness, efficiency, equity and legitimacy of adaptation decisions by adopting a continuous improvement approach that also includes monitoring and re-evaluations of risks.

- Frame and communicate SMART (*specific, measurable, achievable, results-oriented and time-bound)* objectives/outcomes before starting out.

See the adaptation work as an ongoing driver of organisational culture and decision-making processes, with a commitment to regular reviews and updates of the process as new data and information becomes available.

(Adapted from UKCIP 2012.)

APPENDIX 4: PARTICIPATING COUNCILS

Reference Group:

- City of Canada Bay, NSW
- City of Geelong, VIC
- City of Greater Geraldton, WA
- City of Onkaparinga, SA
- City of Port Phillip, VIC
- Clarence City Council, TAS
- Pittwater Council, NSW
- Randwick City Council, NSW
- Townsville City Council, QLD.

In-Kind Support Group:

- City of Fremantle, WA
- City of Marion, SA
- City of Port Adelaide Enfield, SA
- Gosford City Council, NSW
- Lake Macquarie City Council, NSW
- Melton City Council, VIC
- Mornington Peninsula Shire Council, VIC
- Shoalhaven City Council, NSW
- Western Alliance for Greenhouse Action (WAGA), VIC
- Willoughby Council, NSW.

APPENDIX 5: METHODOLOGY AND RESULTS

In developing the manual an industry best practice approach was adopted that draws heavily on a range of recent work. A variety of data collection methods were used including:

- a review of international and national literature
- a survey of international and Australian councils
- interviews with councils and other stakeholders
- reference group meetings
- consultation on draft material.

A summary of results relevant to each method is included where applicable.

A5.1 REVIEW OF INTERNATIONAL AND NATIONAL LITERATURE

A desktop review of literature relating to climate adaptation and local government was undertaken. Sources focused on academic, industry and government documents, websites and other sources at both an international and national scale. The review focused on understanding the current state of play in embedding climate adaptation into local government organisations, as well as the barriers and challenges involved. The findings of the desktop review were compiled for use in the supporting policy document, and also assisted in identifying councils that are leading the way in climate adaptation and embedding climate risk.

A5.2 SURVEY OF INTERNATIONAL AND AUSTRALIAN COUNCILS

A survey was sent (using Survey Monkey software) to local governments internationally and within Australia. The primary aim of the survey was to identify suitable case studies to include in the manual. Survey questions were structured so as to draw out examples of practical embedding activities across different council functions. The survey was sent internationally on an ad hoc basis – based on the desktop review findings and stakeholder consultation (e.g. ICLEI).

Results of the survey can be found in Table 2 below. The results provide some insight into where leading practice is currently taking place – including in which council function areas. However there are clear limitations in using this survey data to develop theory in a quantitative sense. The main constraint is small sample size. However, this is unsurprising because, as discussed above, the survey was focused on drawing out specific and leading embedding activities including tools and products. If a council was not progressed in climate adaptation e.g. did not have an adaptation plan, it is unlikely they would have participated and completed the survey. Further analysis is provided in the table. The analysis supports the assignment of case studies to each functional area. It indicated where embedding is and is not happening in councils.

Table 2: Summary of survey results

SURVEY COMPONENT	RESULT	COMMENTS
Number of survey recipients	Unknown	Survey was sent through local government associations and other sources, making it difficult to estimate how many completed the survey
Number of survey respondents	22	Five respondents did not provide their council information
Number of Australian survey respondents	14	14 of the respondents noted which Australian council they represented
Number of international survey respondents	3	Kent County, UK; Sefton Council, UK; eThekwini municipality, South Africa
Unknown respondents	5	A total of five (5) respondents provided no data relating to their origin
Number of respondents from NSW	4	–
Number of respondents from QLD	1	–
Number of respondents from VIC	7	–
Number of respondents from TAS	1	–
Number of respondents from SA	1	–
Number of respondents from Northern Territory	0	–
Number of respondents from WA	0	WA has had presence on the reference and in-kind support groups

SURVEY COMPONENT	RESULT	COMMENTS
Spread of progress (i.e. % of respondents that had completed climate adaptation work in the following categories)	Corporate services: 67.5% Land use: 33.7% Asset management: 19.67% Community services: 40% Natural environment: 38%	Corporate services: Q2-5, 8, 9, 13-16, 18 Land use: some of 6, 10 Asset management: some of 6, 11 Community services: Q 7, 17 Natural environment: Q12
Spread of progress (i.e. # of "yeses in each section out of the total "yeses on survey)	Corporate services: 60.8% Land use: 12.8% Asset management: 19.67/198.87= 12.1% Community services: 40/198.87=11.4% Natural environment: 38/198.87= 2.9%	Corporate services: 30 (57%) Land use: 3 (5.7%) Asset mgt.: 9 (17%) Community services: 6 (11.5%) Natural environment: 4 (7.7%)
International progress (i.e. % of "yeses out of all selectable options)	47.5%	-
Domestic progress (i.e. % of "yeses out of all selectable options)	30%	-

A5.3 INTERVIEWS WITH COUNCILS AND OTHER STAKEHOLDERS

Phone interviews with councils and other stakeholders were targeted to ensure efficient use of project resources. Interviewees were identified.

Phone interviews were informal and semi-structured, with a focus on drawing out the actual process of steps undertaken to achieve the embedding initiative or activity. Councils typically worked collaboratively with the consultants in developing the manual to produce the case studies.

In addition to phone interviews, email correspondence was adopted for transfer of case study documentation and supporting information (products etc.).

A5.4 CONSULTATION ON THE DRAFT MANUAL

Several reference group (refer to APPENDIX 4) meetings were held throughout the program of manual development. The meetings focused on the content of the manual, as well as opportunities for its promotion into the local government community. Members of the reference group were also contacted informally from time to time to provide advice on a particular issue. A smaller working group was also formed to discuss and provide more detailed input into the manual structure. The reference group reviewed the draft manual and provided feedback and input into developing it in its final form. This review role was seen as critical to ensuring the manual was structured to suit the varying needs of local government.

The in-kind support group members (refer to APPENDIX 4) also contributed to the development of the manual through providing support in developing some of the case studies. They also contributed case studies.

About ACELG

ACELG is a unique consortium of universities and professional bodies that have a strong commitment to the advancement of local government. The consortium is based at the University of Technology, Sydney, and includes the UTS Centre for Local Government, the University of Canberra, the Australia and New Zealand School of Government, Local Government Managers Australia and the Institute of Public Works Engineering Australia. In addition, the Centre works with program partners to provide support in specialist areas and extend the Centre's national reach. These include Charles Darwin University and Edith Cowan University.

Program Delivery

ACELG's activities are grouped into six program areas:

- Research and Policy Foresight
- Innovation and Best Practice
- Governance and Strategic Leadership
- Organisation Capacity Building
- Rural-Remote and Indigenous Local Government
- Workforce Development.

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