Systems Approach to Regional Climate Change Adaptation Strategies in Metropolises

Case Studies of Adaptive Capacity: Systems Approach to Regional Climate Change Adaptation Strategies

SYDNEY COASTAL COUNCILS

National Research
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Climate Adaptation

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University *of the* Sunshine Coast
Queensland, Australia

Case Studies of Adaptive Capacity:
Systems Approach to Regional Climate Change Adaptation Strategies

Timothy F Smith[1], Cassandra Brooke[4], Thomas G Measham[3], Benjamin Preston[2], Russell Gorddard[3], Geoff Withycombe[5], Beth Beveridge[5] and Craig Morrison[5]

[1] University of the Sunshine Coast
[2] CSIRO Marine and Atmospheric Research
[3] CSIRO Sustainable Ecosystems
[4] WWF-Australia
[5] Sydney Coastal Councils Group

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Enquiries should be addressed to:

Russell Gorddard
CSIRO Sustainable Ecosystems
Phone: +61 (0)2 6242 1789
Email: russell.gorddard@csiro.au

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EXECUTIVE SUMMARY

The *Case Studies of Adaptive Capacity* report represents the output of the third phase of the 'Systems Approach to Regional Climate Change Adaptation Strategies in Metropolises' project. The case studies focused on elucidating the three regional cross-cutting barriers to climate change adaptation (communities, planning and infrastructure) which were identified in the second phase of the project through 15 climate change workshops with Member Councils of the Sydney Coastal Councils Group (SCCG). The purpose of the case studies was to: (i) deepen understanding of key barriers; (ii) inform the feasibility of future strategies to better manage the barriers; (iii) provide a benchmark of Council response to the barriers that may form the basis for an ongoing monitoring and evaluation framework; and (iv) provide recommendations to improve the adaptive capacity of regional Local Governments to manage priority climate change issues.

Due to the resources necessary to conduct face-to-face interviews, three of the SCCG Member Councils (Leichhardt, Mosman and Sutherland Shire) were selected for the case studies based upon a range of criteria. Thirty-three semi-structured interviews with representatives from the three Councils (consisting of elected representatives, senior managers, middle managers, and operational staff) were conducted in April and May 2008. The interviews were recorded and transcribed verbatim. Data were coded in relation to:

- Councils' current responsibilities for adapting to climate change;

- contextual, structural, procedural, and outcomes considerations with regards to the three regional cross-cutting barriers (community, planning and infrastructure);

- preferred Council climate change adaptation roles and responsibilities;

- what Councils needed to do differently to achieve their climate change adaptation goals; and

- respondents' expectations of this project.

Qualitative analysis of responses collected during the interviews was used to identify the key adaptive capacity issues facing SCCG Councils with respect to adapting to climate change. In addition, information collected during the 15 climate change workshops, particularly with respect to identified barriers and opportunities for adaptation, was also incorporated.

Key findings included the following:

Local Governments have already made significant progress towards mitigation. For some time, Councils have been engaged in efforts to reduce greenhouse gas emissions and waste within both Council and the larger community. This reflects the widespread awareness of climate change across society and the growing momentum for substantive actions to reduce emissions. Such efforts do not, however, address the issue of adapting to the effects of climate change that cannot be avoided through mitigation. It was clear from interviews that current thinking about climate change policy was biased toward consideration of the emissions side of the issue. As such, there appears to be significant scope for building awareness on the meaning of adaptation and, particularly, how adaptation links into the existing management responsibilities of Local Government.

Local Governments are still coming to terms with progress towards climate adaptation. Local Government's efforts on climate change adaptation illustrate the evolution of thinking and policy that manifests around emergent issues of public concern. Although promising, such efforts are at present tentative and ad hoc, comprised of a mixture of community engagement and geotechnical risk assessment. Interviews with Council staff and Councillors generally provided a clear indication that Local Government would like to exercise a leadership role in ensuring

communities are appropriately prepared. However, there are limits to how far and how fast Local Governments can proceed with adaptation.

Key barriers to climate adaptation propagate from the State and Federal policy environment in which Local Government operates. While existing State legislation and management manuals create a mandate for Local Government to identify and manage risks to the community, such legislation continues to assume a stable climate. As a consequence, there is little explicit guidance to Councils regarding how consideration for climate change should be incorporated into standard planning instruments. This is exacerbated by the fact that other legislation places restrictions on Local Government authority and decision-making with respect to building codes, rate increases, and limits on growth and development. Collectively, these issues create strong disincentives for progressive action by Local Government with respect to climate adaptation.

Further adaptation barriers stem from the organisational structures of Local Governments, resource availability and decisions about climate risk. Such barriers are largely a function of the limited capacity of Councils to cope with a broad range of regulatory and service demands with limited resources including financial capital, technical information and expertise. In addition, Local Government is inherently structured around thematic 'silos', which compartmentalise expertise in core operational areas, but which limit the diffusion of knowledge. As a consequence, some Council sections that are critical for successful adaptation have yet to recognise the relevance of climate adaptation to their work.

There are strong feedbacks between top-down and bottom-up adaptation barriers. For example, alleviating the resource limitations within Local Government for addressing climate risk will depend to some extent upon the delivery of greater support to Councils by higher levels of government and/or relaxation of policies that limit Councils' freedom-of-movement. Similarly, securing more robust legislation and policy guidance from Australian and State Government can be aided by more concerted action within Local Government to prioritise adaptation and communicate its needs not only to higher levels of government but also the community at large.

Despite the challenges, through collaborative effort across the three levels of government, communities and the private sector, there is ample opportunity to increase the adaptive capacity of local Councils. While this report had identified a broad range of specific options to address adaptation barriers, there are six broad 'adaptation streams' around which adaptation options can be organised (Table A).

Some options for increasing adaptive capacity are more readily pursued than others. Actions which are associated with low costs and with minimal legislative or inter-institutional entanglements should be pursued at the earliest opportunity. At the opposite extreme, there are a range of options that will necessitate interventions from higher levels of government which also have significant policy and economic implications. While it is never too late to start laying the groundwork for such actions, substantive progress may be some time in coming. In the middle lie a range of actions that will certainly require some effort and investment, but which may nevertheless generate positive outcomes. Such actions should be pursued, but some caution should be exercised to avoid potential conflicts.

There is significant advantage to be gained in getting some 'runs on the board'. Policy positions based upon preservation of the status quo offer little in the way of benefits. Such a stance does nothing to reduce future vulnerability of local Councils and the communities they serve, nor does it facilitate learning that will place Local Government in a position to make more informed decisions in the future. Therefore, Councils need to continue to push the issue, even if through tentative steps, so that society can get on with the process of adaptation and continually test and improve potential solutions.

Table A. Adaptation streams for increasing adaptive capacity of Local Government

Stream Name	Description of Covered Actions
"Know Your Enemy"	Enhancing understanding regarding existing and future climate hazards and social and ecological vulnerability
"Plan for Change"	Incorporating climate change into existing and novel Local Government planning frameworks
"Get Smart"	Implementing education and outreach programs to increase the knowledge of Council and the broader community with respect to climate change, vulnerability and adaptation
"Act, Watch and Learn"	Implementing monitoring, evaluation and reporting measures for Local Government to track outcomes with respect to policies and measures associated with climate adaptation
"Put the House in Order"	Developing both internal and external institutional arrangements that build adaptive capacity within and across Councils and other levels of government
"Money Talks"	Enhancing revenue streams to Councils to assist in financing adaptation and cost-sharing mechanisms to spread the burden among multiple tiers of government

Adapting to climate change is a shared responsibility. This report is one output of a larger project specifically focused on adaptation within Local Government. However, one of the clear implications of this work is that for adaptation to be successful, collaboration will have to become the new standard model for governance in Australia. There is ample 'low-hanging fruit' upon which Local Government can capitalise over the short-term. Yet the major stumbling blocks to adaptation will only be circumvented through partnerships and good-faith 'give-and-take' among relevant organisations. Ultimately, such collaboration represents a 'win-win' for all involved as it increases the efficiency of governance by leveraging knowledge, talent and resources in pursuit of common interests.

1 INTRODUCTION

As part of the Australian Government Department of Climate Change[1] (DCC) National Climate Change Adaptation Program, the Sydney Coastal Councils Group (SCCG) have partnered with the CSIRO Climate Adaptation Flagship, working in collaboration with the University of the Sunshine Coast (USC), to undertake research on regional systems approaches to managing climate vulnerability in the Sydney region. This two year project is one of five studies funded through the DCC Integrated Assessment of Settlements Sub-program, initiated in 2006.

The aim of the project is to develop and trial a method for a systems approach to regional climate change adaptation strategies in large urban areas, through:

- developing and testing an integrated (systems) method to generate information about the likely impacts of climate change and feasible adaptation strategies in the Sydney region;

- deepening the understanding of the likely impacts of climate change and resulting adaptation options in the Sydney region through integration of existing models, vulnerability mapping, and an analysis of adaptive capacity; and

- assessing the transferability of the integrated (systems) method to other large urban areas, with transfer to be facilitated through the project National Reference Group.

Earlier reports from this project included:

Mapping Climate Vulnerability in the Sydney Coastal Councils Group (hereafter Preston et al., 2008), which provided background information on projected climate change and potential impacts relevant to the Sydney region and presented results of a relative vulnerability assessment for the SCCG Member Councils.[2]

Regional Workshop Synthesis Report (hereafter Smith et al., 2008), which summarised the outcomes of the 15 climate change workshops conducted with SCCG Member Councils including the key barriers and opportunities affecting Local Government's attempts to manage climate vulnerability.[2]

The purpose of this report is to synthesise the findings of case studies of adaptive capacity in relation to managing the key regional barriers contributing to climate change vulnerability in the Sydney coastal region, and to make recommendations to build adaptive capacity within Councils.

The specific objectives of the case study report are to:

- deepen the understanding of the most common cross-cutting barriers to adaptation in Local Government (identified through the 15 Council workshops and summarised in the aforementioned report);

- inform the feasibility of future strategies to better manage the cross-cutting barriers;

- provide a benchmark of Council response to the barriers that may form the basis for an on-going monitoring and evaluation framework; and

- provide recommendations to improve the adaptive capacity of Local Government to manage climate change issues and risks.

The remainder of this case study report is broken into six sections (Table 1).

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[1] The Australian Government Department of Climate Change was established under the Rudd Government and was formerly known as the Australian Greenhouse Office (AGO).
[2] Reports are available through the SCCG website: http://www.sydneycoastalCouncils.com.au/

Table 1. Organisation of this report

Topic	Section
The role of Local Government in the context of climate adaptation	Section 2
Methods utilised for conducting stakeholder interviews and analysis	Section 3
Stakeholder perspectives on adaptation barriers associated with the themes of Community, Planning and Infrastructure	Section 4
Common themes regarding adaptation barriers	Section 5
Recommendations to build adaptive capacity within Local Governments	Section 6
Prioritising actions and demonstration projects	Section 7
Conclusions	Section 8

Box 1. What is Adaptive Capacity?

Throughout this project and this report in particular, the concept of "adaptive capacity" appears repeatedly. In the climate change context, adaptive capacity refers to the ability of a system to adjust to climate change (including climate variability and extremes) to moderate potential damages, to take advantage of opportunities, or to cope with the consequences. A detailed discussion of adaptive capacity and its various dimensions and implications is presented in *Appendix I. Exploring the Meaning of Adaptive Capacity.* Briefly, however, it is possible to convey the meaning of adaptive capacity by simply highlighting some of the recognised pre-conditions that must be met if an institution such as a Local Government is to effectively adapt to climate change in a timely manner:

- **Awareness of the problem:** Assessing and communicating vulnerability to climate change;

- **Availability of effective adaptation options:** Triggering research that may lead to the development of new adaptation options;

- **Information about these options:** Identifying and assessing effective adaptation measures;

- **Availability of resources for implementing these options**: Evaluating co-benefits of adaptation (thus increasing perceived benefits); identifying ways for the most efficient use of resources by, for example, mainstreaming adaptation in existing activity (thus reducing costs); and motivating the provision of additional resources, either locally, regionally, or nationally;

- **Cultural acceptability of these options:** Educating people about risks and response options to increase the acceptability of unfamiliar measures; and

- **Incentives for implementing these options:** Identifying obstacles for implementation of effective measures and suggesting options to overcome them.

Many of the barriers to adaptation that emerged from the stakeholder interviews discussed later in this report as well as the subsequent recommendations to improving adaptive capacity of Local Governments can be mapped back to one of the above issues.

Source: adapted from Füssel (2007)

2 THE ROLE OF LOCAL GOVERNMENT IN THE CONTEXT OF CLIMATE ADAPTATION

Summary

- *Australian Local Governments are charged with a broad array of statutory and non-statutory responsibilities. While this provides Local Government with a large number of potential management levers for addressing climate risk, it also creates challenges. For example, while Councils are obligated to fulfil their duty-of-care to residents, uncertainty about how to rigorously uphold this obligation places Local Government in a difficult position.*

- *Councils frequently look to higher levels of government, particularly the State, for policy guidance. As such, Local Government is largely the implementer of policy directives codified within State legislation and guidelines. This relationship between State and Local Government largely dictates the scope of Local Government responsibilities and heavily influences the resources available for their execution.*

- *Despite the strong state/local interactions that drive policy, modern governance is often quite complex and networked, with the three levels of government, other public organisations and the private sector often having shared responsibilities for decision-making and management. This complexity is a barrier to adaptation in itself, as it confounds attempts to draw clear lines of responsibility and limits the freedom-of-movement of individual organisations.*

Australia's Local Governments are the most readily accessible level of governance for individuals and are charged with the provision of a broad range of services.

Therefore, rather than Local Government being an autonomous actor, it instead routinely takes on the role of carrying out State policies in a manner that conforms to the local context and needs of communities. In fact, in some instances, Local Government assumes direct and indirect management responsibilities for state-owned assets, such as Crown lands, that are vested within Councils. States also have important roles with respect to emergency management, through, for example, the NSW Office of Emergency Services and the NSW Rural Fire Service. This means the Local Government is largely inseparable from State Government with respect to governance and also creates responsibilities within State Government to ensure that Local Governments are sufficiently resourced to maintain their duty-of-care.

Meanwhile, there are also a range of pathways by which Australian Government policy, activities and assets influence Local Government. The separation of powers between Australian and State/Territory Governments means that there are limited regulatory pathways by which Federal policy influences decision-making at the local scale. However, the Council of Australian Governments (COAG) issued a National Climate Change Adaptation Policy Framework in 2006, which was designed to set an overarching framework to guide adaptation actions across all levels of Australian governance. In addition, the Australian Government does have jurisdiction in local matters of national significance. For example, the Environment Protection and Biodiversity Conservation Act 1999 gives the Commonwealth jurisdiction over development approvals that impinge upon world heritage sites, national heritage places, or nationally threatened species and ecological communities. Similarly, the Australian Government has a role to play with respect to critical infrastructure including airports, ports, rail lines, and motorways – all of which have a significant presence in the SCCG region. The Infrastructure Australia Act 2008 developed under the Rudd Government seeks to better harmonise infrastructure planning and development across the three levels of government.

One of the principal roles that the Australian Government has played with respect to climate adaptation is the provision of information, data and tools and the support of research efforts. For example, the Department of Climate Change has supported a range of activities including the acquisition of a nationally consistent digital elevation model, the execution of a national 'first-pass' coastal vulnerability assessment, and has commissioned a broad array of scoping and research studies into the national, regional and local vulnerabilities to climate change for multiple sectors. For Local Governments, this work has included the various projects within the Integrated Assessment of Settlements sub-program (which also funded this project) and, more recently, funding for 50 local climate risk assessment and adaptation strategies under the Local Adaptation Pathways Program.

Some of these functions are regulatory or associated simply with day-to-day operations, but Local Government is also responsible for the provision of a diverse array of non-regulatory services. The manner in which these responsibilities are pursued varies across Councils depending upon size, capacity, geographic location and the various assets and activities that occur within Councils.

In the context of climate change, this diversity of responsibilities creates a number of challenges. First and foremost, Local Governments have responsibility for both identifying potential natural hazards within Council, including those associated with climatic events, and for approving developments. As such, there is a duty-of-care within Local Government to ensure that development decisions do not create the potential for significant, unmanaged exposure to hazards. While this has long been a responsibility of Local Government, climate change has complicated this process by forcing Local Government to consider not only historical climate variability but also future climate change. Yet, the rates, magnitudes and spatial distribution of future climate change are uncertain.

While Local Government may be 'the tip of the spear' with respect to responding to the challenges of climate change, given the complexity of modern governance arrangements, it is inappropriate to consider Local Government in isolation from other levels of government or institutions. Federally-funded research and support will also be provided by the recently-established National Climate Change Adaptation Research Facility at Griffith University.

Responsibilities are conferred on Local Government by the New South Wales Government (Table 2). For example, the NSW Local Government Act 1993 states, "all functions of a Council come from statute, either from this Act or another Act." Furthermore, the Local Government Act of 1993 is just one of a broad array of overlapping legislation that determines Local Government responsibilities. For example, Local Government responsibilities with regard to coastal management are articulated in a range of State legislative instruments including:

- Local Government Act 1993

- Environmental Planning and Assessment Act 1979

- Coastal Protection Act 1979

- Crown Lands Act 1989

- Threatened Species Act 1995

- Protection of the Environment Operation Act 1997

- Native Vegetation Act 2003

- Water Management Act 2000

Table 2. Examples of Local Government responsibilities

Functions	Examples	Relevance to Climate Change
Regulatory	• Making and determination of applications for approval (including applications by the Crown) • Accreditation of components, processes and designs • Giving of orders • Adoption of local policies concerning approvals and orders	• Approvals associated with development in areas vulnerable to current climate variability and/or future climate change • Potential land use re-zonings
Non-regulatory	• Classification and reclassification of public land, • Use and management of community land including environmental planning instruments (e.g., LEPs, DCPs) • Water supply, sewerage* and stormwater drainage works and facilities • Community services and facilities • Public health services and facilities • Cultural, educational and information services and facilities • Sporting, recreational and entertainment services and facilities • Environment conservation, protection and improvement services and facilities • Storm water drainage and flood prevention, protection and mitigation services and facilities • Fire prevention, protection and mitigation services and facilities • Land and property development • Tourism development and assistance	• Development and implementation of environmental planning instruments that reflect climate risks • Supply and maintenance of stormwater infrastructure • Public education and engagement on climate change and its risks
Revenue	• Raising of revenue from rates, charges, fees, grants, borrowings, and investments	• Sufficiency of financial capital resources to bear the costs of climate adaptation
Administrative	• Staffing of Councils • Council operations • Management plans	• Organisation of Council staff and operations to effectively respond to climate risks and adaptation
Enforcement	• Prosecution of offences • Recovery of rates and charges	• Liability of Councils for climate change damages and/or policy decisions • Prosecution of offences associated with violations of Local Government planning policies
Ancillary	• Acquisition of land • Entry on to land for inspections/investigations	• Investigation and identification of at-risk assets • Acquisition of at-risk land and assets

Source: New South Wales Local Government Act 1993, New South Wales Environmental Planning and Assessment Act 1979; Climate Change Adaptation Actions for Local Government.
* Water supply and sewerage are not Local Government responsibilities in Sydney.

Box 2. NSW Environmental Defenders Office Audit of Climate Change Policy Provisions

The Sydney Coastal Councils Group engaged the NSW Environmental Defenders Office (2008) to undertake an assessment of Australian and NSW legislation and government policy provisions in relation to climate change relevant to regional and metropolitan NSW coastal Councils. The investigation focused on the statutory obligations and potential common law liability of coastal Councils in NSW. The specific aims of the project were to:

- Identify where and within what legal and implementation context the terms climate change, greenhouse and sea-level rise occurred within all legislation, planning instruments and policy relevant to coastal Councils in NSW;

- Provide a discussion of responsibilities of Local Government to implement the provisions identified; and

- Examine potential Common Law liabilities.

The report found that at present there are currently few statutory obligations placed on Councils to address climate change. As a result Councils retain significant discretion in relation to if and how they adapt to climate change. Within legislation relevant to NSW Councils there is little mention of climate change. Only 16 legal instruments at a Federal, State and Local level were identified. It has also been demonstrated that of those instruments that do mention climate change, none impose mandatory duties on Local Councils. The 16 legal instruments were largely comprised of environmental planning policies (State and Local), followed by provisions for energy supply, environment protection or biodiversity conservation, and water allocation and management.

The specific instruments include:

Commonwealth Legislation

- Environment Protection and Biodiversity Conservation Act 1999

- National Greenhouse and Energy Reporting Act 2007

- Renewable Energy (Electricity) Act 2000

NSW Acts and Regulations

- Electricity Supply Act 1995

- Energy and Utilities Administration Act 1987

- Threatened Species Conservation Act 1995

- Water Management Act 2000

- Environmental Planning and Assessment Regulation 2000

Local Environmental Plans

Standard Instrument (LEP) Order 2006	Sydney LEP 2005
Botany Bay LEP 1995	Warringah LEP 2000
Mosman LEP 1998	Waverley LEP 1996
Rockdale LEP 2000	Wollongong City Centre LEP 2007

The statutory requirements that exist are largely discretionary, or are found in objects clauses. These provisions require the consideration of climate change impacts and potential preventative and adaptive behaviour. They say nothing about the final outcome of decisions. Councils are merely required to take climate change into account, but are not required to make 'climate friendly' decisions. However, it is likely that legislation will be amended in the near future to require positive actions by Councils and/or the mandatory refusal of development applications once climate change impacts become more widespread and common.

While the aforementioned discussion highlights the overlapping areas of influence and responsibility among the three levels of government, the actual governance networks under which decisions are made at the local to regional scale are often even more complex. In addition to the three traditional tiers of government, a range of other public, quasi-public, and private institutions also influence decision-making relevant to climate change. For example, the SCCG is itself an example of another layer of governance. Though comprised of Local Government members and lacking any independent statutory authority, such regional organisations of Councils sit between Local and State Government. Catchment Management Authorities which have a range of responsibilities in the area of natural resources management, overlap Local Government areas. Utilities that service the Sydney region fall under a range of governance arrangements. For example, Sydney Water, Australia's largest water utility, which supplies the metropolitan Sydney area, is wholly owned by the State of NSW. The same can be said of Sydney's public rail infrastructure, operated by RailCorp. Meanwhile, the privatisation of Telstra has placed the ownership of the nation's largest telecommunication services and infrastructure Corporation in the hands of private investors. This complexity in governance arrangements means that for any given parcel of land within a Local Government area, the number of institutions that potentially have influence on decision-making can be many and varied, yet the power relationships among them are often unequal or simply undefined.

Such complexity of governance sets the context in which Local Government is currently attempting to pursue adaptation to climate change. As reported by Local Government stakeholders in both workshops and interviews, this complexity in itself is a barrier to climate adaptation, as it ultimately constrains the options available to Councils and clouds the decision-making environment. In most cases, Local Government is still in the early stages of understanding what climate adaptation is, and what their role should be in this very young area of policy development. To examine this issue more specifically in the context of the SCCG, as part of this project, from October 2007 to February 2008, 178 SCCG Member Council strategic and environmental documents were surveyed for references to climate change and the contexts in which they appeared (Table 3). Of these, the majority mentioned either "greenhouse" (80%) or "climate change" (58%). However, the vast majority of references to such terms were made in the context of greenhouse gas mitigation. Only 2% of the documents made reference to climate adaptation. Furthermore, those references generally acknowledged the importance of adaptation without specifying clear direction regarding potential or actual adaptation activities being undertaken. Some analysis of existing planning and policy instruments across New South Wales reveals that this is typical of government in general (Box 2). While such statistics suggests climate adaptation is not firmly established in Local Government, as discussed toward the end of this report, there are a range of actions that are emerging that suggest a significant shift toward more proactive responses to climate risk (see Section 7.1). Although the rapid evolution of knowledge and action with respect to adaptation to climate change in the SCCG Member Councils is a positive sign, such learning and policy development must be pursued across the three tiers of government and other relevant public and private institutions.

Table 3. SCCG Member Council environmental documents surveyed for references to climate change.

Document Type	Number Surveyed
State of the Environment Report	54
Management Plan	46
Local Environmental Plan	15
Development Control Plan	9
Strategic Plan	8
Environmental or Sustainability Policy/Strategy	6
Greenhouse Action Plan	5
Greenhouse Strategy	5
Environmental Management Plan	4
Report to Council	4
Energy Saving Action Plan	3
Flood Study	3
Risk Management Policy	3
Water Saving Action Plan	3
Cycle Action Plan	2
CCP Milestone five report	2
Annual Report	1
Climate Change Impacts and Risk Review	1
Environmental Education Strategy	1
Flora and Fauna Survey	1
Media Release	1
Performance Report	1

3 METHODOLOGY

Summary

- *Analysing the adaptive capacity of Local Government is a difficult undertaking, due to uncertainty about how organisations are likely to respond to issues such as climate risk, but also due to the complex processes by which policy decisions are made.*

- *This project has used a range of tools for answering questions about adaptive capacity that have generally targeted progressively finer scales. This report represents the culmination of that effort, with insights about adaptive capacity being informed by direct face-to-face interviews with Local Government staff and Councillors.*

- *Three themes of adaptation barriers (planning, infrastructure and community) were selected as case studies based upon outcomes from a series of 15 climate change workshops. Three Councils (Leichhardt, Mosman, and Sutherland Shire) were selected as case study areas based upon a suite of criteria to ensure a sample representative of the diversity of perspectives. A total of 33 individuals were interviewed across these three Councils.*

- *Feedback from case study participants was organised around four different categories, depending upon whether they pertained to context, structure, process or outcome issues associated with adaptation in Local Government.*

Building an informed understanding of the ability of Local Government to adapt to the effects of climate change, while seemingly a straight-forward task, is actually one that is affected by a number of challenges. On one hand, such an analysis requires knowledge, information and data regarding existing climate variability and future climate change. Such data can now be readily obtained from various scientific institutions, although there are still significant uncertainties associated with such information at global, national and regional scales. In addition, data are needed with respect to social and economic changes that might manifest in the future, such as population growth and development and the depreciation and aging of existing infrastructure. Such trajectories also are uncertain because they depend in part upon choices that will be made by individuals and institutions such as Local Government in the coming months, years and decades and the extent to which climate change is considered in making those choices. Such decision-making is influenced by a diverse array of factors including community values, shifts in short- and long-term policy priorities, and the manner in which institutions and communities go about the process of developing and implementing policy.

Given such complexity, the question for researchers is what methods can be used to analyse adaptive capacity. One of the primary goals of the discipline of integrated assessment is transcending this boundary between quantitative objective information and qualitative and subjective values, which involves bridging bottom-up and top-down analytical approaches (Wilbanks 2002). In practice, complete integration of these approaches may not be possible or even desirable (Malone and Rayner 2001), and so the integration of descriptive national level data and interpretive local level data can be seen as a process whereby information from the two approaches is not so much integrated as exchanged (Naess et al. 2006).

The current project utilised a number of tools to undertake integration in the assessment process:

In the first phase, a range of climate, social and economic data sources were combined in an indicator-based spatial assessment of regional vulnerability to different climate impacts. This assessment was undertaken largely independent from Local Government, and while capturing the broad patterns of vulnerability reflected in the indicators, a broad range of more subjective and institutional issues were not captured (Preston et al. 2008).

In the second phase of the project, an explicit effort was made to elicit information from Local Government stakeholders with respect to vulnerability and adaptive capacity through a series of 15 stakeholder workshops. In these, stakeholders identified key issues, rated their vulnerability and adaptive capacity with regard to these issues, and identified barriers and opportunities for adaptation. The three thematic barriers identified most often by Councils were community values and behaviour, planning, and infrastructure (Smith et al. 2008).

In the third and final phase of the project, this concept of adaptation barriers was used as a pathway for the analysis of adaptive capacity, with case studies focused on the aforementioned three thematic barriers drawing on deliberative interviews with Local Government staff and elected representatives.

3.1 Case study selection

The thematic barriers selected for case studies were focused on the three most common barriers that emerged from the small group discussions in the regional workshops (see Regional Workshop Synthesis Report, Smith et al., 2008). These barriers included: (i) community; (ii) planning; and (iii) infrastructure, and their high frequency of occurrence within stakeholder discussions is indicative that these are cross-cutting issues relevant to a broad range of Councils, if not all.

Due to constraints on project resources, three of the 15 SCCG Member Councils were selected for the case study investigation to provide local perspectives on the regional cross-cutting barriers. The Council selection was based on two decision processes. The first involved the use of qualitative analysis to identify Councils that either:

- focused their small group discussions on two or more of the cross-cutting barriers (i.e. community, planning or infrastructure);

- focused their small group discussions on just one of the three cross-cutting barriers; or

- did not focus their small group discussions on any of the three cross-cutting barriers.

This categorisation was undertaken to distinguish between Councils that prioritised issues that were well-represented among other Councils in the SCCG region and those that appeared to have a somewhat unique set of priorities with respect to adaptation barriers (Table 4). The results of this analysis identified two Councils that had small discussion groups that focused on all of the cross-cutting regional issues (Willoughby and Leichhardt), and one Council that did not focus on any of the cross-cutting regional issues (Mosman). The rest of the Councils covered either one or two of the cross-cutting regional issues.

Hence, for the case studies, there was a choice to select three Councils from:

- Either Willoughby or Leichhardt;

- Mosman; or

- any one of the other 12 Councils.

The second decision process involved indicators of difference to allow a diverse set of Local Governments to be selected that represent the range of SCCG's Member Councils. The indicators of difference included location within the region (i.e., north, south, central), demography, physical exposure (e.g., open coast versus estuarine), socio-economic status, and resourcing.

Table 4. Matrix of Council groupings in relation to cross-cutting barriers[3]

Council	Regional barrier			Total
	Community	Infrastructure	Planning	
Hornsby	✓	✓		2
Pittwater	✓	✓		2
Warringah			✓	1
Manly		✓		1
Willoughby	✓	✓✓	✓	3
Mosman				0
North Sydney		✓	✓	2
City of Sydney	✓	✓		2
Leichhardt	✓✓	✓	✓	3
Woollahra		✓		1
Waverly			✓	1
Randwick	✓			1
Rockdale		✓	✓	2
Botany		✓		1
Sutherland Shire	✓		✓	2

Using this approach, Leichhardt was selected over Willoughby because of the following considerations:

- Willoughby is similar to Mosman (already selected) in terms of biophysical, socio-economic and governance perspectives;

- Leichhardt is highly urbanised with broad range of issues that stem from this (e.g., highly modified environments, and aging infrastructure); and

- Leichhardt has a diverse community (socio-economic, demographics), within a relatively small Council; as well as a low rate base and limited opportunities to increase revenue.

The final Council selected for the case studies was Sutherland Shire, as an attempt to balance some of the characteristics of Mosman and Leichhardt. More specifically, Sutherland Shire is:

- Located in the south of the SCCG region with open coast and estuarine areas; and

- Has extensive rural areas, despite a heavy concentration of dense development in the Council's north.

Figure 1. Location of Councils selected for case studies

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[3] See Appendix II for a list of small group discussion topics

Therefore, based on the selection process, the three Councils selected for inclusion in the case studies were: Leichhardt, Mosman, and Sutherland Shire (Figure 1).

3.2 Data sources and analysis

Case studies relied primarily on stakeholder interviews. Document analysis was also used to identify the formal responsibilities of Councils in relation to climate change adaptation (Section 2). The key informant interviews consisted of:

- Identification of a cross-section of Council staff and elected representatives;

- Semi-structured interviews for each cross-cutting barrier; and

- Qualitative analysis of interview transcripts to elucidate the various dimensions of each barrier and the feasibility of strategies to improve adaptive capacity within Councils.

3.2.1 Identification of Stakeholders

One of the findings from the *Regional Workshop Synthesis Report* (Smith et al., 2008) was that climate change responsibilities were largely isolated to the environmental divisions within the SCCG Member Councils, and that there was limited integration of climate change issues within other Council departments. As climate change adaptation requires an integrated and comprehensive response, there was a deliberate focus within the case studies on gaining a cross-section of perspectives on issues affecting adaptive capacity among a range of departments within each case study Council. Furthermore, as adaptation to climate change requires both institutional support and operational commitment, the selection of stakeholders for in-depth interviews included representatives from senior management (including elected representatives), middle management, and operational staff. A total of 33 interviewees were selected – approximately 10 interviews in each of the three Councils (Table 5). Of these, approximately half also participated in the Council workshops (Smith et al., 2008). The identity of all interviewees remains anonymous, and while some direct quotes are used in the research, the sources of the quotes remain confidential.

Table 5. Statistics on Case Study Participants

Council	Workshop Attendance (#)	Case Study Participants (#)	Case Study Participants Attending Workshops (#)
Mosman	12	12	2 (17%)
Leichhardt	23	11	8 (73%)
Sutherland	16	10	5 (50%)
Total	51	33	15 (46%)

3.2.2 Semi-structured interviews

Semi-structured interviews were used to assess adaptive capacity within the three case study Councils. Assessment of adaptive capacity was framed within a context-structure-process-outcomes framework (Box 3) and builds on the information in the United Nations Development Programme draft report *Monitoring and Evaluation Framework for Adaptation to Climate Change* (UNDP, 2007). Questions focused on the three regional cross-cutting barriers (community, planning and infrastructure).

Additional questions were also asked in relation to:

- Councils' current responsibilities for adapting to climate change;

- preferred Council climate change adaptation roles and responsibilities;

- what Councils needed to do differently to achieve their climate change adaptation goals; and

- their expectations of this project.

Box 3. Framework for analysis of adaptation barriers

Climate Change Context

● Acceptance of climate change as an issue

● Factors contributing to diverse perspectives

Structures

● Inclusion of climate change in plans and policies

● Boundaries of responsibility and formal mandates

Processes

● Capacity to implement climate change adaptation strategies

● Facilitation of climate change discourses

Outcomes

● Measurement of adaptation outcomes

● Reporting of adaptation outcomes

● Understanding adequacy of adaptation outcomes

- **Context** refers to the factors that influence the framing or characterisation of the problems and opportunities associated with climate change (e.g., social, economic, environmental, institutional and technological factors), which influence the rationality underlying a policy or other form of response.

- **Structure** refers to the formal rules including legislative and policy mechanisms; as well as, formal institutional relationships for climate change adaptation.

- **Process** refers to the operationalisation of formal and informal rules to address climate change adaptation through strategies and activities (e.g., resourcing, education, and capital works).

- **Outcomes** refers to the impacts that are achieved, both anticipated and unanticipated, in relation to climate change adaptation. Outcomes also include both on-ground changes; as well as, enabling outcomes (i.e., outcomes that enable future on-ground changes such as more knowledge about how the climate change adaptation system functions).

Interpretation of the results from the context-structure-process-outcome framework can be used as a diagnostic to identify adaptive capacity interventions, and inform the feasibility of adaptive capacity and adaptation interventions.

Source: adapted from Bellamy et al. (2005)

All 33 interviews took place at the relevant Council offices and each interview lasted for between 30 minutes and 1 hour. All interviews were captured with digital voice recorders and ethical conventions were observed (e.g., voluntary nature of participation and participant anonymity). The semi-structured interview questions are reproduced in Appendix III.

3.2.3 Data analysis

Data from the interviews were analysed qualitatively. Interviews were transcribed and then coded in relation to:

- Councils' current responsibilities to adapting to climate change;

- contextual, structural, procedural, and outcomes considerations with regards to the three regional cross-cutting barriers (planning, infrastructure, and communities);

- preferred Council climate change adaptation roles and responsibilities;

- what Councils needed to do differently to achieve their climate change adaptation goals; and

- respondents' expectations of this project (to inform the project monitoring and evaluation process).

Emergent themes within each of these categories were also captured. The data analysis focused on identifying the key adaptive capacity issues facing the SCCG Member Councils for responding to climate change.

4 FINDINGS

This section reports the findings of the case studies based upon face-to-face interviews with Local Government staff from the three case study Councils. The findings are presented in four sections, with each section addressing a key issue relevant to assessing the adaptive capacity of Local Government (Table 6).

Table 6. Organisation of Case Study Findings

Topic	Location in this Report	Key Issue
Local Government perceptions of current roles in adaptation	Section 4.1	**What is adaptation and how does Local Government perceive its roles and responsibilities in regard to adaptation?**
Adaptation barriers associated with planning	Section 4.2	**What are the barriers associated with adapting the planning process of Local Government to climate change?**
Adaptation barriers associated with infrastructure	Section 4.3	**What are the barriers associated with adapting infrastructure to climate change?**
Adaptation barriers associated with community	Section 4.4	**How does the community represented by Local Government and Council's relationships act as a barrier to climate adaptation?**

Each of these sections discusses barriers utilising the Context-Structure-Process-Outcome framework (Box 3), and these discussions focus on highlighting the main issues raised by stakeholders during the interview process, the context in which those issues were discussed, and, where particularly relevant, direct quotes from interviewees that illustrate particular points.

4.1 Council Perspectives on Current Local Government Roles in Adaptation

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Summary – Local Government Roles in Adaptation

- *Local Government doesn't necessarily make clear distinctions between actions targeting adaptation and those targeting mitigation. This may simply reflect Local Government's tendency to use 'common sense' language rather than adopting explicit definitions and distinctions utilised by climate researchers and academics. However, to the extent that this contributes to confusion about policy responses, consideration for climate adaptation could fall through the cracks.*

- *A major broad responsibility of Local Government is as the implementer of policies, particularly those codified in State legislation and other policy instruments. This, however, places Local Government in an awkward position, as there are limits to what Councils can do in the absence of sufficient funding and implementation guidance and policy certainty from State and Australian Government. On the other hand, there are risks associated with delaying action, as Local Government has a duty-of-care to respond to community threats.*

- *Planning policy was identified as one of the key policy arenas where Local Governments wield their power, and therefore the key potential instrument for driving adaptation. Yet the existing lack of guidance to Local Government means Councils are largely restricted to pursuing adaptation through other mechanisms, such as building Local Government and community capacity around climate change and adaptation.*

- *One area where Councils perceived both a strong responsibility as well greater freedom-of-movement was in the arena of community communication. Local Government is the first stop for expressions of community concerns and has experience in delivering 'plain English' messages to the community.*

4.1.1 Interpreting adaptation

While Section 2 summarised some of the complexity associated with apportioning roles and responsibilities for climate adaptation, the case studies provided an opportunity to elicit information directly from Local Government staff in regard to how they perceive the issue of adaptation and their current role in implementing adaptation responses. One of the first observations that was made in response to interviewees' comments was the tendency to either confuse adaptation and mitigation, or else describe all elements of environmental sustainability work as climate adaptation. This was also observed during the stakeholder workshops during the development of Council mental models (see *Regional Workshop Synthesis Report*, Smith et al. (2008)). For example, when asked about the current role of Council in climate adaptation a number of respondents answered with reference to such things as carbon pollution and emissions and energy efficiency – both have important implications for mitigation of greenhouse gases, but lesser relevance to local adaptation. This confusion influenced people's perspectives about the role of Council and other levels of government in adaptation:

> Well to be honest, I don't think Local Government can do much to control climate change. I think it should be more a State Government role and responsibility because I think a lot of the climate change issues are related to [carbon] pollution…generated by big companies and manufacturing companies.

The above quote suggests climate change is simply a matter of greenhouse gas emissions which should be controlled from the top-down. Interestingly, this overlooks the implications of adverse climate impacts, which are the primary reason for concern about climate change and also the management arena where Local Government is already active.

Similarly, interview respondents were apt to label current environmental sustainability activities as climate change adaptation. This included things related to the Council's ecological footprint such as encouraging lower water consumption (e.g., rainwater tanks) and energy use as well as recycling water for green spaces, cleaning up stormwater, and rebuilding seawalls in an ecologically friendly manner. Within Council itself, actions included paper recycling and replacing six cylinder cars in the vehicle fleet with LPG or four cylinder cars. The rationale was that

> …if less energy is used, if less waste is generated then this will help to reduce global warming and control climate change…

This quote identifies climate change as being a consequence of generally wasteful behaviour on behalf of individuals and communities. Yet again, while waste reduction and increased efficiency and conservation will have benefits for reducing greenhouse gas emissions, the implications for reduced vulnerability to climate impacts is not immediately apparent. Generally, this phenomenon suggests two things:

1. The management response to climate change to date has largely been one focused on greenhouse gas mitigation, and thus Local Government has developed a strong mental linkage between climate change and mitigation. This bias in thought is certainly not unique to Local Government. Even the international community has been criticised for its historical focus on mitigation over adaptation (see Pielke et al., 2007).

2. Council staff view the issue of climate change as being one component of a much broader set of existing environmental management responsibilities. As such, they will not necessarily embrace the subtleties of language and terminology that have been developed by the climate change research community. In fact, to a large extent, Councils have been engaged in adaptation throughout their existence, but under a different name (e.g., hazard mitigation, risk management, community development or sustainability), which begs the question of why a new concept and/or term such as 'adaptation' is needed.

Neither of these points are inherent problems for climate adaptation unless they cause Councils to overlook the risk management dimensions of responding to climate change in favour of simply targeting greenhouse gas emissions reductions (i.e., point #1 above) or marginalise consideration for future implications of climate change in favour of more immediate priorities (i.e., point #2). Some interview respondents did question the current focus on climate change in terms of Council priorities and resources, while others were concerned that Councils were only at the level of dealing with the status quo. Such sentiments suggest that climate adaptation is not perhaps 'ripe' for Local Government action, which may be a function of the lack of signals to Local Government from the grassroots (e.g., the community) or higher levels of government.

Despite the above, the project team also spoke with a number of interviewees who demonstrated a sophisticated level of understanding of the issue and where Local Government fits in. Such respondents identified the most important current roles in climate adaptation for Local Government are as planners and implementers of higher level regulation and policy, and facilitating community education by way of the special relationship Councils enjoy with their local communities. For example, when queried about the appropriate role of Council in climate adaptation, one respondent stated,

> It would depend on the leadership of the organisation and the level to which the organisation's directors and Councillors want to become involved in the issue. It would depend on their attitude to cost shifting and their attitude to the various levels and responsibility of the State and Federal Government, their perception of that and also the level of responsibility that they believe individuals or communities should take of their own accord so, that's kind of a process that varies from Council to Council.

Again, this suggests that the role of Councils is to respond to external cues by either the community or State Government, although the above quote also acknowledges that the manner in which a Local Government may respond to such cues is dependent on internal issues such as leadership and institutional priorities. Such issues are core components of adaptive capacity (see Box 1). Some interviewees were very aware of the subtleties and complexities of climate adaptation and provided quite technical comments on Council's adaptive capacity:

> One of the things we'll be looking at is measures of trust and resilience. Some of these are the indicators that say how adaptable a community is or how able a community is to respond to a perceived threat or the need for change.

Concepts such as trust and resilience are widely discussed among the academic community as being central metrics of adaptive capacity. The above quote therefore demonstrates that some Council staff approach the issue of adaptation from a range of perspectives including not only the physical aspects of a changing climate and its consequences, but also the social dimensions and the subtleties that exist within policy environments.

4.1.2 Implementing policy

Another key role for Local Government that was recognised by interviewees is as an implementing agency for State Government policies, including those related to climate change. For example, Council staff commented on the actions regarding water saving and re-use schemes and more energy efficient buildings. While these actions could be viewed as contributing to adaptation at both regional and local scales, they were likely initiated in response to concerns about current water scarcity and, again, as part of greenhouse gas mitigation strategies pursued by State Government. Councils' recognition of their role as implementing authority raises the question of the extent to which Councils must be passive bodies that simply carry out the policies handed down by State Government as opposed to playing a more active role in policy development and facilitating community action. For example, as stated by one interviewee,

> ...if you haven't got someone at the local level out there helping to promote the message, whatever it might be, in this case about climate change, really as a participant in the community, you'll only get involved when regulation hits you.

This sentiment suggests that Local Government does indeed have an important role in stimulating community action and suggests that it is more advantageous for communities to be proactive in addressing environmental issues like climate change than simply waiting for action to be dictated from above. The reason for this is two-fold:

If Local Government simply implements policies dictated by State Government, and those policies are not forthcoming, then there is no driving force to address challenges facing the community.

Alternatively, if Councils delay action while awaiting policy directives and productive actions could be taken in the interim, the costs of responding to policies once handed down may be greater to the community than if more proactive actions had been taken independent of State policy. However, it must be acknowledged that there are risks to Local Government associated with moving forward with adaptation policies and measures in the absence of policy guidance from above.

Ideally, in terms of advancing adaptation policy, Local Government should attempt to manage up as well as down. In other words, Councils should actively attempt to drive adaptation within the community through public education and providing incentives for behaviour change. Meanwhile, Local Government should work in a collaborative relationship with State and

Australian Government (e.g., through the COAG process, lobbying and other mechanisms) to influence policy development so that the policies that they are ultimately charged with implementing are developed in a timely manner that meets the needs of Local Governments and their constituencies. While Local Government may aspire to build such relationships, interviewees suggested that such a productive relationship across different levels of government has yet to emerge in NSW. For example, one interviewee stated,

> I think a very interesting process could be to have a different sort of relationship
> between the three levels of government in addressing these questions…

The potential causes of dysfunctional relationships among different levels of government with respect to climate adaptation may be attributed to a number of sources including;

- the novelty of climate adaptation as a public policy issue which leads to confusion among different levels of government with respect to roles and responsibilities; and

- unequal power relationships among different levels of government that can contribute to conflict at the expense of cooperation and constrain the freedom-of-movement of Local Government with respect to policy development and implementation.

Although Local Governments recognise their role as implementers of State policy instruments, at the time of writing this report, there was little if any policy specific to climate adaptation at the Australian or State level for Local Government to implement. In the case of Sydney, Local Government is working through the SCCG to encourage such policy development. Nevertheless, the persistence of a policy vacuum places Local Government in a precarious position. On one hand, Councils may seek to advance climate adaptation in recognition of their duty-of-care.[4] On the other hand, the pursuit of adaptation policies and measures in the absence of sanctioned tools and guidance from State and Australian Government leaves Local Government vulnerable to challenge. The sooner such tensions are resolved, the sooner effective adaptation strategies can be implemented.

4.1.3 Local Government as planners

Interviewees indicated that one of Local Government's primary roles in adapting to climate change was as the developers and implementers of local planning policy. This is consistent with development approval and local planning as being among the core responsibilities of Local Government in general (see Section 2). Furthermore, this also helps to account for why the issue of planning emerged as one of the key cross-cutting adaptation barriers (discussed in more detail in Section 4.2). As the primary power wielded by Local Government, it naturally follows that this would be the critical point where Councils would view themselves as having an influence with respect to adaptation.

Despite the importance of planning, interviewees noted that the comprehensive incorporation of consideration for climate change into Local Government planning instruments remained in its infancy or had yet to be initiated. Instead, Local Government remains in a largely preparatory stage that consists of drawing together information to assist future decision-making surrounding adaptation. Put another way, Local Government is focused on building its capacity to adapt, but hasn't necessarily pushed ahead with full-scale implementation. For example, as commented by one interviewee,

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4 see NSW Environmental Defenders Office 2008 for a broader discussion of Councils' duty of care.

> in broad terms Local Government is…thinking about it [climate change] a lot and it is doing a lot of preparatory work and trying to pull in information to assist it in adapting, … and that includes …planning, …assets and infrastructure or …being able to provide the community with good information or ideas...

Overall, this suggests that while Local Government recognises its pivotal role in planning, it is not currently in a position to bring that power to bear in regard to adaptation to future climate change. As such, Councils are operating to some extent with one arm tied behind their backs. There is a range of potential reasons for this, and these are discussed more thoroughly in Section 4.2.

4.1.4   Informing communities and translating science

Given the challenges that appear to exist at present with respect to Local Government fully utilising its planning powers to adapt to climate change, Councils appear to be utilising some of their other roles and responsibilities in addressing climate risk. Specifically, Local Government currently plays a strong role in keeping communities informed about relevant issues including climate change. This includes the business community, the residential community, and the visiting community. As stated by one interviewee,

> Well I suppose the main role is that we're closest to the people and I suppose we're closest therefore to some of the very sort of grassroots levels of how we adapt to climate change.

Hence, Local Government is located 'at the coalface' of the community, is likely to be the 'first responder' to community interests and concerns, and this proximity leads to a unique relationship between government and the public. While communication is certainly one aspect of Local Government's duty-of-care, Councils have some freedom-of-movement with respect to how they communicate with the public and the issues that are raised. For example, as commented by one interviewee,

> I think Council does have a role, or it's my perception that they have a role in getting information out there. I think Council is taking on a role but I'm not sure if someone's telling us to.

While one can't read too much into this single statement, it does reflect the perception of Local Government's responsibility in regard to community education and also suggests that there is freedom within Local Government to take a leadership role and demonstrate some initiative in this arena even in the absence of guidance from State or Australian Government. This communication role is an extension of existing activities in communicating environmental management and sustainability, which, as mentioned above, were seen as closely related to climate change adaptation by many interviewees. One interviewee, for example, discussed the role of risk communication in the context of natural hazards:

> …I think in terms of its responsibilities, [Local Government] has a role in educating the community about the issues and the risks and how risk can be managed. It has a role in educating the community about how they can reduce the effects of climate change. It has a role … when risks or…disasters do happen in managing those disasters from an emergency services … perspective. It has a role in being up to date with the latest in research and in being able to communicate that in a plain English way to its staff and residents.

As climate extremes and hazards are one of the key concerns of Local Government and the community with respect to climate change, it's clear that Local Government will be one of the institutions for keeping the public informed about how such risks are likely to change over both the near- and long-term. However, the above quote also identifies one of the important elements

in educating the community about climate change − the need to translate climate change science and impacts into 'plain English' that is relevant to communities. This is particularly the case where there is too much advice or conflicting information, or when people don't know from where to obtain information:

> … we're…relatively well trusted in that area [public communication]…we're not talking about intangible things, we're not talking looking at the inevitable CSIRO report which tells you all good things but always in beautifully written scientific terminology which people look at and it's always so qualified through peer review and so forth that everybody doesn't want to put a foot wrong. People are reading this and saying but how does it affect my – where's my house?

The above quote illustrates quite nicely the role that Local Government can play as an intermediary between scientific institutions, which often provide rigorous scientific analyses that are difficult to interpret and not necessarily tailored for end-users, and the community, which needs concise, straight-forward information that provides a clear indication of what is known and unknown. Because of their relationship with the community and, perhaps, because of the lack of prioritisation among scientists of user-friendly information, Local Government has to fill this communication gap. The above quote also points to an issue that emerged during some of the workshops, which is the occasional lack of confidence on behalf of Local Government in the ability of the scientific community to provide straight answers. This raises the question of what exactly are the messages that Local Governments are providing to their communities and whether some potentially important information is being lost in translation.

4.2 Planning

Summary – Adaptation Barriers Associated with Planning

Context

- *There is recognition with Local Government that climate change is important, but the concept of adaptation is relatively new to the planning process and there are significant competing demands on the policy agenda.*

Structure

- *Existing legislation regarding planning creates an obligation to Local Government to act to identify risk and protect the public. However, the lack of explicit guidance regarding how to fulfil this obligation in the context of climate change creates disincentives for action.*

Process

- *Knowledge on and responsibility for climate change within Local Government often lies within 'silos', limiting 'whole-of-government' responses. Advancing issues on the planning agenda necessitates securing both community support as well as the support of elected members.*

Outcome

- *Local Government already has a range of planning instruments in place to accommodate and mitigate climate hazards. However, Local Government also has largely recognised that adjustments are necessary to ensure those instruments remain robust to a changing climate. Undertaking such adjustments is difficult given uncertainty, time-scales, and the lack of explicit guidance within existing legislation. The most productive near-term outcomes likely to arise from adaptation in the planning arena are 1) promoting the revision of existing planning mechanisms given future climate change and 2) the development of adaptation strategies to address key gaps and vulnerabilities. Such outcomes are already beginning to emerge from the SCCG.*

Planning is a fundamental activity for Local Governments, who, as discussed in Sections 2 and 0, play a key role in developing and implementing planning at the community level. Local Government planning takes two forms. The first is the strategic planning process, which fosters community vision, aspirational goals and charts general pathways by which they can be realised. The second form operates at a more immediate scale: the execution of statutory planning instruments including development approvals which are informed by local environment plans and development control plans. Although these two types of planning are quite different in practice, and in many cases are managed by different departments, both are highly important to climate change adaptation.

4.2.1 Planning context issues

Summary – Planning Context Issues

The key contextual issues identified from case study interviews included the following:

Overall, interviewees communicated that Local Government generally recognised that climate adaptation had important linkages with the planning process. There were some examples of reluctance to prioritise the issue, at least at present, due to questions about the veracity of current climate projections and attribution, but the more prevalent concern appeared to be competing demands on Council resources.

Leadership within Council has a significant influence on how Local Government is positioned with respect to climate change and its willingness to prioritise adaptation on the policy agenda. In some instances, interviewees indicated that senior staff and elected officials were championing the issue within Council. However, some interviewees perceived less enthusiasm at the highest levels.

Pursuing adaptation at present is somewhat impeded by the existence of 'silos' within Local Government, which often see climate change trapped within environmental departments, despite its implications for other areas of Council operations. At the same time, there are staff within Councils that are quite knowledgeable on this issue, and there is evidence that Councils are taking proactive steps to break-down institutional silos so that knowledge can be more widely shared.

As already discussed in Section 4.2, Local Government identifies planning as one of its key responsibilities and an important management lever for climate change adaptation. Most of the participants acknowledged that planning needs to address climate change in a Local Government context. However there was a minority of participants who did not see climate change as a relevant issue for planning. Furthermore, there were differences in the degree of acceptance of its linkages to adaptation both within and between Councils. For example, some participants saw it as an utmost priority:

> It's the number one issue for our Council…. It's really vital that our Councillors want to be seen to be a leader in this area and would regard that our place-based planning needs to have a vision for the prospect of climate change.

Throughout the interviews it was clear that the opinions and value system of the mayor in particular, as well as the CEO or general manager, made a strong difference as to the opinions held by other participants. That said, there were several incidences where participants held contrasting positions to senior mangers or Councillors which they were prepared to express in confidence. For example in discussing the recognition by Council of adaptation for planning, one respondent commented:

> I think very much by Council management and the professionals. The Councillors I think would be 50/50.

Similarly, there remains resistance in some cases to including climate change in the planning agenda:

> I don't know that that's really reflected in the planning that we're doing at the moment. I think there's still an element of hope it won't happen.

While it is important to note some residual resistance to acknowledging climate change in general, overall there was a pervading recognition of climate change being relevant to at least consider in the case of planning, and hence there was sufficient recognition of the issue for it to be pushed onto the planning agenda. Nevertheless, the point that such comments illustrate is an important one. While Council staff can certainly play an active role in raising issues on the political agenda and educating senior management and elected officials, key decisions are generally made from the top-down. As such, to the extent that adaptation isn't considered 'ripe' as a policy issue or its connections with key Council activities such as planning aren't acknowledged at the highest levels, Local Government may be impeded in both implementing policies and measures or working with other levels of government on policy development.

It was evident from interviews that adaptation represents only one area of priority amongst other competing interests. This may in fact account for some of the aforementioned reluctance to embrace the issue – such sentiments may not necessarily reflect outright scepticism, but rather feelings that the Local Government has more immediate issues with which to contend. These

competing priorities arise from many sources, and may include the different perspectives and areas of operation among Council staff and elected officials. They might also arise from differential priorities between the community versus what Local Government recognises as important. For example, different interviewees identified simple but illustrative examples of values conflicts with respect to planning and approvals:

> One of the other objectives [regarding climate change] is that we should be getting our older buildings to operate in a more environmentally sustainable way. Now, immediately that brings you into conflict with the true heritage [planning] people.

> Solar I think we're still coming to grips with because there's the argument about the look and…what the effect of that [extensive approvals of solar panels] will be.

A common challenge for planning is that Local Government is charged with achieving a range of goals: public safety, community amenity, economic growth, sustainability and more. Ultimately, this will result in real or perceived trade-offs in the planning process. Which is more important, the perseveration of heritage value or 'climate proofing' the built environment to maintain thermal comfort and reduce cooling costs? How does Local Government pursue sustainability without sacrificing community amenity and individual property rights? The answers are not always clear cut, and climate adaptation is another issue that is being inserted into what is already a complex planning environment.

Aesthetic concerns are not the only issue that planners have to juggle when it comes to finding space for climate change on the planning agenda. The mandate for Local Government planning has consistently increased in recent years to incorporate a range of community service provisions, development controls and asset management. This rising burden of governance on Local Government invariably has its limits, particularly if resources for Councils are not expanded accordingly. The frustration for Local Government is understandable and, with one interviewee, quite palpable:

> We're involved in everything from babies to bitumen and the request for more funding just comes in on a daily basis. We're not about to start throwing large sums of money at building extraordinary fortifications just in case the sea level rises.

The importance of climate adaptation also is probably influenced significantly by how the issue is perceived. For example, to the extent that it is viewed as a public safety issue or a development issue, it may have greater resonance within Local Government. Generally, interview respondents reported climate change as being seen largely as one environmental issue alongside such topics as pollution and water quality. For example, one interviewee commented:

> …our environmental officers… have a better idea of what's going on with climate change and some other part of Council like development assessment planners might not have as big an idea of what climate change issues are about because we're closer to [the concerns of] the people like developers. At present they don't really care about climate change.

This comment stands in contrast with the broader view that climate change and adaptation is in fact an important issue for planning. However, it also suggests that in some cases, knowledge and responsibility for tracking and responding to climate change is not evenly distributed across Local Government departments. One interviewee, for example, described the 'silo effect' that exists within Council:

> Within this organisation I would say the environment unit is a silo, the social unit is a silo and the economic unit is a silo and at the top the directors get to integrate …on a needs basis…but there's no mechanism within our Council for us to meet across the divisions on a regular basis.

To the extent that climate adaptation is trapped within an environmental department, it is unlikely to be picked up by other departments, even though there are clear planning, development and social issues linked to climate change. Council engineers, for example, tended to buck this trend. Given their direct knowledge of local climate and coastal hazards and their direct involvement in hazard mitigation, they tended to be adept at recognising the potential implications of climate change for their own activities. However, such knowledge did not appear to be freely exchanged across Council as a rule. There are signs, however, that Councils are making moves to address these issues. One of the case study Councils, for example, had become aware of the implications of its own institutional silos and had recently developed a strategy to have climate change-related performance measures across various departments:

> …we're [now] approaching… environmental sustainability on an organisation-wide basis, rather than what…in the past…[was]… very compartmentalized

Recognising that climate change isn't just a matter for the environment department is a recent development, but represents a major shift for Local Government which can assist in ensuring internal institutional arrangements enable Councils to be responsive, recognise threats and capitalise on opportunities.

What these examples show is that climate change is increasingly accepted as an issue for planning but in the context of all the other responsibilities with which Councils must contend, Local Government is struggling to give climate adaptation special treatment on the policy agenda. There may be some instances where there is a perception that climate adaptation doesn't warrant such special treatment. However, any reluctance to take-up adaptation seems more likely to reflect the fact that human and financial resources are finite, the tasks of Local Government are many, clear guidance on how to respond is absent, and the threat doesn't appear immediate. Hence, the need to reshuffle the policy agenda isn't readily apparent, particularly given the perceived difficulty in designing responses Nevertheless, there is also room for optimism, such as the earlier comment by one interviewee that, "it's the number one issue for our Council." Therefore, overall the mood among Local Government suggests a willingness to take up the adaptation cause and act to address potential barriers such as departmental silos. Yet this willingness needs to be supported with clearer guidance on what actions can and should be taken (including which actions make sense given climate uncertainty) and the provision of sufficient resources for their implementation.

4.2.2 Planning structure issues

Summary – Planning Structural Issues

The key structural issues identified from case study interviews included the following:

Local Government is currently in a challenging position with respect to adaptation policy. Existing planning instruments, for example, require Local Government to address risks associated with climate hazards such as bushfire events, flooding, and coastal hazards. Yet the relevant legislation was drafted with little consideration for additional and changing patterns of risk associated with climate change. Hence, while Local Governments have a general duty-of-care to respond to climate risk and anticipate future threats, lack of specific guidance and policy certainty limits the scope of actions that are available to Councils.

At some level, consideration for climate change in both strategic and operational plans is increasingly a routine process, as evidenced by planning instruments currently in use by a number of Local Governments. However, attempts to address climate change largely focus on greenhouse gas mitigation rather than adaptation (see Section 0). With adaptation to future changes in climate conditions a novel policy challenge for all levels of government, its

incorporation into statutory planning instruments has yet to be widely undertaken. However, there are some relatively simple policy adjustments that could be implemented at the State and local level to free up Local Government decision-making in this arena. Furthermore, the success with which mitigation measures have been implemented into planning policy provides evidence that similar developments will emerge in the adaptation arena over time.

For the moment, Local Government is attempting to push forward with adaptive planning, particularly in regard to non-statutory planning. While, the lack of guidance may make this process somewhat ad hoc, highly variable across Councils and at times inefficient, such actions are laying the preparatory groundwork for a future, more appropriate policy environment.

As noted in Section 4.1.3, the planning activities of Local Government can be divided into strategic planning and local planning that includes land use, development and environmental planning and assessment. Such planning instruments represent the structural framework of planning policy for Local Governments, which are codified to varying degrees within State planning legislation and policies such as the Local Government Act 1993 and the Environmental Planning and Assessment Act 1979. This section therefore reports on Local Government stakeholder perspectives on these planning policies and instruments, their potential applications in climate adaptation and the various barriers to adaptation associated with the existing structure of such policies.

Across all three Councils, interview participants emphasised that climate change was part of their strategic plan in some form, either specifically or grouped as one of a suite of other environmental issues. This demonstrates that climate change is being considered in the guiding strategies of the three Councils to varying degrees. For example, as one interviewee stated,

> …it's in… our Management Plan and in terms of making sure that all our services and everything that we do is sustainable, has climate change in mind… That's come from the strategic level…

In one Council, climate change was incorporated into the strategic plan at the request of residents:

> Well our strategic plan …[has]…a section…, 'reduced greenhouse gas emissions'. A lot of that was to do with climate change. That's from the community…. . as a Council, we respond to this, it flows down into our management plan….

This comment marks an important clarification about the nature of Local Government planning in that it responds to the concerns raised by residents through community consultation. Having been raised through the consultation phase for strategic planning, climate change is being incorporated into the strategies which are intended to guide management decisions.

Beyond strategic plans, the extent to which climate change was incorporated into operational plans varied considerably. For example one Council had a sustainability strategy which specified greenhouse reduction targets in different areas around Council:

> … [We] have these targets that feed down from our strategic plan to our …[title removed]… strategy and down to our management plan, so they can be monitored. So there's specific targets for greenhouse gas reductions here.

In another Council, participants could identify specific plans and policies but acknowledged an overall lack of consistency:

> It is in some [operational plans], but I think it could be embedded in more and probably… more strategically. … we have our [name removed] action plan and our purchasing plan that addresses building environmental criteria into Council's purchasing…but perhaps across Council it could be… [more consistent].

What these examples demonstrate is that Councils are making progress towards incorporating climate change into their planning processes at the strategic level, but the speed and extent to which that proceeds from the strategic level to the operational level appeared quite varied across the three case study Councils. Furthermore, almost all of the above discussion pertains to addressing the greenhouse gas mitigation side of climate policy, not the adaptation side. While strategic plans for Local Government already address climate-related hazards, public safety, and the importance of emergency management services, there are likely to be significant opportunities to reconsider these issues in the context of a changing climate and therefore build more comprehensive consideration for adaptation into strategic and operational planning.

This issue of mitigation bias in existing planning for climate change was also reflected in local environment and development control plans. For example, in the New South Wales' Environmental Defenders Office audit of climate change language in State and Local Government policy instruments (Box 2) it was noted that six of the SCCG Member Councils include climate change in their local environment plans, but not necessarily in the context of climate adaptation. In fact, across all three case study Councils, there was consistent evidence that climate change adaptation is not explicitly incorporated into local environment plans and development control plans. Overall, at the time of the interviews, there was a lack of attention to climate change (both adaptation and mitigation) in land use planning, which frustrated several participants. For example,

> I think Council have accepted it as an issue for planning but we're still stuck…
> we need to…make this something that we have to adhere to. Like to put it in our
> LEP and actually make some guidelines…

Hence, even where climate change and its implications for adaptation are acknowledged, there is little mandatory response required of Councils with respect to planning adjustments. Nevertheless, some participants were positive about the opportunity to better acknowledge climate change through relatively simple adjustments to existing controls. For example, one interviewee stated,

> …I think this is a good time for Councils to be thinking about how…elements
> addressing climate change can be put into policies, because everyone is
> reviewing their planning controls now ...There are a number of small areas for
> residential development that you can introduce additional provisions for in your
> own local development control plan… things like landscaping, stormwater
> management… an obvious one would also be cars. And it's not there at the
> moment. So these are some of the things that you could do in a local planning
> context, quite easily I think.

Essentially there was recognition amongst planners that several adjustments could easily be made to existing planning mechanisms such as provisions for landscaping and storm water management and reducing vehicle use. This was largely due to the fact that Councils perceive some responsibility for dealing with climate risk, due to existing legislated responsibilities. For example, while climate change adaptation is not specifically mentioned in many policies and plans at the Local Government level, one respondent did note that the Local Government Act specified responsibilities for a range of areas that may be affected by climate change: provision of adequate, equitable, and appropriate services; exercise of community leadership; and to properly manage, develop, protect, restore, enhance, and conserve the environment in a manner that is consistent with, and promotes, the principles of ecologically sustainable development.

However, other staff were clearly uncomfortable with such open interpretations of legislation. For example, with respect to sea-level rise, the majority of planning staff felt they could go no further in the absence of more specific legislative guidance. There is currently no formal recognition of climate change impacts in State flood guidelines, which makes it difficult for Councils to adjust their flood levels to reflect climate change in development approval processes. One interviewee summarised the challenge as follows:

> …in terms of adapting to climate change we feel that we can only take it so far and we can't take it any further. We know the problem. We acknowledge the problem. We've done preliminary research but until there is a Federal or State [decision] – until someone has the …space for them to come out and say plan on a 50 year or a 100 year time horizon based on this degree of impact, we can't get off, you know, first base with flooding.

Without such revisions, there is no legal basis for adjusting local environmental planning in terms of climate change, making it very difficult for planners to do so. In principle, Councils can, of course, attempt to be more conservative in their planning than they are required by current State flood policy guidelines. Furthermore, while existing planning guidelines do not provide information on how to manage future changes in climate or sea level explicitly, they certainly do instruct Councils to incorporate climate hazards generally into planning, as evidenced by existing planning to account for flood-prone areas, bushfire-prone areas, and coastal hazards. Therefore, there is a legislative responsibility to mange climate risk broadly, which Local Government could be used as a platform for arguing that consideration for climate change must be incorporated into planning. However, as noted in Sections 2 and 4.1.2, to act in such a proactive and cautionary manner has costs for individuals and organisations and in the absence of specific guidance from State Government with respect to adapting to climate change, Local Government has no iron-clad defensible basis to act more conservatively at present.   A related concern is the issue of uniformity. One of the key aspects of policy guidelines emerging from the top-down is that it sets a level playing field for all Councils, and thus an individual Council does not have to address arguments that its revised local planning provisions are more onerous or insufficient compared to surrounding Councils. Businesses and developers also require this consistency across Local Government jurisdictions.

Collectively, the insights provided by Council staff reflect a policy environment where Local Government is attempting to make the most of the policy instruments that exist at present. Awareness of and guidance for the incorporation of adaptation specific to future climatic changes is lacking, in part simply because adaptation is a fairly new concept within public policy (for local, State and Australian Government alike), which leaves Local Government limited alternatives with respect to the development of significant statutory and regulatory measures. Instead, Local Government is attempting to harvest some of the low-hanging fruit with respect to climate change policies and measures and build acknowledgement of climate change and its potential consequences into non-statutory instruments, such as strategic plans. More formal and effective policies for dealing with increasing climate risk, however, will necessitate a more robust policy framework, with a strong evidence-base for demonstrating changing spatial and temporal dimensions of risk and explicit guidance for addressing this additional risk posed by climate change into planning provisions.

4.2.3 Planning process issues

Summary – Planning Process Issues

The key process issues identified from case study interviews included the following:

There is lingering confusion about how to implement adaptation plans within existing policies, which is in large part due to a lack of guidance as well as the potential risks to Local Government of acting alone. While climate adaptation may be part of broad Council strategies, the lack of specific requirements for adaptation means implementing such policies is largely incomplete and inconsistent.

Access to rigorous and useful information that provides a clear indication of how risks should be managed which can stand up to scientific and legal scrutiny is a major challenge for policy

implementation. Some Councils have sufficient expertise or the resources to contract expertise to address critical knowledge gaps. However, in the absence of resources to acquire such information and more core knowledge about what the gaps in understanding are, it is questionable whether it is effective, efficient or equitable for Local Governments to fend for themselves in this regard.

The manner in which Local Governments approach policy implementation is driven from the top by the leadership shown at the highest levels of Local Government as well as from the bottom by the community which places various demands on Council. This means that Local Government staff are challenged to manage in two directions – keeping senior managers and Councillors advised on the relevance of climate change to secure support for actions while educating and listening to the broader community to help build support and also respond to planning priorities.

How is the existing structure of policies that are relevant to climate adaptation, limited though it may be, implemented? Among Council staff who participated in interviews, the process of planning and particularly implementing plans was generally recognised as difficult for Local Government. One of the most common responses to this question was that participants simply didn't know how to go about it.

> I don't know. I don't know if anyone knows that… how do you operate policy? I suppose, if I look at sea-level rises, I suppose we're trying to deal with that through our …planning study…. But… operationalised policies is a bit of a different thing. I don't know how far advanced a lot of other organisations are with respect to that.

This quote draws attention to the fact that these challenges are not only faced by Local Governments, but by a broader range of organisations.

During an earlier phase of this project, some of the interview participants had taken part in a series of climate change workshops, part of which involved the consideration of different types of climate impacts including extreme heat events, bushfire and storm events (see *Regional Workshops Synthesis Report*; Smith et al., (2008)). However when it came to considering how to act in response to these impacts, participants again had difficulty articulating clear paths forward with respect to how to respond to such challenges. For example,

> **Interviewer:** … in regards to… some of the things which came out of this workshop…for example, temperature ranges or how that might impact on the seniors?
>
> **Respondent:** That's a good question, isn't it? I don't know, I'm sorry.

What is interesting about these comments is that they contrast with Council staffs' ability to clearly articulate actions that are being undertaken to reduce greenhouse gas emissions from Council. Furthermore, the experience and expertise of Local Government in responding to natural hazards and emergency management is well-documented. Despite this, how Local Government should respond to the additional risk posed by climate change again appears to be less certain. It should be noted, however, that not all interviewees had roles within Council that would require specialist knowledge about addressing climate risks.

The uncertainty associated with Councils' adaptation processes can be attributed to a number of sources. First and foremost, in many cases as stated in Section 4.1.2, Local Government identifies its key role as the implementer of policies outlined by State Government (as stated in Section 4.1.2). Yet in the absence of clear policies for climate adaptation, Local Governments have little structural guidance and thus the processes by which existing policies should be adapted to attempt to capture climate adaptation is unclear. Yet even independent of the structural issues and the policy vacuum, Local Government also identified a lack of useful,

credible and relevant information about the nature of the climate risk to which they must adapt to be a key barrier for planning for climate change. This issue is captured in the following quote:

> I guess there are some gaps in the knowledge – there are some issues that I'm not exactly aware of. We do talk about rise in sea levels and things like that but we're not really mapping those types of issues and I think we could respond to some of those issues a bit better, getting out a bit more data and research…

As such, a key process to incorporate climate change into planning process is to improve the information base for key climate adaptation issues. Increased intensity in storm events and the potential for increased sea-level rise and storm surge were noted as potential concerns for some Councils. In one example, a two-dimensional flood study and an estuary water level study were major steps that one Local Government has undertaken to gather the information that is needed for effective planning in relation to climate change (see also Box 4):

> We're also doing a estuary planning level study... which is working out storm surge levels around the foreshore based on a modelling of the whole harbour…it just recommends levels to build above and it has a built-in climate change factor…

At the time of the interview, the aforementioned climate change sea-level rise factor was being subjected to scientific review. For the purposes of the current discussion, the exact figure is not the most important issue. Rather the important issue here is that the Council is taking the issue seriously and conducting an engineering study based on best available assumptions to provide the basis for future planning. In this case the Council is intending to use this study to inform its future development control plans. As such it represents a tangible commitment to adapting planning for the purposes of climate change adaptation.

Box 4. Building knowledge on storm surge effects: an example of current best practice

Incorporating climate change impacts into local environment plans and development control plans requires an improved information base. In one of the case study Councils, engineers were undertaking a two-dimensional flood-level modelling study to calculate revised storm surge levels by incorporating a margin to allow for predictions of sea-level rise and more intense storm events. The study involved working closely with climate scientists to provide access to the best available science, which was then applied to generate locally-relevant estimates of potential inundation. The outcome of the study will be to provide planning staff with a more informed and more precautionary approach to development control in the future. This provides an example of current best practice in terms of overcoming uncertainty and building adaptive capacity for local Councils to address climate change impacts. Yet, there is a need for policy to maximise the utility of such work and ensure it is consistent with efforts on behalf of other Councils and enable future planning development controls and vulnerability reduction.

Such examples demonstrate that Local Government has mechanisms at its disposal to improve its own knowledge of the implications of climate change and take steps to implement planning policies that accommodate climate change. However, as discussed previously, it remains to be seen the extent to which such information can be utilised in statutory decision-making (e.g., development approvals) by Local Government in the absence of clear policy guidance and support from higher levels of government. Furthermore, what are the implications for the aforementioned Council if it updated its development control plan in light of the findings of its study which in turn affected development approvals? On one hand, such actions represent a Council responsibly executing its duty-of-care to the community in the spirit of existing policies and legislation. On the other hand, by acting alone such progressive action may incur scrutiny and potential legal challenges by developers and other stakeholders.

The key issue here is that even though existing legislation and policies provide a reasonable foundation upon which to act to address future climate risk, the fact that they lack specific language and guidance with respect to actions relevant to the daily business of Council poses a significant challenge. Unless there are specific considerations and requirements relating to climate adaptation, there is a tendency to overlook it when assessing develop applications relative to planning guidelines:

> We are preparing new planning controls, and as part of those… we do recognise climate change and there are general statements… It's great to have goals and objectives but to actually implement those is sometimes a bit tougher. Like we lose sense of the bigger picture in terms of development…We do try and apply those to development assessment and also development policies but, yeah, we probably could do better.

Regardless of the spirit of legislation and regulation, there is often room for some interpretation, which ultimately leads to policy ambiguity. For example, Local Government has a responsibility to advise the public of flood hazards and control development in areas at risk. While some policies may state that Local Government must account for climate change in the implementation of those policies, such mandates often lack specificity with respect to time-frames and/or the management of uncertainty about future climates. In the absence of such specific information, guidance and directives, Local Government cannot ensure substantive actions will be undertaken. In another example, the way to make progress towards climate adaptation was to have distinct targets and actions in the management plan which drives Council business.

> Within [the management plan] there are actions…and when I say actions, there are specifics. That's like install rain water tanks at [a particular location] …or provide a new filtration system for the Aquatic Centre....

By specifying actions and providing budgets and reporting requirements, Councils effectively become committed to seeing them through.

Across all three case study Councils, the process of getting actions and goals codified within management plans was viewed as being dependent upon garnering support from Councillors. For example, as stated by one interviewee,

> …one of the issues…is actually getting those ideas into Councillors' heads and into senior management, so that you actually get buy-in… that's the crux of the planning process, doesn't matter whether it is climate change issues or anything…

This quote emphasises that planning isn't simply a rational process but requires endorsement from those who represent constituents, as part of a cycle of informing, endorsing, action and reporting. In particular, providing information about potential impacts was found to be an important step in garnering support:

> …we… put some various reports to Council – and sea-level rise is one of the best ones because we had a number that we could go with. We mapped that number and it just showed on a map exactly what the potential impacts of that were. So they could see in an instant what it was, rather than say, you know, if we have a four degree increase in temperature it might put this much extra strain on health services…It was a bit more of a concrete thing that they could picture.

Of particular note was the role of providing so called 'concrete' information, such as identifying tangible hazards in the form of particular parks or residential areas. This leads to another process issue for planning for climate change in the form of getting specific about the nature of planning challenges and how to respond to them.

Leadership from the top also requires support from the bottom. One of the most common responses to the question of how to operationalise management plans regarding climate change was through community education:

> We've been operationalising a lot of policies in educating the community about what they can do as to reduce emissions and things like that… we've been doing that for years.

Underlying this principle is the notion that Local Government is in direct interface with local residents and is well placed to influence their behaviour:

> I think education to the public is a very important factor to control climate change. We always need to make a balance between what the community expects and what we try to do but if we can make the public aware of the issues more, then they may do less things to cause the environment harm I guess.

It is important to point out that community education is limited by the assumption that residents will change their behaviour once they are better informed. Yet there was a sense amongst participants, that in the case of promoting mitigation, even informed residents are reluctant to surrender the benefits of a resource intensive lifestyle:

> Well, again, it's the population of the municipality; its demographic is they are pretty well educated, pretty aware of issues…there is a lot of support for the ideas, but when it comes down to… people having to make a change about what they do in their own backyard, that's when it all falls apart.

This notion, that the population has become too accustomed to resource intense lifestyles was raised in each of the Councils which participated in this research and presents a major challenge for planning. Furthermore, this issue is one that will appear repeatedly in subsequent sections.

4.2.4 Planning outcome issues

Summary – Planning Outcome Issues

The key outcome issues identified from case study interviews include the following:

Policy outcomes lie along a continuum, from the development of strategies and action plans, to their implementation, evaluation and subsequent revision and adjustment. Local Governments already have strategies and plans in place to address many of the climate hazards that are commonly encountered. However, given growing knowledge of future climate change and its implications, Local Government has recognised that these plans may need to be adjusted. While such adjustments are a routine part of the policy process, climate change poses some unique challenges due to the long time-scales and uncertainty. As such, additional guidance from other levels of government and the scientific community is necessary to facilitate such adjustments and ensure positive outcomes.

While having planning policies in place to address climate change is a productive outcome in itself, the manner in which those policies are implemented is of equal if not greater importance. Existing frameworks within Local Government for implementing and evaluating the performance of policies and planning measures may be readily utilised for climate adaptation. Yet, this first necessitates the development of those policies and the establishment of appropriate performance metrics. This, too, is likely to require external guidance.

Perhaps the most productive outcome for Local Government at present with respect to planning is to review existing planning instruments to determine whether they are relevant in light of climate change and, subsequently, to design strategies that target key vulnerabilities. There are already signs that such efforts are proceeding in the SCCG region, such as the development of Council climate risk assessments and adaptation strategies.

One of the key indicators of the incorporation of adaptation into Local Government planning is the extent to which tangible planning outcomes are clearly recognisable. Interview participants described planning outcomes which can be represented as a logical continuum comprised of four components or processes:

Strategy $\longrightarrow$ Implementation $\longrightarrow$ Tracking Progress $\longrightarrow$ Incremental Adjustment

The crucial starting point in evaluating outcomes is whether or not a strategy exists by which consideration for adaptation can be operationalised. Following on from this, a sign of success is whether such strategies are being implemented and the effectiveness of that implementation. Subsequently, metrics for tracking progress toward strategic goals can be used to evaluate success (e.g., consumption of natural resources, incidence of injury and death, damage to assets) and incremental adjustments can be made to correct inefficiencies and/or enhance benefits. Here, each of these different dimensions of outcome issues associated with planning are discussed in turn. However, it is important to recognise that this is a cyclical process – evaluation of the performance of planning policies will drive incremental adjustment which leads to updated policies that will be subject to future evaluation and, in time, adjustment.

To some extent, Local Governments already have strategies and plans in place to address climate-related challenges to the community. For example, flood plans and disaster plans are routine instruments applied by Local Governments as part of their duty-of-care to the community. As such, Local Government already has a strong foundation upon which to build an adaptive response to climate change. As has been previously demonstrated (Sections 4.2.1), the SCCG Member Councils generally recognise the potential implications of climate change for planning. While this in itself is an important outcome, the key challenge appears to be one of how to update existing planning instruments and plans to accommodate the changing climate. For example, one interviewee commented,

> Well…we can't measure global warming as an indicator of our success and we are just going to have to come to pretty basic simple things that we're doing our bit… to say here's a line on a map and these are the bundle of properties to manage the risk… and come up with strategies to [reduce risk]

This statement reflects recognition of the importance of developing strategies for managing risk, but also reflects the fact that the development of such strategies is difficult in the absence of information regarding the nature of the risk. In other words, as part of their routine monitoring of existing strategies, Councils are increasingly aware that those strategies may not necessarily capture the additional risk associated with climate change. Local Government therefore is attempting to undertake those adjustments to their planning instruments that are necessary to accommodate the changing nature of risk. For climate change, however, this is a particularly challenging task due to the uncertainty about future climatic change and the long time-scales over which it will unfold.

In addition, the case study participants also cautioned that simply having a strategy for addressing climate risk does not automatically lead to an outcome, which mirrors other comments regarding process issues (4.2.3). For example, as noted by one participant:

> …that's the challenge for a strategy…a lot of people think that's the end of it…to me genuine innovation is not the idea, it's actually the delivery of the idea… that's the real challenge with environmental issues…

There is recognition of the need to measure the extent to which plans and strategies are effectively implemented by Local Government. In this regard, interviewees indicated that climate change was no different from any other issue for which Local Governments plan and assess themselves. As summarised by one participant,

> You measure the success for climate change planning the same as you do for any other planning…through…detailed strategic plans and your KPIs that are set from that, that you review and monitor regularly. So climate change planning or any other planning [is] exactly the same.

One existing mechanism for measuring outcomes in the climate change domain is through conducting a comparison of Council resource use patterns against some agreed baseline. This is being utilised to examine Council progress on greenhouse gas mitigation, based upon a baseline survey conducted in 1996 following an agreement with ICLEI. As one participant expressed:

> …so we need to be reporting on it quarterly and we also have through the environment department, just commissioned an independent consultant who will monitor that data for us. So they're doing waste data, obviously we do energy, I guess they're doing water and stuff as well.

This comment highlights the fact that one important component of monitoring outcomes is simply to have an agreed procedure in place to work with – having a suite of clear actions, demonstrating that those actions have been implemented, and then measuring the performance of those actions against a set of criteria. The fact that measuring outcomes for climate change can be pursued using a standard framework that is already commonly utilised within Local Government suggests a potentially high capacity to adapt once Local Governments have made the appropriate adjustments to their planning instruments. The critical question, however, is the extent to which there is clear understanding regarding which adjustments are, in fact, appropriate. As discussed in Section 4.2.2, structural issues have largely impeded development of policy instruments to accommodate climate risk. The lack of a clear strategy for addressing the additional risk posed by climate change suggests the outcomes with respect to climate adaptation in Local Government are currently limited. On the other hand, the absence of explicit planning instruments for future climate change doesn't necessarily mean that Local Governments are facing climate catastrophe. In some instances, the policies in place to cope with existing climate variability and extremes may be sufficient to accommodate significant future climate change. Therefore, there would appear to be two critical outcomes that Local Governments need to secure over the long-term:

1. evaluation of existing planning instruments to assess whether they are appropriate in light of future changes in climate and, if not, where the critical points of potential critical vulnerabilities and points of failure lie; and

2. development of policies and measures that facilitate adjustments to planning instruments that specifically address those vulnerabilities.

Some steps in this direction are already being taken. Of the 15 Member Councils of the SCCG, five are currently engaged in the development of adaptation strategies based upon perceived vulnerabilities to climate change. Two of these, Hornsby Shire and the City of Sydney, are participating in International Council for Local Environmental Initiatives' (ICLEI) climate risk assessment pilot projects while three others, Rockdale, Randwick and Manly, have received funding from the DCC Local Adaptation Pathways Program to undertake risk assessments and develop a suite of adaptation actions. Such developments certainly rank as positive outcomes for adaptation planning. Similar activities are likely to be undertaken by other Local Governments in the SCCG region, and throughout Australia, as resources and expertise are made available. Nevertheless, it is clear that there are a range of additional desirable outcomes that lie downstream of such strategies. Some time and additional thought will need to be invested to enable those additional outcomes to be properly tracked and necessary adjustments to be undertaken.

4.3 Infrastructure

Summary – Adaptation Barriers Associated with Infrastructure

Context

- *Adapting infrastructure to cope with a changing climate is significantly constrained by the legacy of past decisions. Particularly in densely developed areas, aging infrastructure as well as the high concentration of existing infrastructure limit opportunities and resources for upgrading and/or expanding infrastructure to increase climate resilience.*

Structure

- *As is the case with planning, the lack of clear policy guidance with respect to infrastructure management in a changing climate creates significant challenges for Local Government with respect to decisions regarding infrastructure design and investment. This is exacerbated by the complex web of ownership and responsibility that surrounds many infrastructure systems. Councils that attempt to proceed with infrastructure adaptation with only existing legislation and guidance as a justification run the risk of conflicts and litigation with not only State and Federal Government, but also the community.*

Process

- *Due to the structure issues, Councils' current attempts to manage infrastructure for a changing climate tend to be ad hoc and to vary from one Council to another. Greater collaboration across Councils in the pursuit of adaptation may increase efficiencies and contribute to more uniform policies and measures. However, this may necessitate the break-up of 'silos' within Local Government in order to ensure ownership for climate change exists among a broader suite of skill sets and departments in Councils.*

Outcomes

- *While most SCCG Member Councils can identify some tentative steps in adapting their infrastructure for climate change, at present there are few demonstrably effective examples of infrastructure outcomes specifically associated with addressing future climate risk. Productive near-term outcomes that are within reach of Local Government include the systematic review of the sufficiency of existing infrastructure given long-term climate change and the consideration of metrics for monitoring and evaluating performance.*

Councils have responsibility for a vast amount of infrastructure including roads, drainage, playing fields, beaches, reserves, Council owned property and bushland. Potable water and sewerage are the primary responsibility of Sydney Water while drainage infrastructure is the primary responsibility of Local Government (Sydney Water own about 2% of the drainage infrastructure in the study region). Power infrastructure is managed by Energy Australia, with the exception of where Councils do specialised street or park lighting. In addition, Local Government is responsible for a number of foreshore parks, some of which are Crown land, but often Councils still have responsibility for their care, control and management. Other State and Federal agencies are responsible for water, sewerage, and some roads and foreshore facilities and assets including port facilities. To some degree nearly every type of infrastructure has the potential to be impacted by climate change, although the severity of those impacts and their timing may vary significantly.

4.3.1 Infrastructure context issues

Summary – Infrastructure Context Issues

The key context issues identified from case study interviews include the following:

Aging and inadequate infrastructure within SCCG Member Councils places a significant burden on Local Government. This burden arises from the significant maintenance costs associated with simply keeping up with the needs of aging infrastructure as well as concern that existing infrastructure is inadequate for current or future conditions. The scale of some infrastructure (e.g., stormwater drainage systems) is so great that comprehensive replacement isn't feasible, forcing Councils into a priority, response-oriented management framework.

Highly dense development in some SCCG Member Councils also constrains infrastructure development by simply limiting the available space. Lack of open space and greenfields limits opportunities for stormwater retention or management of overland flow paths. In addition, the high concentration of underground utilities places inherent limits on the expansion of the infrastructure that is already in place.

Perhaps one of the most important considerations in understanding the context issues associated with infrastructure and climate adaptation is the fact that current and future options for adaptation are constrained by the decisions of the past. For example, as stated by one interviewee,

> Oh it's the constraints [that] are already there, like the roads are already there. There are services weaving…under the road everywhere so you're limited as to what size pipe you can put in…to fit in with the other services and then there's very hard rock not far under the surface...But really the drainage system around here is just so old and inadequate that we're just battling to try and upgrade it where we can and make it function well, let alone trying to get it to the extent it needs to be to be a system that will handle any storm. We're a long way off that – we'll probably never get there.

This comment raises two key points. First and foremost, climate change pressures will affect infrastructure that in some cases is 150 years old and was never designed scientifically. Such infrastructure does not have an infinite lifespan. On one hand, this creates opportunities for adaptation, as periodic maintenance of infrastructure may create windows-of-opportunity for upgrades that enhance the capacity of systems to cope with climate change. On the other hand, such aging infrastructure also contributes to vulnerability, particularly for extensive systems such as drainage infrastructure. The age of some infrastructure puts a heavy burden on ongoing maintenance, yet the replacement of entire systems is prohibitively expensive, which forces managers to undertake infrastructure investments on a priority basis and identify ways of augmenting existing systems. For example, measures such as stormwater retention and re-use have been introduced to reduce the pressure on infrastructure. Local Government is often in a position of playing catch-up with respect to large-scale infrastructure systems, which limits opportunities for more forward-looking and systematic approaches to adaptation.

The second important point raised in the quote above is the fact that options with respect to adaptation are severely limited by the infrastructure that is already in place, regardless of its age. For example, the vulnerability of coastal infrastructure to sea-level rise and storm surge events is a product of prior development and risk management decisions, which may ultimately act as a barrier to adaptation. Where infrastructure is indeed at risk, there may be strong incentives to invest in protection measures, given the only alternative is to abandon the infrastructure and/or spread the risk through insurance or other mechanisms. In any case, a cost will be borne. Similarly, in densely developed communities, attempts to expand the capacity of drainage systems or modify overland flow paths may be quite limited and there may be few areas available to enhance stormwater retention (e.g., open space and greenfields).

As was observed with planning, decision-making on infrastructure takes place in a context of competition for resources. Upgrading infrastructure is presently beyond the resources available to Local Government. Rate pegging means that the only way for Councils to raise rates is through introduction of a special levy. Some Councils have an environmental, stormwater and/or infrastructure levy and yet the degree of resources needed to prepare infrastructure for climate change is vast:

> We've got significant concerns as most Local Government authorities have about infrastructure provision and replacement. There's recognition across Local Government as to the lack of funding and the backlog in infrastructure. So being a coastal Council we've got marine infrastructure, sea walls, jetties, baths, a range of well used community facilities which are in some instances in a fairly poor state of repair but because of the use there's a desire to maintain them and a need to undertake works which are poisonously expensive to do.

> I think most Local Governments have such an asset replacement backlog that we don't have enough money to be planning, all we can do is try and keep what we've got going longer than it's normal cycle should be anyway.

A lack of resources also affects Councils' own buildings and the desire to be seen as leaders, in particular with environmentally sustainability initiatives. For instance in one case Council added 20% to the cost of a project to incorporate green initiatives, but even this project was subject to significant compromises due to cost.

4.3.2 Infrastructure structure issues

Summary – Infrastructure Structure Issues

The key structure issues identified from case study interviews include the following:

The complex governance arrangements associated with infrastructure, whereby multiple agencies or organisations may have shared responsibility for a particular asset, creates disincentives for reforming infrastructure management or implementing significant upgrades. This is exacerbated by the lack of clear policy guidance that communicates acceptable standards for infrastructure design and margins of safety in a changing climate.

The lack of guidance regarding infrastructure adaptation also creates challenges with respect to community engagement. In the absence of a specific strategy or plan that identifies infrastructure needs and pathways to addressing those needs, Councils do not have a platform from which they can communicate the public and secure community support.

Councils that forge ahead with significant infrastructure planning and management in the absence of sanctions by State Government run the risk of criticism from both the community as well as higher levels of government. In the most extreme form, this criticism can result in litigation that challenges the wisdom of Local Government decision-making and management efforts.

The structural issues associated with infrastructure management and adaptation often arise due to the fact that Local Government often shares management responsibilities with a number of different agencies and utilities (See also Section 2).

> You know, I reckon that Council doesn't really know what their responsibility is. I reckon one of the reasons that makes [management] harder is that you've got so many layers of government...So I don't know how you would deal with that, because that's something that is inherent…

The overlapping, and in some cases confused, relationships that govern infrastructure were seen to be a barrier to adaptation to climate change. The freedom-of-movement of Local Government regarding management decisions may be constrained by other responsible parties, and the lack of clear delineation of responsibilities and authorities provides disincentives for pursuing substantial reforms of management practices or undertaking significant investments in infrastructure development, maintenance or upgrades.

Ideally, such issues should be addressed by policies and measures, including guidelines and legislation that maps ownership, responsibility and authority to individual parties. However, in their discussion of infrastructure, many participants in the case study interviews raised the issue of the lack of guidelines and legislation, which also was a common theme associated with the structural issues for planning (see Section 4.2.2). The lack of such higher level guidelines from State Government leads to uncertainties surrounding the issue of liability for climate impacts. The following two comments from interviewees illustrate this issue:

> Because there is so much potential variation of impacts and because any one of the scenarios has real costs for individuals and makes for some hard decisions about privately and publicly owned assets, it has to be done consistently… across New South Wales, Councils' liability is set aside if we act in accordance with the State flood plan policy. We need that same degree of comfort [for climate change adaptation].

> I'd like to see an increased role from the State Government in giving us some guidance on exactly what it is that we should be planning for. Because at the moment there's a range of scenarios that we could plan for. There's a range of time frames that we could plan for. It may be appropriate to plan for a range of time frames depending on the potential life span of the infrastructure. But at the moment there's the risk of one Council planning for one thing and then across to the other side of the road another Council planning for a completely different thing and having different standards apply across a range of different Councils.

Adaptation requires both an understanding of the impacts of climate change and how to design and/or protect infrastructure, but also how to best communicate risk to the local community. Respondents remarked that it was difficult to talk about adaptation with the community before Council has put planning in place, and this is in turn was hindered by a lack of legislation to use as a guide to planning. A number of interviewees mentioned that the biggest issue for infrastructure was that until State Government develops guidelines or standards, Councils would be exposing themselves to litigation and insurance claims. The same issue was raised in regard to planning (see Section 4.2.2), and the following quote from one interviewee reflects some of the same concerns that were raised previously about the potential pitfalls and constraints that arise in an adaptation policy vacuum:

> Now Council has been saying to the State Government which of these scenarios do we use for our design and planning and they said they haven't decided yet, they don't know. So in terms of formally doing something, we're waiting for a decision from the government…But the Council itself isn't prepared to act unilaterally even though we've got the information… Because if you move too quickly ahead of the State Government, Local Government just gets jumped on.

The potential for Local Government to come into conflict with State Government by going it alone on climate adaptation is clearly one strong disincentive for progressive action. However, the lack of policy guidance from above also creates the potential for conflicts between Councils and the communities they serve. For example, while some Councils have undertaken analyses of climate impacts, such as sea level-rise mapping, they have been reluctant to communicate the results to the public in the way they originally anticipated because of issues relating to liability and property value. As commented by one interviewee,

> …to get a report up to Council probably took about 12 months just for them to acknowledge that it's happening and we need to think about it…that even had to be confidential because they didn't want any of the community to know about it. So they're still– politically very scared by it, I suppose, and the potential ramifications.

When Councils undertake actions that are not necessarily sanctioned by State Government, they can face criticism for overstepping their mandate for governance. In contrast, when actions and policies are pursued in response to a directive from a higher level of government, Councils are on a much firmer footing with respect to justifying those actions to the community.

4.3.3 Infrastructure process issues

Summary – Infrastructure Process Issues

The key process issues identified from case study interviews include the following:

At present, Councils are attempting to implement actions to address climate vulnerabilities related to infrastructure, but such actions are proceeding in an ad hoc manner which varies significantly from one Local Government to another. There is recognition that consideration for climate change is prudent in the design of new infrastructure, but much of existing infrastructure is managed to maintain the status quo.

The existence of departmental 'silos' within Local Government represents a significant internal barrier to adapting infrastructure for climate change, as it causes Local Governments to rely upon individual champions to advance issues upon the policy agenda rather than a comprehensive response led from the top.

The collaboration of multiple Councils in infrastructure management is a particularly useful tool for Local Government to expand its lobbying power, leverage resources and ensure consistent responses. Ultimately, though, such collaboration must occur against a back-drop of cooperation with State and Federal Government and engagement with the community.

Despite specific legislative and policy guidance with respect to infrastructure, some Councils are attempting to address climate change issues under the existing policy structure. However, at present such actions are unfolding in an ad hoc manner for some Councils, while for others the lack of guidance has prevented significant actions with respect to infrastructure adaptation. For example, factoring in sea-level rise, storm surge or habitat considerations may occur when a new piece of infrastructure is designed such as a sea wall. However when Council revamps or repairs an existing piece of infrastructure it tends to be maintained as it was rather than adapted in response to potential sea-level rise or storm surge. For example,

> Yeah, with the sea walls, they're [accounting for sea-level rise] already. But say with things like upgrading the jetties, I don't think it's factored in, because we're just sort of maintaining them as they are. So I guess if it's maintenance, then we just tend to maintain [it] the way it is. But if we're doing something new, then maybe…climate change gets considered.

Additional constrains on the adaptation of infrastructure arise from the availability of information and data to Local Government that is relevant to infrastructure management. A number of respondents mentioned that the design of rigorous adaptation measures will be dependent upon Local Governments having a firm understanding of what they are adapting to. Modelling of the physical landscape and quantification of climate impacts on specific local landmarks was seen by some as a prerequisite for adaptation. While Council staff collaborate by going to seminars,

exchanging information, or sourcing information and insights from other states, many of the staff involved in the physical realities of adapting infrastructure to climate change feel that there is simply not enough concrete data for the task. For example, as stated by two case study interviewees,

> I'm not disregarding any of the arguments [about climate change] but in terms of planning [I] just don't want to see a whole lot of time and assets and money go into a solution that may not have been fully thought out…I feel a lot of the engineers are in the same boat – that as engineers we're happy to do whatever as long as we've got enough data to support our argument.

> …it's such imprecise science at this stage…it's a little bit airy fairy I suppose. We haven't done a lot of preparedness with respect to that level of risk. So I think it'd be fair to say that it's been a little bit ad hoc.

On the other hand, some interviewees revealed that Councils typically deal with the uncertainty of climate change by making assumptions based on limited information, and using the precautionary principle:

> But our data is of necessity fairly limited so we've made assumptions of our own to cover those sort of issues…Our planning implicitly implies assumptions about some aspects of climate change.

Other case study participants, however, preferred using information about the probability of future events and consequences as management tool, and cited the lack of information about probabilities as a barrier to adaptation:

> So you can't predict now what you might do when it comes to designing the thing, you need to run sensitivity analyses on the different likelihoods.

Another interviewee mentioned that in terms of infrastructure, some risk assessment is undertaken through public liability insurance schemes:

> You know that's one of the things you get every year, your risk assessment. I guess if you're higher than other Councils you might think, "well our infrastructure's worse than others. So we're less ready for change of any sort."

However as was pointed out, this risk assessment process was only valid for current conditions:

> I think that we're going to find that our infrastructure might be very inadequate and that really concerns me. We're going to have increased storms and extreme weathers. We're going to have less reliable rain. I just think probably a lot of local Councils are going to be in for a big shock and we'll probably be one of them. Although we think we're doing a good job, we're just dealing with what we've got.

Generally, the impression one receives from the interviews is that Councils do not fully understand the extent of their exposure to future climate or where to focus their energies and have reservations about the implications of decision-making in the absence of appropriate expertise.

Where action does seem to be occurring it appears to be predominantly driven by concerns about water resources. For example, one Council is conducting a project mapping water sources and demands on GIS layers and determining projects for water sustainability over the next 10 years. This is being undertaken in conjunction with a flood study and a flood risk management plan that will deal with flooding from the main creeks as well as all overland flooding from the local drainage system. The study is two-thirds funded by the State Government. This is complemented by a planning study which will determine storm surge levels around the foreshore based on a modelling approach. Climate change has also been factored into plans for some specific localities

where assets such as roads or surf clubs are likely to be at risk. These altered management plans then feed up through to infrastructure programs and budget deliberations.

Such examples indicate that there are actions that can be taken by Local Government even in the absence of explicit top-down guidelines, although one must note that one of the aforementioned efforts was being undertaken through significant funding from State Government. Nevertheless, despite such positive actions, some interviewees also communicated that existing approaches to infrastructure management are inadequate as a response to climate change, particularly for long-lived infrastructure that will persist for many years while the climate continues to change:

> We just do it in little bits. Sometimes I question the little bits we do and what it costs us whether it's worthwhile. But when you look at the big picture you see if everybody did what we did we'd be all a damn sight better off.

> I don't think we've really accounted for major climate change in the construction of that wharf, for example…So in terms of infrastructure, I don't think we're doing an awful lot at the moment, or not as much as we should be.

> …the Local Government department, they're looking at [a time horizon of] 10 years. But I think, in terms of looking at broader issues like [climate change]…, 10 years is probably not long enough.

Such comments from case study participants suggest that there is yet to be a comprehensive long-term approach to infrastructure design, maintenance and upgrades to account for future climate change within Local Government. However, there are tentative steps forward that may represent the early stages of a broader process of mainstreaming consideration for climate change into infrastructure management.

For such efforts to proceed, Local Government attempts to adapt infrastructure must be coordinated both internally and externally. Internally, the importance of adapting infrastructure must be recognised and pursued across relevant Council staff and Councillors. Given the acknowledgement by Council staff that much of the knowledge regarding climate change and adaptation was trapped within Local Government 'silos', much of the work of integrating climate change concerns at present appears to be driven by individuals rather than Council strategy or directives. This was confirmed in the interviews:

> The only thing I really know about is the sea-level rise modelling we did was actually conducted by our stormwater manager. He obviously looked at that and went I think this is going to be a big issue for our infrastructure and how we're going to handle it. So he's the one who initiated the modelling for that. Since then though I think it's stagnated.

With the limited staff and resources of many Councils, the presence of individuals with expertise or interest in climate change issues becomes an important driver for the degree to which climate change is incorporated in infrastructure issues.

Externally, Local Government must be able to cooperate with State and Federal Government both in funding infrastructure as well as developing guidelines and standards for managing climate change. Such collaboration, between local and State Government, public and private utilities, and between Councils themselves, figured as one of the most important barriers to effective adaptation. On the positive side, there is considerable collaboration between Councils on individual projects, as evidenced by the existence of the SCCG and the ongoing support it receives from Member Councils. Combining effort across Councils is not only efficient in terms of scale, but also can lead to wider community education benefits. Two interviewees summed up the benefits of Local Government collaboration as follows:

> So I think that whilst we're bounded by our LGA and where we're actually supposed to spend money, there's huge leverage that we can get by joining

> with other Councils. And there's also benefit—I think every Council wants to nail a best practice project, and be the first in their area or their expertise to do something that can really stand up as a great educational facility that could really educate the wider community.
>
> So working across the board you've then, instead of talking about [tens of thousands of] residents in a community, you're talking more like about two and a half million, or thereabouts, and you've also got incredible lobbying power to get to the State and Federal Government.

In addition to collaboration among Councils, Local Government must also engage the community in delivering infrastructure projects, particularly given much of Council infrastructure is used by, or designed to benefit, communities. When asked who the key stakeholders are with respect to infrastructure, one interviewee commented,

> Well, ultimately the community, 'cause they've got to accept the standards, the consequences. But again, for them to accept it, they have to understand it. So, again, there needs to be a dissemination of information into the community so that they understand the issues, they understand what's driving the proposal and they can see that it makes some sense.

This issue of bringing the community along in Local Government decision-making also arose in the context of planning (see Section 4.2.3). In fact, the challenges identified above with respect to the process of pursuing infrastructure adaptation are in many ways similar to those for planning:

- Ad hoc implementation of adaptation due to the lack of explicit policy guidance from higher levels of government as well as limited Council resources and access to relevant and quality information;

- The importance of organisational champions in advancing climate adaptation on the policy agenda, but a strong tendency for knowledge to be trapped within departmental 'silos'; and

- A strong need for community engagement, consultation and support for Local Government policies and measures and wide recognition of the power of inter-Council collaboration.

4.3.4 Infrastructure outcome issues

Summary – Infrastructure Outcome Issues

The key outcome issues identified from case study interviews include the following:

At present, there are few concrete outcomes that represent demonstrable, effective actions to adapt Local Government infrastructure to accommodate future climate change, although there is evidence of some tentative first steps down this pathway.

As with planning, the most productive outcomes for Local Government at present would be the completion of infrastructure risk assessments to identify key vulnerabilities. Again, there are already signs that such efforts are proceeding in the SCCG region, such as the development of Council climate risk assessments and adaptation strategies.

The lack of explicit management plans for infrastructure largely prevents the standardisation of the performance evaluation and monitoring of existing infrastructure. Until the policy guidance is in place that makes consideration for climate change routine within Councils' day-to-day operations, climate adaptation will face significant competition from other issues that are currently considered Local Government's 'core business'.

While interviews with Council staff indicated that some tentative steps have been taken with respect to managing infrastructure for a changing climate, generally there are few concrete examples of outcomes. Given the variety of upstream context, structure and process issues that have been identified, this is perhaps not surprising and generally reflects the fact that the adaptation of infrastructure is still in its early days. If one looks further afield, it is clear that much of Australia is in the same situation. For example, the Australian Academy of Technological Sciences and Engineering recently published a national-scale risk assessment of infrastructure in the context of climate change and the State of Victoria published a similar report in 2007.[5] Meanwhile, the Australian Government Department of Climate Change is undertaking an assessment of significant infrastructure in Australia. While such reports represent some tangible outcomes relevant to adapting infrastructure, they are not necessarily relevant at the Local Government scale nor are they direct outcomes of Local Government policies and interventions. Nevertheless, they may prove to be useful references to assist Local Government in identifying potential consequences at the local scale.

As Local Government moves forward with accounting for climate change in infrastructure management, it is important that systems are in place to track progress and effectiveness on initiatives that are enacted. Just as with planning (Section 4.2.4), a useful starting point would be the assessment of the performance of existing infrastructure given various assumptions about future climate change – over-topping of sea-walls, inundation of emergency routes or facilities during flood events, etc. This then provides information on where future investments need to be directed to address key vulnerabilities. As previously mentioned, some effort is already being invested in such evaluations (e.g., sea-level rise and storm surge). However, just as with planning, standard metrics for evaluating the success of adaptation actions for infrastructure are needed, and the interviews uncovered little evidence of ways or means to monitor adaptation for infrastructure. In addition, metrics alone are of limited utility unless there is an existing policy, strategy and/or plan to enable their monitoring to become a mainstream activity of Council business. This means that the achievement of outcomes is inherently tied to having an underlying policy framework. For example, as stated by one interviewee,

> I think what is happening up in our environment section is they're becoming overwhelmed by the number of 'you beaut' ideas. People want to progress and we've only got limited resources. What our manager of environmental services… says to me all the time, look can we just stick to your environmental management plan and get those outcomes rather than doing all these 'you beaut' ideas....

Not having specific outcomes for adaptation embedded within Council management plans or concrete performance indicators to measure effective climate change adaptation means that ultimately the priority placed on adaptation is limited. Therefore the challenge for Local Government in achieving outcomes is to arrive at a place where incorporating climate change in infrastructure management is viewed as a routine aspect of Council functions and responsibilities as opposed to a novel pursuit on the fringe of Councils' scope of operations.

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[5] See ATSE (2008). Assessment of Impacts of Climate Change on Australia 's Physical Infrastructure. ATSE, Parkville, Victoria; and Victorian Government (2007). Infrastructure and climate change risk assessment for Victoria. Department of Sustainability and Environment, Melbourne, Victoria.

4.4 Community

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Summary – Adaptation Barriers Associated with Community

Context

- *Council staff reported a high degree of community polarisation regarding the issue of climate change, which to some extent was mirrored among Council staff as well. Such polarisation likely results from the diversity of messages communicated through the media as well as vested interests that may benefit from promoting sceptical views of climate change.*

Structure

- *The lack of explicit guidance to Local Government regarding climate adaptation influences the manner in which Councils can communicate to residents on the subject. As formal strategies and plans for climate adaptation proliferate, it will be possible for Councils to engage with the community on specific management issues and goals that are more aligned with Councils' core business.*

Process

- *Local Government has a proven track record in engaging with communities on a range of issues. However it remains unclear how this engagement should be framed or who should take the lead in its facilitation. Communication about climate change is often confined to environmental departments within Local Government, which ultimately influences how the issue is perceived in the community. Local Government's strengths in this regard likely take on greater relevance as clarity builds around Councils' roles and responsibilities for adaptation.*

Outcomes

- *Monitoring of the effects of Local Governments' public engagement effort is largely limited to anecdotal information or indirect proxies. Clear outcomes of the effectiveness of Council on adaptation and community engagement could be whether the issue features prominently in Council elections and/or whether budgets are responding to public demands for greater attention to adaptation.*

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The single most frequent theme that was identified in Council workshops as both a barrier to and opportunity for Local Government adaptation to climate change was that of community. While initially surprising, when one reflects upon the primary goal of Local Government – to service the population that lives within the jurisdiction of Council – it becomes self-evident that the community and its relationship with Local Government have a substantial influence on the policies and actions undertaken by Councils. This section examines the various issues that emerged from the case study interviews with respect to the concept of community and its role in driving or perhaps impeding adaptation.

4.4.1 Community context issues

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Summary – Community Context Issues

The key context issues identified from case study interviews include the following:

There is a perception among Local Government staff that communities are highly polarised on the issue of climate change and the responses that Councils should or should not be undertaking. To some extent such polarisation can also be found within Local Governments themselves, although generally interviewees communicated that appreciation for climate change and its implications was relatively widespread within Local Government, despite some individual exceptions. Nevertheless, community polarisation poses challenges for democratic institutions

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like Local Government that are charged with responding to community concerns.

The causes of community polarisation can be attributed to a range of sources including ambiguous media portrayals of climate change science, limited science education among the public, vested interests of individuals and organisations that create incentives for vocal scepticism, as well as fundamental attitudes about "green" issues and the extent to which they should be taken up by Councils.

Local Government's duty-of-care to the community means it must act as a leader in proactively addressing community threats. However, as a democratic institution, it must also be responsive to community preferences. This results in an ongoing push-and-pull between Councils and the communities they represent. While to some extent, this slows the response time of Local Government, interviewees expressed the belief that Local Government likely will face growing demands from the community to address climate change and climate risk in the years ahead as awareness builds and the consequences become more apparent.

The principal contextual issues associated with Local Government and its interactions with the community related to the varying attitudes and perspectives within the community regarding the issue of climate change and, subsequently, what role Councils should play in responding. Many respondents, for example, discussed polarised perspectives among residents in relation to whether climate change existed, what caused it, and what the likely impacts would be. In essence, there was not believed to be a continuum of perspectives, but rather, two distinct camps. The first included those who accepted the dominant scientific opinion of:

- Human-exacerbated climate change drivers (e.g., the burning of fossil fuels leading to increased atmospheric concentrations of carbon dioxide and global warming); and

- Projected significant impacts of climate change (e.g., increased sea-level rise, and increased frequency and intensity of natural hazards).

The other group of residents did not accept the majority of scientific evidence and disputed whether climate change was real (thus disputing the causes and impacts of climate change and any need for adaptation), although the interviewees considered that this group was a minority. Such polarisation may be a function of the fact that it is the extreme opinions of the community that are expressed most vocally. In other words, those that have strong attitudes regarding climate change may be more likely to communicate those to Council, thereby influencing the policy and political environment. In reality, there is likely a third, and perhaps quite large, group of residents that have yet to form any opinion on climate change.

As observed with the prior issues of planning and infrastructure, the polarised perspectives within communities were also mirrored within each of the case study Councils.

> There's definitely a lot of people even within Council who will say "I don't believe in climate change."

However, the vast majority of respondents did accept the majority of scientific evidence. Those that did not (including some elected representatives) drew similarities between those who accepted climate change with religious zealots:

> For some it's virtually a religion in the way they look at it and in fact deal with it. They don't tolerate heretics.

This previous quote also highlights the potential conflict when discussing climate change issues both among residents and within Councils. Council staff and Councillors are to some extent mirrors of the community, in that they often are residents themselves and have a responsibility to faithfully represent community interests. However, if the goal of Local Government is to service

the community, and the community is strongly divided over the issue of climate change, it is extremely difficult for Councils to identify areas of common interest that policies and actions can target.[6] Furthermore, some respondents noted that climate change is often labelled as a "green" issue and that non-environmentally inclined staff and Councillors were less likely to support climate change adaptation initiatives in favour of more traditional Local Government responsibilities (e.g. provision and maintenance of roads and recreational facilities).

The cause of the polarised perspectives was most often considered to be influenced by the media (television, radio and print); or more accurately, many people with low confidence regarding the scientific evidence supporting climate change did so because the media portrayed the issue as a balanced debate:

> People think it's like a 50/50 argument. That the scientists are 50/50 when really it's like 95 or 99% of the scientists are here and only one person here. But people think because of the way the media portrays it that it's a 50/50 argument that some of the scientists are here and some of them are here. They're going "I don't know which one to pick because I guess the media presented a balanced argument" which is I guess what they're supposed to do.

> I think the media's sort of maybe casting doubt on the science, but the scientific community seems to be fairly uniform that it's happening. So I think there's a bit of a – my impression is that the media's casting doubt or more doubt than the scientific community is suggesting.

Some respondents also made the link between the acceptance of sensationalism (in terms of there being scientific doubt) in the media and people's ability for critical thinking. As one respondent stated:

> I think the media affects them [residents] a lot and I think also the level of education influences the perception.

Some respondents from all three Councils stated that education levels affected perspectives on climate change. For example, respondents stated that it was difficult to explain climate change issues to residents who did not have a grasp of science. It is certainly accurate that much of the debate on climate change has been based on scientific studies into the causes of climate change, which involves (sometimes complex) understanding of chemical and other biophysical drivers and responses. Similarly, some estimates of exposure to climate change (e.g., coastal impacts of sea-level rise and storms) have also involved complex scientific interactions. Without understanding the logic of scientific evidence some people may dismiss that evidence. Similarly, notwithstanding the role of the media, climate change sceptics highlight a larger issue relating to the public's trust of scientists and the challenges of establishing scientific credibility and consensus around complex issues.

While the climate change sceptics were seen as a minority both within Councils and among residents, many respondents highlighted general disinterest from many people. Once again, the issue of competition for the attention of the public and Council staff surfaced. As one respondent noted:

> …it's not like you're getting tons of emails every day from people concerned [about climate change].

It was noted that many people were already coping with a myriad of other issues such as interest rate worries and the impending financial crisis:

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[6] *For an in-depth examination of such issues, see Pielke Jr., R. (2006). The Honest Broker: Making Sense of Science in Policy and Politics. Cambridge University Press, Cambridge.*

> Yeah and it's not good news either you know. I think a lot of people don't really want to have to cope with it. Everyday life's enough.

Similarly, some respondents noted that there was a general feeling that people were responding through mitigation, but were far less certain about what to do in relation to adaptation. This is somewhat unexpected as climate risk management (e.g., hazard planning and mitigation) is a core aspect of Local Government operations. Furthermore, while greenhouse gas mitigation efforts in Local Government areas have long-term global benefits with respect to reducing the rate at which greenhouse gas emissions enter the atmosphere, adaptation has local (and in some cases quite immediate) benefits for reducing climate vulnerability.

Some respondents also noted that certain individuals, groups and organisations have vested interests in not investing in climate change adaptation, and that these interest groups were promoting climate change denial to communities. Some respondents also believed that these interest groups were lobbying politicians and other decision-makers to ignore the majority of climate change science. For example, one interviewee commented,

> I mean you've sort of got science on one hand suggesting that this is what's happening and then you've got maybe some politicians or other special interests saying, "oh it's all a bunch of rubbish."

The vested interests mentioned included businesses that were contributors to climate change (through, for example, significant greenhouse gas emissions) or those interested in developing areas vulnerable to climate change. Similarly, some of those whose properties may be devalued due to recognition of potential climate change impacts were also seen to be critical of climate change adaptation responses.

While many respondents noted contextual issues that may adversely affect climate change adaptation strategies (e.g., lack of understanding, disinterest, and vested interests), most respondents stated that there was some level of expectation among residents that local Councils should be responding to climate change. Furthermore, some respondents noted that the expectations from communities had driven many Council responses to date:

> …I think [the general manager is] sort of thinking "oh okay, enough people are talking about this stuff. We better put it in."

The above quote raises some interesting questions regarding the extent to which Local Government is a leader (identifying issues of potential importance to the community, educating the public and implementing effective actions) or a follower (setting priorities and taking actions in response to the preferences expressed by the community). Local Government likely is engaged in both through an ongoing process of push and pull. As part of its duty-of-care, Councils have a responsibility to proactively address community threats. As a democratic system of governance, however, Local Government also has a responsibility to represent community interests and preferences in decision-making. Such complexities mean that any significant shifts in policy or attitudes are unlikely to emerge overnight, but rather evolve over time as both Councils and the community learn and different actions are trialled. However, it is important to note that most respondents believed that increasing expectations would continue to drive Council agendas in relation to climate change over the coming years.

4.4.2 Community structure issues

Summary – Community Structure Issues

The key structure issues identified from case study interviews include the following:

As observed both with planning (see Section 4.2.2) and infrastructure (see Section 4.3.2), the lack of explicit policy guidance on adaptation from Federal and State Government was judged to be a significant obstacle to Local Government decision-making. Specifically, this policy vacuum also affected the manner in which Councils communicate with the community, as clear strategies and policies were seen as an important foundation to enable informed community engagement.

The development of strategies and policies for climate adaptation would help facilitate community engagement by focusing communication on specific management issues that are aligned with Councils' core business as opposed to the larger, more nebulous issue of climate change.

Most interviewees stated that one of the key structural impediments to responding to climate change was a lack of direction and formal mandate from State and Federal Government (e.g., legislation and policies outlining roles and responsibilities in relation to climate change). This structural impediment is consistent with those expressed in relation to addressing planning (see Section 4.2.2 and infrastructure (see Section 4.3.2). This vacuum spills down to limit formal structures for adaptation planning at the Local Government level (e.g., inclusion within local environment plans, and development control plans) and impede Local Government efforts to communicate with the community about adaptation. For example, many respondents stated that there was no formal mandate for Councils to engage with communities on climate change issues and that informal dialogue was compromised due to the lack of formal policies and measures (e.g., planning policies) that explicitly target climate adaptation:

> It's really hard for us to then go to the community and start talking adaptation when we haven't put in place any planning. Above us there's been no legislation…to support us putting it in and then to feed that down to the community

Such comments highlight the critical nature of formal structural mechanisms for enabling Local Government to adapt to climate change. Explicit policy is needed not simply for statutory planning decisions (e.g., development approvals), but also as a foundation for communication between Councils and the community. This means that the absence of explicit policy guidance on climate adaptation has quite far-reaching consequences that significantly constrain Council responses across a range of areas.

Some interviewees returned to the theme of departmental 'silos', stating that the various sections within Council were disconnected, with each having a narrowly-defined mandate to engage with communities on only those issues that were of direct relevance to their daily business. For example, it was highlighted that it was easier to engage with communities on issues such as bush regeneration on Council reserves, which was seen as directly related to the core business of Council. However, many respondents noted that there were increasing attempts to communicate climate change issues to communities, although many of these were initiated by the environmental divisions of Councils. Generally this suggests that climate change is perceived to be a large, nebulous issue that has unclear linkages to the day-to-day operations of Local Government. This likely stems from viewing climate change as an independent issue that must be treated in its own right, rather than examining existing aspects of Council core business and identifying where climate change may have a potential influence. For example, Local Governments do not adapt to climate change per se, but rather the increased frequency or extent of flooding during extreme rainfall events that may arise in a changing climate. When framed in

this context, climate change simply becomes a small consideration within the larger issue of flood mitigation, which is already core business.

4.4.3 Community process issues

Summary – Community Process Issues

The key process issues identified from case study interviews include the following:

The capacity of Local Governments to pursue adaptation efforts is constrained by financial, human and technical resources as well as a bias toward addressing those issues that Councils confront every day in favour of those that appear novel or where Local Government responsibilities have yet to be clearly defined. Ultimately, this limits the scope of operations in regard to climate change, with effort often being relegated to environmental departments and staff, which may have difficulty getting traction with other relevant departments. As a consequence, the community hears about climate change as an environmental issue, but not necessarily as a planning issue, social issue, or asset management issue.

As noted previously, however, Local Government has a proven track-record in community engagement and communication, with many tools at its disposal. Therefore, as resources become increasingly available, and climate adaptation becomes more ingrained within other areas of Council business, Local Government should be able to act as effective communicators. In particular, case study participants noted the sophisticated views on climate change that are already present among community youth, which foreshadows future expansion of understanding and capacity as the younger generation matures. Nevertheless, there is still a need to expand engagement with today's adults to address present risks and avoid overburdening future generations with challenges that can be addressed in the present.

Many respondents noted a range of capacity constraints with engaging effectively with communities on climate change adaptation issues. Capacity issues related to understanding of climate change vulnerabilities and feasibility of adaptation options. The capacity issues were varied and included:

- lack of climate change expertise within Councils;
- lack of resources to engage researchers to undertake vulnerability assessments; and
- lack of focus within Council to undertake proactive and long-term initiatives (e.g., pressure to react to issues of the day).

Some examples of respondent comments in relation to capacity issues included:

> We don't have the expertise [to assess climate change vulnerability]…
> We need money to do the research.

The capacity gaps within the three Local Governments need to be addressed in order to effectively implement the range of adaptation interventions needed to respond to climate change (e.g., capital works, education strategies, and planning).

One consequence of the limited capacity of Local Government to address climate adaptation is that community engagement on climate issues was largely left to environmental departments within Local Government. Alternatively, where other departments were engaging on climate change issues, they were often undertaken in isolation from environmental and other departments, and the view was expressed that this was leading to unstructured and non-integrated messages and approaches for climate change adaptation:

> I don't think it happens in a structured way, no. The environmental scientists will talk to their groups but I don't know that it happens in a structured way.

The lack of resources for adaptation planning combined with the lack of policy guidance limits the scope of Council operations regarding climate adaptation. As a consequence, the issue becomes marginalised within Local Government – environmental departments are charged with addressing the issue, but with limited access to information and expertise. This hinders the capacity of staff to demonstrate the importance of a 'whole-of-government' approach to the issue that involves planners, as well as infrastructure and asset managers. Mainstreaming climate change as a Council-wide agenda and issue continues to be a problem for many Councils. However this appears to be more a side-effect of the structure of Local Governments, whose staff are organised around thematic operational areas. Climate change is one issue that defies such treatment, as it has implications across traditional disciplinary categories.

While respondents highlighted capacity issues in terms of understanding climate change vulnerabilities and adaptation, they also demonstrated significant capacity for, and commitment to, the process of community engagement. Respondents discussed numerous community engagement tools to maximise participation in environmental and social issues (a few of which focused on climate change) including: forums, lunchtime seminars, street events, surveys, open days, websites, and staff briefings. Apart from diversity in the tools used, respondents also cited numerous examples of community engagement for a range of issues (e.g., from bush regeneration to youth issues). Therefore, if the other capacity issues are addressed to provide climate change a more robust and comprehensive foundation in Local Government, Councils possess an effective means to engage with a range of communities on climate change adaptation.

One of the more novel opportunities for community engagement identified by case study participants involved children. Some respondents, for example, cited high levels of climate change awareness among youth:

> …the kids were unbelievable. We had an advanced year six class and one of the kids, when we asked at the end, "what do you think we can do to help reduce emissions and stop climate change or reduce climate change?" One of the kids said, "well you shouldn't have presentations using electricity and a projector." One of the others said, "you should use cardboard and someone else said no that's cutting down trees."…So they'd obviously thought about all the options…you definitely get a lot out of the kids.

Furthermore, some respondents acknowledged that climate change impacts may become worse in the long-term and thus focusing education and other engagement activities on children was seen as critical:

> I think at a very young age teaching kids to be more responsive to the actual environment is a good thing.

While it is unclear the extent to which a community's children can drive climate adaptation, they can certainly play a role in stimulating discussion and learning. For example, what children learn in school about climate change can be brought home to parents and shared around the dinner table. Nevertheless, some respondents acknowledged that the focus on education of children should not be at the expense of targeted education of adults about climate change, as the action of adults over the near-term is likely to impact on issues that will confront today's children over the long-term.

4.4.4 Community outcome issues

Summary – Community Outcome Issues

The key outcome issues identified from case study interviews include the following:

There is little or no formal evaluation and monitoring of existing Local Government actions that are relevant to climate adaptation, even for communication and community engagement, which was judged to be an area where Councils are already taking significant steps. As such, the success of such engagement is judged by anecdotal information or indirect metrics.

Perhaps the most readily recognisable outcomes regarding climate adaptation is whether resources are being directed to adaptation (as reflected in Council budgets) and/or whether issues such as climate change are featuring prominently in Council elections and their outcomes (the ultimate expression of the community's preferences and satisfaction with the policy agenda). However, it should be noted that the scope of permissible actions for Local Governments is still limited by structure and process issues.

A significant challenge for tracking adaptation outcomes is the difficulty in attributing outcomes to specific adaptation activities. Local Governments are constantly adjusting policies and actions in response to information about effectiveness. Meanwhile, there are a range of actions that could be classified as adaptation that would also make sense independent of future climate change. Hence, Annual Reports and/or State of the Environment Reports may be relevant for the tracking of adaptation outcomes even if the metrics utilised weren't explicitly developed for that purpose.

While many respondents discussed the number of communication events and the diversity of engagement tools used with the community, there was no systematic monitoring and evaluation of the success or impact of those community engagement events. Hence, much community engagement is being undertaken without any way of comprehensively knowing the outcomes of that engagement such as changes in attitudes and behaviours towards climate change. Nevertheless, some staff suggested that a major measure of climate change adaptation would be changing community awareness of this issue.

> …the signs of a successful adaptation I think is greater community awareness
> [through] good key performance indicators… that really show the difference.

The important point here is the reference to "key performance indicators". In other words, Councils have to be able to rigorously track community awareness over time. Related to this focus on measuring community awareness was recognising the need to measure staff awareness also. Given the tendency towards a 'silo' effect, with environmental officers being the active in regards to climate change, there was recognition that measuring the degree of staff awareness was also an important outcome.

However, while there was no systematic monitoring and evaluation of the direct changes in relation to community engagement or of the process of engagement, two surrogate measures of community engagement success were cited by respondents: feedback from residents and political decisions. For example, some community engagement practitioners used anecdotal evidence to inform the effectiveness of their community engagement activities. Similarly, actions within communities that resulted shortly after a range of community engagement events were used as a surrogate indicator of the success of those events, although some also expressed the goal of self-mobilisation of communities in response to climate change being the ultimate indicator of effective community engagement:

> … So for me that's an indication that enough education's been done. That
> people are actually now willing … I don't know how else you would. I guess from
> a community perspective, in terms of true community development, it would be

> when the community themselves were mobilising to do something about it
> without Council pushing them to. So it would be like a project that they said "hey
> we want to do something about this in [Council]". That for me would be the
> ultimate …

Hence, if consistent measures of community mobilisation were able to be monitored, it may provide a surrogate indicator of engagement success. Yet, this first necessitates the identification of relevant, standard metrics of community mobilisation that can be tracked over time. As discussed previously in the context of planning (Section 4.2.4) and infrastructure (Section 4.3.4), there needs to be formal strategies in place that underpin monitoring and reporting efforts.

Many respondents also cited the link between feedback from communities and political decision-making, where effective community engagement was reflected in the outcomes of political decisions and investment allocations:

> But political decisions and government budgets are a good indication that things
> are moving. If there's money being taken out of one area of government
> spending and moved into responses to climate change then you know that
> that's an area where the community wants to go because that's how politicians
> work and that's how they survive.

Hence, another surrogate indicator of community engagement success may be type and scale (e.g. financial commitment) of political decisions relating to climate change adaptation. Climate adaptation outcomes should be reflected in Council budgets, although it may be difficult to distinguish between activities undertaken as part of traditional routine Council business and those undertaken specifically for climate adaptation. In addition, if politicians are indeed responsive to community priorities, then another way of tracking outcomes would be to assess the extent to which Council elections are influenced by candidates' positions and actions on climate change.

Regardless of what outcomes and metrics currently exist or are ultimately developed, these outcomes must be communicated to the community. Several interviewees described Local Government reporting as being comprehensive. However, most Local Government responses to climate change that have been reported to date have focused on greenhouse gas mitigation actions (e.g., energy conservation through low energy lights and co-generation energy systems, and petroleum and greenhouse gas reduction through hybrid cars). Because of the attention paid to reporting within Councils, any conscious climate change adaptation actions are likely to be reported – and a few interviewees stated that Council climate change adaptation measures were captured indirectly through things such as State of Environment Reports, and Council Annual Reports, which were disseminated to communities. One of the issues with reporting climate change adaptation initiatives is that some or even most adaptations may not be identified as being in response to climate change specifically (e.g., water conservation, or beach protection measures). Hence a comprehensive account of climate change adaptation is difficult. Furthermore, if those adaptations are reported inconsistently, then comparative analysis of the successes or failures of those adaptations may be difficult and may not effectively guide adjustments to existing initiatives or the development of future initiatives.

5 DISCUSSION OF COMMON THEMES

Summary – Common Themes Emerging from Interviews

A suite of themes emerged from the case study interviews that point to cross-cutting barriers and opportunities for climate adaptation:

Focus on the Community − Local Government views the community as a focal point of its governance efforts, using policy guidance from Federal and State Government as a means for fulfilling its duty-of-care to residents. This creates both challenges and opportunities for adaptation. On one hand, Councils would ideally prefer to act as leaders on the issue of climate adaptation, using their relationship with the community as a vehicle for educating the public and garnering support for progressive action. On the other hand, Councils are mindful to avoid getting too far out in front of the community when it comes to policy development. There is a give-and-take associated with local governance that must be respected.

Barriers Propagating from the Top-Down − Independent of its relationship with the community, there are a suite of adaptation barriers that lie external to Local Government and propagate from the top-down. Chief among these is the current policy vacuum regarding adaptation, whereby there is little explicit guidance from Federal and State Government regarding how consideration for climate change should be operationalised within Local Government's scope of operations. This both contributes to and is exacerbated by a lack of clarity regarding where responsibility for adaptation ends for Local Government and where the responsibilities of other public and private organisations begin. Collectively, this creates a strong and understandable bias within Local Government toward maintenance of the status quo.

Barriers Propagating from the Bottom-Up − There also a range of adaptation barriers that have their origins with Councils themselves. These tend to largely be associated with limited knowledge regarding how to address adaptation challenges due to limited access to knowledge, data, tools and expertise. Ultimately, this suppresses any feelings of urgency in addressing climate change and/or contributes to uncertainty regarding what actions are indeed warranted and when. Responsibilities for climate change within Local Government often lie within environmental divisions. This sends a message throughout Council that climate change has limited implications for other departments such as planning and asset management. Despite these being internal issues, improved resourcing of Local Government by State and Federal Government as well as the establishment of more robust adaptation policy would assist Councils with overcoming these hurdles.

The findings that emerged from the case study interviews offer a more detailed look at the diversity and complexity of challenges that face Local Government with respect to climate adaptation. In reality, many of the issues raised by case study participants are not necessarily confined to climate change, but rather are reflective of the inherent difficulties associated with the reform of existing policies and/or the development of new policies. When viewed quite broadly and generically, adaptation is fundamentally about institutions changing the way they do business. Regardless of whether that business is addressing climate risk or simply maintaining recreational facilities, significant changes in the policy status quo can be challenging and lead to conflict. For climate change, this challenge is particularly acute because it is not only Local Government that must change what it is doing, but also other levels of government, the private sector, and the wider community.

While the preceding section presented a discussion of adaptation barriers associated with three specific themes – planning, infrastructure and community – a number of issues reappeared, indicating the existence of a suite of adaptation barriers that are cross-cutting, universal challenges. These key issues are summarised below (Figure 2). Some of the barriers have their origins within Local Governments themselves, such as availability of data, information, expertise

and other resources. However, others have their origins outside of Local Government, such as State and Federal legislation and planning policies that fail to explicitly articulate the manner in which climate adaptation should be pursued.
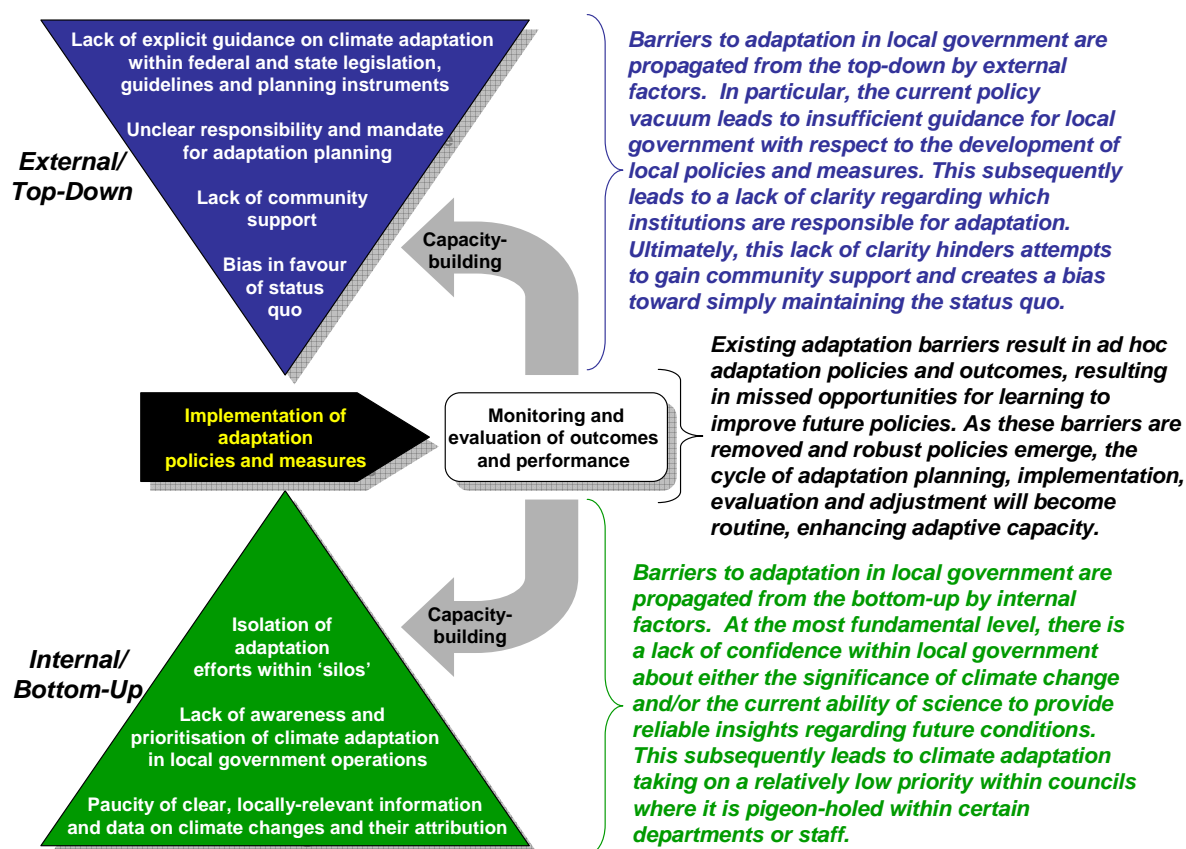
Figure 2. Summary of cross-cutting issues acting as barriers to climate adaptation within Local Government.

In this section, these cross-cutting issues are summarised, with additional commentary from case study participants where relevant. This summary begins by reiterating one of the key underlying themes of the stakeholder interviews, which was the relationship that exists between Councils and the communities they serve. Subsequently, the key cross-cutting barriers are discussed as those that largely propagate from the top-down versus those that propagate from the bottom-up. This framework helps to distinguish those challenges where greater investment, coordination and progress is needed from other institutions from those that lie within Local Governments and therefore may be subject to a greater degree of local control.

5.1 Focus on the Community

During the various discussions that occurred among Council staff during the climate change workshops (Smith et al., 2008), the theme of community emerged repeatedly as being one of the most fundamental barriers to advancing adaptation as well as one of the greatest areas of opportunity. The findings reported in Section 4 only reiterated the importance of community, as time-and-time again, interviewees pointed toward community as having a role to play even when interview questions targeted planning or infrastructure concerns. In many ways, this persistent focus on the community is quite a positive message as it signifies recognition on behalf of Local

Government of the importance of the communities they serve and their responsiveness to community interests and concerns. Generally, the recurrent themes associated with community centred on four topics:

- duty-of-care;

- engagement and communication;

- responding to community expectations; and

- leadership.

Each of these is discussed in more detail below.

5.1.1 Duty-of-care

Throughout the various interviews, respondents repeatedly returned to the issue of Local Government's responsibilities in regard to its duty-of-care to the community. Generally, this duty-of-care manifests as a responsibility for risk management, with one interviewee summing up this issue as follows:

> I think Council's role is like the wise monkeys; we sit there and really should be taking in the information, assessing the information and acting when we feel we've got enough information, to make sound judgments on behalf of the people that we're dealing with.

Across the interviews pertaining to planning, infrastructure and community, interviewees often referred to Local Government's responsibilities for understanding the consequences of climate change and incorporating that information into planning. As such, the uncertainty that exists regarding future climate change and the lack of guidance on how to manage that uncertainty in decision-making was viewed as an obstacle to Local Government executing its duty-of-care to the community. In other comments, interviewees suggested that the more serious or shorter the time-scales for climate change, the greater the role for Councils, who would then need to be tougher with regard to statutory regulation and monitoring, as opposed to non-statutory activities such as education. As discussed previously, many aspects of increased regulation cannot be undertaken by Councils independently (Section 0), although there is some scope for Local Government to plan for climate change under existing State Government regulations.

Similar to the theme of risk management, interviewees also acknowledged a broader role for Local Government as a steward or custodian for the local environment, which in turn has benefits for the community:

> If we don't educate and try and reduce the negative impacts, then it's going to affect the quality of life of our residents. So even from that standpoint, we need to do – and we've got a responsibility as the custodian of the environment…

The importance of the above statement is that it acknowledges that Local Government responsibilities lie beyond simply what is codified within legislation, strategies, and planning instruments and may be associated with historical or cultural factors, or even moral and ethical judgments. It is this fundamental concept of duty-of-care which underpins Local Government activities, with the codified statutory and non-statutory duties of Councils being the means by which that duty-of-care is maintained.

5.1.2   Communication and engagement

Many interviewees highlighted the unique position Local Government is in with respect to having a special relationship with the community. Across the discussion of planning, infrastructure and community, case study participants raised the importance of Councils' role as community educator. Interviewees suggested that Local Government could better capitalise on its connection to the community and the level of trust that it has. Similarly, during the workshops with Local Government, one of the most commonly cited opportunities for advancing the cause of adaptation was the enhancement of this role to better inform and mobilise communities (Smith et al., 2008). Local Government tends to be in the best position to determine how education can be delivered, as they are on the ground, speaking and dealing with people on a day-to-day basis:

> I know because I work on the ground with the residents about what is going to work and what is more likely not to work. We have, of course, our community to be answerable to, and we would have to talk to them on a daily basis, and they tell us. They also provide information to you, because they can tell you what sorts of things need to be actioned and planned for.
>
> I think we're the sort of front line with the community. I think that's the main thing when you talk about local Councils in comparison to any other public authority or group. And I think because Councillors are elected by the community they should be reflective of the community rather than other sorts of groups that operate within the community, Councils are supposedly more representative.

Furthermore, this local connection gives Councils' the ability to go beyond mere education and act as a 'change agent' for climate adaptation:

> The role for Local Government is as a change agent…and being able to take an educative role, a connecting role building resilient and capable communities…that are adaptable to change, that actually feel empowered and able to respond individually and as a community to change, and that's very vital. That stuff, as much as anything else, can keep communities going…

This sentiment reflects quite a progressive attitude toward the role of Local Government in engaging with the community. Rather than Local Government having to direct the community, Councils can use education as a tool to facilitate self-empowerment. The idea here is that given sufficient information and guidance about climate change or other relevant issues, communities can self-organise and take a leadership role. In addition to placing additional power in the hands of the community and giving the community some responsibility and self-determination, it also reduces the burden on Local Government. Councils would not have to drag the community along in decision-making, but rather work in a more collaborative partnership.

5.1.3   Responsiveness to community concerns

One of the implications of close connection and communication with the community is that it creates an obligation within Local Government to respond to community concerns. As stated previously, while Councils have responsibilities to execute State polices and legislation, their democratic nature means that in so doing, they have an obligation to reflect the preferences of the community. Ultimately, this creates both challenges and opportunities. The challenges arise when Local Government resources are spread thin attempting to honour a broad range of community demands, or when issues identified by Local Government are not necessarily embraced by the community. Litigation that has emerged in recent years in New South Wales as well as Victoria and South Australia regarding attempts by Local Government to control coastal development in at-risk areas has highlighted the potential for conflicts among Councils' duty-of-care, developers and individual property rights.

Nevertheless, there are also a range of opportunities that emerge from Local Government's responsibilities to the community. For example, across the planning, infrastructure and community discussions, interviewees commented on community demands for more proactive management of climate change and climate risk. While some interviewees expressed this relationship as one of Local Government being dragged into issues, perhaps for political reasons, a more accurate assessment is that Councils use public sentiment as a cue for prioritising activities. While differences of opinion between communities and Local Government could again create the potential for conflict, the democratic nature of Local Government means that as concern for climate change becomes more mainstream, Councils will invariably make greater investments in climate risk management and make greater pleas to State and Australian Government for resources to do so.

5.1.4 Leadership

While Local Governments have an obligation to respond to the preferences of the community, the net effect of Councils' obligations regarding duty-of-care and their role in community and education and outreach also conveys substantial opportunity for Local Government to assume a strong leadership role. For example, regardless of what role Local Government currently plays on the issue of climate adaptation, when asked what role Council should be playing in adaptation, one of the most commonly-cited responses among respondents was that Local Government was in a position to lead by example and be a 'champion' for climate change adaptation:

> So basically leading by example would be my idea of how Council in the future could actually try and encourage climate change by actually doing things themselves, by being the actual example, by being the leader…

> I think Local Government has a variety of roles in terms of climate change. First and foremost, it needs to be a leader. It needs to be an organisation that can lead by example; by also educating the community, so there would also be that teaching aspect. Also through policy implementation and preparation, have an enforcement role as well. So, I think lead by example, be an educator to the community, and also have an enforcement role.

This leadership would include such things as preparing Councils' own infrastructure for climate change, as well as incorporating adaptation into planning and strategies, and taking advantage of its role in community education and outreach. While this is an ambition of Local Government, the discussions of the structural and process issues (i.e., policy vacuum) associated with planning and infrastructure in particular also indicate that Local Governments need to be empowered to take full advantage of their leadership potential. At present, substantive leadership may be limited by raising the public profile of adaptation and the needs of Local Government, lobbying for policy certainty from State and Australian Governments, and building collaborations across Local Governments. Demonstrable leadership in policy implementation, however, likely will be dependent upon the removal of other barriers.

In addition, due to the need for Local Government to be responsive to the community, it is crucial to point out that Councils are, by necessity, sensitive to the fact that they are limited in how far out in front of their residents they can lead. For example, one of the interviewees described a policy for reducing car use. However, residents are very sensitive about impingements to their driving habits:

> … we want to reduce the amount of car dependence…but…that is very difficult for Councillors to go back to the community and say, "sorry…we're going to take one of your car parks…"

Furthermore, throughout the previous sections on planning, infrastructure and community, the challenges of ensuring Local Government and the community work collectively to achieve goals were emphasised. Some more general comments from case study participants that drive these challenges home included the following:

> ...in terms of climate change and our long term sustainability, our biggest challenge is not the Council. It's the people living out there. We've got to find a way to modify their behaviour.

> I think part of it is still in the community just getting them to a point where Councils are able to make some decisions that are not going to be as popular.

So while reducing car use and promoting public transport seem like responsible policy, Councils would be very bold to take away or impinge upon what is considered by the municipal community to be a right to drive (and to park). Central to this barrier is the perception that individual change is beyond the direct control of local authorities:

> That's a difficult one because we can do whatever we can do promote, to legislate for people to adapt and mitigate. But when it comes down to it, it's really up to individuals and households to do something on a personal level. That's difficult to control – we're a democracy.

While the above comment emphasises the need for grassroots support for adaptation actions, it perhaps doesn't give sufficient value to the role that governments and policy play in addressing issues of public concern. While democratic decision-making obviously discourages the implementation of policies that are broadly unpopular, this does not mean that progressive action is limited to individuals acting alone. Environmental regulation in general represents actions that require or prohibit certain behaviours by individuals and institutions, often at some cost to society. Yet individuals may be willing to bear that cost, particularly if they value the associated intent and benefits of the policy. Therefore, even politically sensitive issues advance, albeit in some cases slowly. As demonstrated by one participant, there was a sense that progress is being made in terms of raising awareness about climate change and growing momentum:

> You forget the initial shock and then you sort of move along a bit. The general community…they're getting perhaps more resigned to the fact that [climate change] is something that they can't just disregard…

The issue here is not so much that the community acts as a barrier to Local Government attempts to lead, but rather the issue is one of inertia. Local Governments can and do play a role in 'moving the debate along', and once momentum builds, significant change can occur over a relatively short time-frame. However, there are limits on that momentum and the burdens and behavioural changes that residents will accept before rejecting the local bodies that represent them.

5.2 Adaptation Barriers from the Top-Down

One broad category of adaptation barriers, and perhaps the category that has the most far-reaching consequences, is those that emerge from the top-down and thus lie outside of individual Local Governments. Such barriers would include those generated by the policy environment arising from Federal and State policy as well as the interactions between Councils and these higher levels of government. Federal and State legislation and policies set the playing field for Local Government decision-making, which is largely involved in executing the policy directives it receives from above.   The ultimate consequence of adaptation barriers that propagate from the top-down is the strong disincentive they create for Local Government with respect to taking progressive action and leadership on, say, climate adaptation. The common themes arising from

case study interviews as well as climate change workshops with SCCG Member Councils regarding top-down barriers included the general policy vacuum that currently exists with respect to adaptation, the lack of clearly delineated responsibilities for adaptation among different institutions and government agencies; and the potential risks that exist to Local Government in attempting to pursue cutting-edge and progressive policy solutions. Each of these is discussed further below.

5.2.1 Adaptation policy vacuum

An unmistakeable barrier that permeated all discussions with case study participants was the general lack of explicit guidance for how to accommodate a changing climate in the implementation of Local Government policy development and regulatory decision-making. While existing legislation and planning instruments necessitate consideration for climate-related hazards, it is clear that existing policies and measures to address climate hazards often assume the risks associated with those hazards are static over time. While it is widely recognised that such assumptions are no long tenable, there is a deficiency of policy guidance, expertise and authority for Local Government to adjust such policies alone. For example, one interviewee stated the following:

> …. If there was a guideline there that said sea-level will rise by this much, even just a guideline saying we'll go with the IPCC predictions…or whatever…and said this is something that if you enforce it, legislation will back you up in enforcing that as a guideline…

In addition to frequently arising in case study interviews, this issue of problematic policy, particularly at the level of State Government, was often raised in the Council workshops – direct references to State Government as a source of adaptation barriers were made no less than 18 times across the different workshops as a source of adaptation barriers or opportunities (Smith et al., 2008), while Federal Government was cited 31 times. While certainly not the only challenge facing Local Government regarding adaptation, there are strong perceptions within Local Government that the existing policy environment is not conducive to Local Government assuming its desired leadership role. For example, as stated by one interviewee:

> There's too much adversarial…angst between Local Government and the New South Wales government...We should be really working hand in hand together.

Another potentially worrying aspect of the lack of adaptation policy is the fact that where discussions and tentative steps are being made is largely confined to coastal issues (sea-level rise, storm surge, inundation and erosion) and, to a lesser extent, flooding associated with extreme rainfall events. This is understandable given the highly coastal nature of Australian development (where metropolitan Sydney is just one case-in-point) and the prescribed responsibilities to Local Government in regard to coastal and flood management. However, injury and death associated with such events is relatively minor compared with bushfire events or heat waves, as noted in the report *Mapping Vulnerability in the Sydney Coastal Councils Group*. Yet, in case-study interviews, these issues were raised much less frequently.

On one hand, this could represent a positive sign, in that it suggests that these may be areas where Local Government already believes it has effective risk management strategies in place. For example, when workshop attendees were polled regarding their perceptions of vulnerability to different climate hazards, coastal hazards had the greatest disparity between perceived vulnerability and capacity to manage. In contrast, issues such as bushfire were generally regarded as being relatively under control for most Councils. On the other hand, this focus on the coastal zone could also mean that certain climate consequences are being neglected across all levels of government. For example, while Sydney is well-documented as being a hot-spot for heat-related

mortality in Australia, Local Governments generally expressed significant uncertainty regarding vulnerability to this issue (again, see *Mapping Vulnerability in the Sydney Coastal Councils Group*). As such, as Councils continue their efforts to elicit greater policy guidance and certainty for adaptation to climate change from State and Australian Government, they should work to ensure that such guidance is comprehensive and empowers Local Government to address the range of climate issues that they will experience.

Finally, as noted in the section on community, there is a relationship between the existence of legislative guidance on Local Government policy and the acceptance of those policies on behalf of the community. Interviewees noted that in order to have a strong foundation for community engagement, Council needs strategies and planning instruments in place. This, in turn, depends upon policy guidance from higher levels of government. Clearly there are sharp distinctions between policies pursued in response to legal obligations and those pursued solely as a result of Local Government initiative. Hence, the absence of such guidance that underpins Councils' decision-making increases the risk of conflicts between Councils and communities over the justification of Council actions. As has already been noted, the loss of community support can severely undermine even the best intended policies of Local Government.

5.2.2 Lack of clarity in responsibilities and authorities

Another important cross-cutting issue was uncertainty over who is responsible for responding to climate change and in what ways. While in some ways this can be attributed to the lack of clear policy guidance (see above), it should also be noted that policy development may be impeded by confusion over roles and responsibilities as well as ownership of assets. Some case study participants questioned the extent of Local Government responsibility for adaptation while State and Australian Governments remain quiet on the nature of climate impacts. For example:

> Climate change I get a bit nervous about because we seem to be accepting responsibility or …Council… could end up being sued for either taking no action or taking the wrong action, that's the one that worries me…When you don't actually have the complete answer…

The above quote reiterates the point raised in Section 4.1.2 about Local Government being trapped between its duty-of-care and the risks of charging ahead with policy in the absence of guidance and support (see also Section 5.2.3). So much of Local Government action depends upon specific standards such as building codes and above floor heights. The lack of such information remains a key hindrance for Local Government planning, infrastructure management and community engagement, due to uncertainty over what climate impacts may involve. Participants noted, for example, that depending upon the figure used for sea-level rise, there may be thousands of properties vulnerable to sea-level rise within the case study regions. Hence, decisions with far-reaching consequences may hinge upon the determination of a single value. Who makes that decision about what constitutes an appropriate value? Participants noted that, in many cases, Councils were inheriting responsibility from State Government, such as management of infrastructure and assets on the State's behalf:

> I think a lot of this is actually passed on from the State Government. State Government always has different initiatives and Local Government is actually like a facilitator to implement the State Government's initiatives.

Overall, questions over responsibility have amplified existing confusion about climate change adaptation and hindered Local Government's ability to respond.

To some extent, such questions could be alleviated by Local Government explicitly accepting shared responsibility for assets, through public/private partnerships or with multiple Councils

banding together. In the workshops, improved coordination across Local Government was frequently cited as one of the opportunities that exist for Local Government with respect to improving management and addressing climate risk. This theme emerged again in case study interviews, with one interviewee commenting,

> …climate change isn't a localised issue. It's a global issue that comes down from national and sub-regional and topographical issues and that that will require good collaboration particularly with geographic neighbours.

Nevertheless, the complexities of responsibility and ownership span legal, social, economic and cultural dimensions. Such complexity must ultimately be untangled, for in the absence of clearly delineated responsibilities (whether shared or not), there are strong disincentives for proactive policy development and implementation.

5.2.3 Risks and liabilities for Local Government trailblazers

While climate adaptation is fundamentally about facilitating organisational change to address the changing nature of climate risk, there are also risks to Local Government associated with the pursuit of adaptation policies. A recurring comment across the discussions of planning, infrastructure and community was concern for, and the liabilities inherent in, Local Government assuming an overly progressive stance in pursuance of adaptation. Generally, the risks fall into one of four categories:

- existing policy prevents progressive action by Local Government;
- progressive action conflicts with community preferences;
- progressive action incites legal challenges; or
- progressive action displaces desirable activities.

The first of these, the outright prevention of action due to constraints imposed by existing policies and legislation is not necessarily the most common, but it is the most constraining. One of the commonly-cited examples where State policies limit progressive action by Local Government is that of BASIX – the New South Wales government's Building Sustainability Index. While BASIX was implemented throughout the State to ensure new buildings are more sustainable (e.g., use less water and energy), it sets limits on that sustainability. In other words, while Local Governments must ensure new developments comply with BASIX standards, they are not permitted to implement standards that exceed those of BASIX. While this ensures equity across the state, it also means that communities are trapped by the lowest common denominator, with little opportunity to take a leadership role on building sustainability, even when such actions are supported by the community. In the workshops with SCCG Councils, the example of BASIX was raised 11 times as an illustration of the constraints placed on Local Government. Other constraints on Local Government such as rate pegging or development and growth quotas also significantly constrain opportunities for self-directed governance among Councils.

Next, progressive action on behalf of Local Government can also lead to conflicts with the community, if policies and measures implemented by Councils in pursuit of sustainability or climate adaptation push residents in directions they are not yet prepared to go. This issue has already been discussed in Section 5.1.3, above. A similar, but potentially more severe risk is when Local Government decisions incite legal challenges by residents, developers, or other parties that perceive they have been harmed by a decision. This is a particular risk when plaintiffs perceive Councils have over-stepped the authorities prescribed to Council by existing legislation. Litigation is therefore just one more in the long list of consequences that arise in the absence of robust legislation and policy. While litigation can generate significant costs for Local Government and undermine preferred policies, depending upon how such litigation is resolved, it

may also contribute to setting precedents that reinforce and strengthen policies. Increasingly, climate change is finding its way into the courts. As such, litigation and court decisions will invariably have a role to play in shaping the future policy environment for adaptation.

Adaptation actions also have potential to displace or drive away valued community activities or assets. Such issues are ultimately tied to the trade-offs that Councils and communities are willing to make. For example, more stringent development controls in foreshore areas may simply displace development, and the associated revenue, into other communities. Some Councils may be happy to make that trade-off, but others may be willing to accept some climate risk in granting approvals for development in return for the direct (e.g., rates) and indirect (e.g., jobs) benefits to Council and the community. Given a standard and equal playing field across Local Governments, Councils will not be forced into deciding about such trade-offs.

5.3 Adaptation Barriers from the Bottom-Up

The other category of adaptation barriers is those that propagate from the bottom-up. Such barriers tend to lie first and foremost within Local Governments themselves, although they are amenable to treatment from external sources. Such barriers would include attitudes of Council staff and Councillors toward climate change or financial constraints that limit investments. The ultimate consequence of adaptation barriers that propagate from the bottom-up is the significant constraint they place on the scope of Council efforts on adaptation. As a consequence, the scope of the challenge is often perceived to be greater than the available resources and know-how with which to cope. The common themes arising from case study interviews as well as climate change workshops regarding bottom-up barriers included the level of knowledge and resources within Local Government for addressing climate adaptation; lack of prioritisation of adaptation within Local Government operations; and the marginalisation of climate change and adaptation within institutional 'silos'.

5.3.1 Lack of resources and information

One of the most commonly cited limiting factors for Local Government is the lack of availability of resources with which to address climate change and its consequences. This resource limitation was commonly expressed as having two different components:

- lack of locally-relevant information about climate change and its consequences; and

- inadequate financial and human resources to address climate challenges.

The lack of information to Local Government about climate change was reported to a have a number of consequences. First, the fact that only a trickle of information about climate change is flowing into Councils creates the impression that either a) little is known about the issue or b) the issue must not be particularly significant. It is likely that part of this perception is due to the larger issue of responsibilities and knowledge for climate change being trapped within Local Government 'silos' (see below). For example, during the Council workshops, it was observed that only a small minority of participants were aware of some of the recent information that had been released about climate change and impacts in the Sydney region. Those that were aware were largely those in Council charged with keeping up with environmental and climate issues. While there may be scope for Council staff to take more initiative in building up knowledge within Council on climate change issues, the absence of a clear policy mandate to Local Government to manage the risks of climate change inherently limits the prioritisation of the issue.

Another consequence of information gaps in Local Government is that it stymies decision-making. For example, case study participants noted that a high level of uncertainty associated with climate change has led to confusion when it comes to practical action:

> I suppose the climate change definition has probably never been adequately addressed to me personally to see what is actually required…

In particular, case study participants felt hamstrung by conflicting information which hindered their ability to take action.

> …there is so much conflicting information. Everything is about climate change now, and obviously we know that doing things for climate change is important, but there is a lot of misinformation out there.

This perception of limited and/or conflicting information on climate change is widespread, not only within Local Government, but across a range of audiences. Nevertheless, case study interviews also revealed a number of Council staff with quite sophisticated understanding of climate change, its consequences and associated technical details and information. Therefore, the key problem appears to be one of climate knowledge being quite unevenly distributed within Councils. Certain staff are the custodians of knowledge, while others lack in-depth knowledge and thus have their perceptions formed predominantly by peers and the media. Depending on the roles of such individuals within Council, this could be a barrier to effective decision-making.

The lack of access to information about climate change was often expressed as a subset of the larger issue of limited financial and human resources to undertake climate work. In Section 5.2.2, for example, one interviewee commented that Local Government is increasingly burdened with a growing number of responsibilities, yet the capacity of Councils to meet those responsibilities has not expanded proportionately. Climate change is just one example of this phenomenon. Generally, case study participants identified State and Federal Government as having a potentially important role to play in addressing such capacity gaps. As summarised by one participant,

> it all comes down to money… we've got one or two environmental officers and …they're pretty stretched just managing what they're doing…if we did get assistance from the Federal Government and actually have some people to assist us in promoting it, I think that would make it simpler and more achievable.

This theme of financial constraints featured prominently in the workshops as well, with over 85 individual references to "money", "costs" or "funding" as barriers to adaptation and the increased availability of capital as an event that would create opportunities (Smith et al., 2008).

In several instances, there was a sense that Councils are already over-stretched in coping with multiple challenges that have greatly expanded beyond the classic responsibilities of 'roads, rates and rubbish'.

> It's all about raising awareness but it's very expensive in terms of it pulls in my staff and resources and stuff like that …

Council activities in terms of community engagement and navigating the complexity of climate information are tasks which Councils found challenging. However there were some exceptions:

> We're in a bit of a fortunate position in.. [we have] mapped some of the sea-level rise…Whereas not a lot of other Councils have got the ability to do that.

Despite these exceptions, overall Councils found that the additional tasks of responding to climate change were a significant strain on their limited resources. Despite these challenges, case study participants have found some areas where their Councils could proceed effectively with specific climate change programs. However, these tended to be in the areas of resource

efficiency and waste management – areas where Local Government already has a mandate to act and where strategies and plans are in place. Therefore, simply providing greater financial resources is not sufficient. A robust policy and planning environment must also be in place to ensure that those resources can be channelled into delivering outcomes.

5.3.2 Lack of prioritisation on adaptation

Several participants described their efforts to push change and sustainability within their own Councils. An element of this was engaging residents, staff and Councillors in discussion on what were relevant indicators of sustainability for Council. For example:

> …what I'm trying to do is to get change in this Council….trying to raise awareness through Council and the community about what the issues are.

What this suggests is a strong need for issues such as climate change and sustainability to receive a higher priority than they do at present, if such causes are to be advanced. For example, although the case study participants were asked what Councils would need to do differently in order to effectively adapt to climate change, it was pointed out that it is not so much a case of what they should do differently, but that perhaps what should be given priority in both Council spending and higher level strategic planning. A number of respondents were openly concerned about the current focus on climate change, and directly challenged whether it was an appropriate use of Councils' limited resources:

> No, I'd spend [money] on something else. There'd always be another park and other roads, more footpaths or something else that would need to be built. But some of what you're proposing to me, like particularly with the seawall down there, it's almost like chasing shadows.

> …it concerns me a little bit that we are spending a lot of time, energy, money, staff resources on something that's a very broad issue and a problem. I think everybody feels good about that. I don't know how much difference we'll actually end up making but it's almost as if we're doing it because it makes people feel good.

The above quotes raise two relevant points regarding the prioritisation of climate change and adaptation. The first is the issue of competition among different issues on the policy agenda of Local Government. Given the expanding list of Councils' responsibilities, difficult decisions have to be made about where funds are directed. Quite often, such prioritisation is driven by immediate needs and what Councils see as their core business. Issues that are likely to play out over long time-scales or where there isn't a current policy or political obligation to act, will invariability slip in the order of prioritisation:

> Councils for too long have been looking at one and three year periods rather than saying 10 and 20 year timeframes. So I think that's a significantly important issue that they have to do, get the binoculars on and look out a bit as to where they're going rather than worrying about how much footpath pavement is going to be done.

The second point that is raised involves the merits of "feel good" actions by Local Government. The problem with such a label is that one person's "feel good" action may be another person's "critical necessity" action. In other words, these are to a large extent subjective judgments. Hence it is helpful if Councils can help develop a shared vision of what the priorities are that are should be adopted across all Council staff and Councillors.

Views on the appropriate prioritisation of climate change adaptation often varied widely, even within a single Council:

> I'd like to see people really take it very seriously and realise that at this point we're just coping with the status quo. We haven't really, in my opinion, looked at what it going to really happen. The impact will probably be felt before people react to the degree that we should be doing. We should be much more prepared, is what I'm saying.

Interviewees suggested that climate change adaptation would require a shift in focus towards greater appreciation for climate change and sustainability. The financial viability of Councils is a paramount concern, but climate adaptation may require a shift in emphasis, as well as the linkage of climate to Council finances:

> I suppose a lot of Councils at the moment are financially driven, and quite rightly so. They need to be. Obviously you can't run a Council that's going bankrupt…but if they wanted to focus on climate change, it's something that would have to obviously be elevated in its priorities.

One of the critical factors in overcoming such challenges is that of political will and leadership. For example, while some actions may be viewed on the surface as simply "feel good" endeavours (and thus disposable, particularly if they are perceived to be difficult), commitment by key decision-makers to a particular course of action can help transform the mindset of individuals and organisations:

> I guess when it becomes a political issue and when it comes down from the top. That's really what it boils down to. Whether that's a big issue for Local Government on a political basis, I don't know. But, really, when it comes down from the top and we're directed to give that greater weight in terms of our work.

In addition, the phrases "leadership" and/or "political will" were raised on almost 30 separate occasions during the climate change workshops in regard to barriers and opportunities for adaptation (Smith et al. 2008). Furthermore, many of the discussions associated with planning, infrastructure and community led to the identification of actions that Local Government could potentially take, but haven't due to the risks to Council. To some extent, accepting those risks is one component of leadership, yet such acceptance is easier said than done. As such, some Council staff maintained a sense of humour on the subject:

> Who is Will and why is he so political? (anonymous comment during one of the Council workshops)

Nevertheless, demonstration of leadership and a commitment to drive Local Government decision-making in a new direction may be one of the most important components of organisational adaptation, particularly when that leadership is exhibited by upper management and Councillors. Unfortunately, such traits cannot simply be legislated.

In addition to the matter of simply getting climate change getting onto the political agenda, a secondary issue concerns prioritising what sorts of actions are appropriate. The local manifestation of climate change and politically palatable means of addressing risk can vary heavily between different issues. For example,

> …if you're in [this Council] and you're saying look our priority is bicycles….That's our thing and politically it's a good thing in terms of yielding votes and what have you… But if you're not – if it's not a political issue in …[another area], you're not going to get the… Councillors abandoning their hot issue and pursuing bikes.

In other words, in addition to Councils have strong opinions regarding whether or not they have responsibility for managing a particular issue, they also will have strong opinions regarding the nature of the management effort. Undoubtedly, some measures will be more effective than others but of those some may be more or less socially or politically acceptable.

5.3.3 Adaptation 'silos'

Both the climate change workshops and the case study interviews with Council staff provide the general indication that the scope of the climate change problem at present is greater than the coping capacity of Local Government. For example, as stated by one interviewee:

> I think again, Councillors probably struggle a bit with how amorphous it is, the idea of climate change, what does it really mean, what are the tools, what do we need and so on, and normally you will have Councils with one or two people with an environmental background who can understand it and put perspective on it, but again, with resources constraints you can't make one person responsible for how a Council does things. So having some help I think for Councillors and Councils as regional groups would be a really good thing.

Much of this can be attributed to the aforementioned issues of limited resources and information, which subsequently affect the prioritisation of the issue. But what happens to low priority concerns in Local Government? The general result that was suggested by the above quote as well as other comments is that they end up being marginalised within a 'silo' of Local Government operations. Two key consequences of this include:

- the conceptualisation of the implications of climate change and the appropriate responses are confined to a small group of individuals, which may frame the issue from a narrow perspective; and

- the implications of climate change for the diversity of Council operations and responsibilities are not recognised.

These phenomena were readily observable within SCCG Member Councils, as illustrated by the following two quotes:

> We haven't got a process in place currently for Council apart from somebody in one part of Council writing a paper putting up some recommendations and Council has adopted, it then becomes Council policy. That doesn't mean then that's a consensus of Council.

> I think having that ability to look across portfolio areas and see what the implications broadly are in the community so that you're not just dealing with the pipes and the gutters and the sea walls while my colleague over here has all of the aged care people who can't get around because of work we've done to stave off the inundation.

In addition to the comments from case study interview participants, additional insights were available from the climate change workshops. For example, in some Councils, attendance was biased toward Council staff with environmentally-oriented roles, and some attendees explicitly stated that the workshops did not appear relevant to their own activities in Council.

Interestingly, the fact that the issue of climate change and consideration for adaptation does so often rest within 'silos' can be linked back to the top-down issues discussed previously, such as the lack of policy guidance on climate adaptation. In the absence of an obligation to account for climate change in, say, infrastructure and asset management or planning, departments and staff responsible for such areas have little reason to engage on the issue. Therefore, its relevance across Council is not immediately recognised and the issue is relegated to those few who have some interest and knowledge in tracking such issues, but not necessarily the purview needed to initiate action. As discussed in Section 4.2.4, core Council operations often conform to a standard protocol that drives action. In order for climate change adaptation to be more widely integrated in Local Government there need to be mechanisms in place by which adaptation can be incorporated into existing policies and planning instruments. As this occurs, consideration for climate change and the adjustment of Council policies and actions will become routine across relevant departments within Local Government.

6 RECOMMENDATIONS FOR IMPROVING ADAPTIVE CAPACITY IN LOCAL GOVERNMENT

The preceding section of this report described the broad range of challenges that Local Governments face with respect to adapting to climate change. While a number of these challenges are imposed on Councils from the outside, some also have their origins within Councils themselves. Perhaps the most important message that can be delivered in response to such information is the fact that these challenges are by no means insurmountable. The history of governance in Australia and around the world is in essence a story about adaptation – the evolution of policy to address new challenges or changing preferences and values. To support this process in the context of climate change, this report seeks to enhance understanding about the nature of the barriers to climate adaptation and, more importantly, offer specific insights and recommendations about how such barriers can be overcome.

This final section of the report presents a range of specific recommendations for addressing barriers to climate adaptation and enhancing the capacity of Local Governments to respond to climate change.

- First, background information on the recommendations is provided, including the scope of the recommendations and how they were developed.

- Second, the criteria that were used in the evaluation of recommendations are presented, which collectively reflect the costs and benefits of different actions over different time-scales.

- Third, the general categories of possible adaptation actions, referred to as adaptation "streams" are identified and described.

- Fourth, specific recommended options for each adaptation stream are presented with supporting discussion, details and caveats.

- Fifth and finally, discussion regarding the implementation of these actions is presented including existing or forthcoming actions by Local Government that are consistent with these recommendations as well as the potential utility of demonstration projects as a means of initiating adaptation experiments within Local Government.

6.1 Scope of Recommendations

Recommendations were not developed simply as a list of actions that Local Governments can take to adapt to climate change. Lists of such options have been produced repeatedly over at least the past ten years by various organizations and researchers from around the world. Recent examples include the report in 2007 by the then Australian Greenhouse Office, entitled *Adaptation Actions for Local Government*. Such collections of options tend to identify actions that can directly reduce vulnerability to climate change. However, they often neglect the many barriers that often impede the implementation of such actions. The recommendations presented here therefore specifically represent actions to address the various adaptation barriers identified in this report, which are argued to be limiting steps in the adaptation process. Furthermore, while many of the actions identified here were developed in light of the insights gleaned from interviews with Local Government staff regarding the themes of community, infrastructure, and planning as barriers, the identified actions likely have broader relevance.

Developing recommendations for increasing adaptive capacity necessitated the consideration of a number of factors and sources of information. First and foremost, recommended actions were developed to address specific barriers identified from the case study interviews with Local

Government staff as well as the broader discussions of barriers and opportunities arising from Council workshops. Recommendations were also developed to 'push the envelope' with respect to adaptation in Australia by including some novel policies and measures that have yet to be tested or that have been proposed by other researchers or institutions in other regions of the world. As such, it should be noted that the recommendations presented here are not necessarily advocated by the Sydney Coastal Councils Group or its Member Councils. Therefore, which of these recommendations are pursued and over what time scale are ultimately issues that can only be decided by Local Governments themselves.

6.2 Criteria for Evaluating Different Adaptation Streams and Options

Rather than simply provide a list of potential options for increasing the capacity of Local Government to adapt to climate change, it is useful to apply a range of evaluation criteria to those options to assist in their prioritisation and to clarify the necessary investments associated with their implementation (Table 7). The criteria utilised here generally reflect a number of broad issues – the cost to Councils, the amount of time likely required for implementation, the level of dependency upon other institutions, levels of government or areas of policy development, and the payouts with respect to learning and knowledge gain and/or direct reductions in vulnerability.

Table 7. Descriptions of Evaluation Criteria for Adaptation Streams and Options

Criteria	Description
C-S-P-O Orientation	Refers to which components of the Context-Structure-Process-Outcome framework are targeted by a given adaptation stream or option.
Cost to Councils	This criterion reflects the costs to Council of pursuing a particular adaptation stream or option. This largely reflects financial costs, but can also represent costs associated with time or loss of community support. "Low" costs can be borne by Local Government with little increase in financial resources. "Moderate" costs require significant shifts in funds within Council or an increase in revenue flows into Council. "High" costs will likely necessitate significant investments by State or Federal Government and/or the private sector.
Speed of Implementation	This criterion reflects the time required to implement a particular adaptation stream or option. "High" speed implementation reflects those actions that could be implemented within a matter of weeks to months, "Moderate" reflects those that will take months to years, and "Low" speed reflects those that will likely take multiple years to see through given current rates of policy development.
Need for Cooperation	This criterion reflects whether a given adaptation stream or option can be pursued by Councils independently of other levels of government or institutions, or whether those actions must be undertaken in conjunction with other governments and/or institutions. "Low" refers to those actions which Local Government can implement independently, "Moderate" refers to those for which Local Government will have to work on conjunction with other regional institutions (e.g., other local Councils or CMAs) and State Government, and "High" refers to those actions that require effort on behalf of all tiers of government.
Co-Dependency	This criterion reflects whether the implementation of a given adaptation stream or option is first dependent upon the implementation of other adaptation policies and measures. For example, actions that target Council structures and processes may be first dependent upon ensuring that climate change and adaptation is viewed in the appropriate context. "Low" co-dependency implies that the option can be implemented without waiting for prior actions to be completed. "Moderate" refers to actions which will require some expansion of capacity within Local Government. "High" refers to actions where major structural changes in policy must first be undertaken before an action can be implemented.

Learning-by-Doing	This criterion reflects the amount of learning that is likely to result from a particular adaptation stream or option that will ultimately benefit Councils with respect to increases in future capacity. "Low" refers to those actions that may have some benefits, but its implementation offers little insight into the nature of climate vulnerability or the costs and benefits of different policy actions. "Moderate" refers to those which provide some significant opportunities for learning, while "High" refers to those which could prove invaluable for influencing future policy development.
Vulnerability Reduction	This criterion reflects whether a particular action will result in a direct reduction in climate change vulnerability, or whether such reduction will only occur indirectly through, say, improvements in adaptive capacity. Actions that convey "Low" vulnerability reduction offer little direct benefits with respect to immediate reductions in vulnerability. "Moderate" vulnerability reduction implies a significant amount of vulnerability reduction is achieved, while "High" vulnerability reduction suggests actions will place particular systems or assets on a path to being 'climate proof'.

6.3 Adaptation Streams and Summary Evaluation

There is a broad array of measures that can be utilised to increase the capacity of Local Government to adapt to climate change. For the purposes of this report, this diversity of policies and measures was categorised into six thematic adaptation "streams", with each representing a discrete genre of actions (Table 8).

Applying the aforementioned evaluation criteria to these six adaptation streams provides a general snapshot of the expected costs and benefits associated with different types of approaches for building adaptive capacity (Table 9). For example, context issues are the most readily deployable due to their ability to be rapidly implemented with limited need for cooperation. These actions represent the steep part of the learning curve with respect to adaptation, and thus capacity can be enhanced quite rapidly with relatively low investment of effort. In addition, these actions have a low level of co-dependency, meaning they are fundamental limiting steps in the larger process of adaptation. In other words, these are issues that need to be tackled first, if substantive more ambitious and forward looking adaptation is to eventuate.

Table 8. Descriptions of Adaptation Streams

Stream Name	Description of Covered Actions
"Know Your Enemy"	Enhancing understanding regarding existing and future climate hazards and social and ecological vulnerability
"Plan for Change"	Incorporating climate change into existing and novel Local Government planning frameworks
"Get Smart"	Implementing education and outreach programs to increase the knowledge of Council and the broader community with respect to climate change, vulnerability and adaptation
"Act, Watch and Learn"	Implementing monitoring, evaluation and reporting measures for Local Government to track outcomes with respect to policies and measures associated with climate adaptation
"Put the House in Order"	Developing both internal and external institutional arrangements that build adaptive capacity within and across Councils and other levels of government
"Money Talks"	Enhancing revenue streams to Councils to assist in financing adaptation and cost-sharing mechanisms to spread the burden among multiple tiers of government

On the other hand, some of the adaptation streams will be more difficult to implement and will require much greater degrees of cooperation and/or investment. While this suggests there are unlikely to be immediate substantive gains on these issues, they also tend to be critical issues to resolve as this is where barriers and bottlenecks in the implementation of vulnerability reduction measures lie. Thus, these issues need to be continually pressed through advocacy and lobbying to accelerate the process by which these issues are captured in actual policies and measures.

Table 9. Summary Evaluation of Adaptation Streams

Adaptation Streams	Evaluation Criteria						
	C-S-P-O Orientation	Cost to Councils	Speed of Implementation	Need for Cooperation	Co-Dependency	Learning-by-Doing	Vulnerability Reduction
1. "Know Your Enemy"	Context, Structure, Process,	Low	High	Moderate	Low	High	Low
2. "Plan for Change"	Context, Structure, Process, Outcome	Moderate	Moderate	High	High	High	High
3. "Get Smart"	Context, Process Structure	Low	High	Low	Low	High	Low
4. "Act, Watch and Learn"	Process, Structure, Outcome	Moderate	Moderate	Moderate	Moderate	High	Low
5. "Put the House in Order"	Structure, Process	Low	Moderate	Moderate	Moderate	High	Low
6. "Money Talks"	Context, Structure, Process	Moderate	Moderate	Moderate	High	High	Low
Key to Table Colours	Low Cost or High Benefit		Moderate Cost or Moderate Benefit			High Cost or Low Benefit	

The six adaptation streams largely target structure and process issues associated with adaptive capacity, which is consistent with the case studies, which identified these as the predominate source of adaptation barriers. However, context was also an important target, which reflects the fact that progressive attitudes within Local Government about climate change and the role of Local Government in the adaptation response are an important component of increasing adaptive capacity. It is also important to acknowledge that different Councils within the SCCG region (or throughout Australia for that matter) will likely be in different places with respect to addressing capacity gaps. For example, the SCCG Member Councils can be argued to be more progressive with respect to climate adaptation than the average Australian Local Government. As evidenced by their participation in this project, most if not all are already moving forward to address context-oriented barriers to adaptation, but have subsequently encountered subsequent barriers associated with the structure of policies that in many instances cannot be addressed by Councils alone. However, the interviews conducted for this report also revealed lingering scepticism or conservatism by some Council staff with respect to climate change and the risks of being early actors on adaptation, which could preclude focused effort to pursue adaptation and enhance adaptive capacity.

The following sections expand the aforementioned adaptation streams to identify specific options for addressing adaptation barriers, with supporting discussion and notes. This is followed by a prioritisation framework that identifies where Councils can capitalise upon "low-hanging fruit" to rapidly increase their capacity versus other actions that, though still important, may require a more prolonged and coordinated effort across a broader range of actors, institutions and levels of government.

6.3.1 Adaptation actions associated with the "Know Your Enemy" stream

The specific adaptation options within the "Know Your Enemy" stream reflect actions that can be taken to assist Councils in building greater understanding of the implications of climate change (positive and negative) at the local scale as well as the potential gaps that may exist with respect to existing risk management activities. All of these actions target the context component of the C-S-P-O framework as they help to shape understanding about the reality of climate change the severity of potential consequences. As such, such actions may be a natural first-step for Councils and many specific options identified here could be pursued relatively rapidly with small to moderate assistance from external parties. Furthermore, Councils stand to benefit from significant learning through such actions which will aid in building capacity to implement responses that are appropriate given identified risks and vulnerabilities. While it must be acknowledged that simply identifying key vulnerabilities alone does not necessarily translate into actions that will reduce such vulnerability, if the vulnerability is sufficiently large, it is assumed that some response will be compelled.

Table 10. Evaluation of Adaptation Options in the "Know Your Enemy" Adaptation Stream

Adaptation Options	Evaluation Criteria						
	C-S-P-O Orientation	Cost to Councils	Speed of Implementation	Need for Cooperation	Co-Dependency	Learning-by-Doing	Vulnerability Reduction
1. Acquire state-of-the art climate change information and projections at the local scale (including down-scaling) to maximise resolution and decision-making utility.[a]	Context	Moderate	Moderate	Moderate	Low	High	Low
2. Undertake new assessments of the spatial and temporal distribution of climate hazards for individual Councils or the SCCG region as a whole.[b]	Context	Moderate	Moderate	Moderate	Low	High	Moderate
3. Identify particularly vulnerable areas, subpopulations, infrastructure and/or assets. This requires assessment of exposure to climate change, as well as assessments of sensitivity and adaptive capacity.[c]	Context	Low	High	Low	Moderate	High	Moderate
4. Invest in the development of digital data sources to enhance spatial understanding of Councils assets, demographics and environment and enhance planning processes.[d]	Context, Process	Moderate	Moderate	Moderate	Low	High	Moderate
5. Trial existing tools within Australia and/or overseas for their utility in assisting in Council planning for climate adaptation.[e]	Context, Process	Low	High	Low	Low	High	Low

6. Undertake training workshops for Local Government staff on advanced GIS methods, the use of climate projections, or vulnerability assessment.[f]	Context	Low	High	Moderate	Low	High	Low
7. Review existing risk management protocols to identify potential gaps with respect to current climate conditions and future climate change.[g]	Context	Low	High	Moderate	Low	High	Low
8. Lobby NSW State Government for reform of notifications of hazards under Section 149 of the Environmental Planning and Assessment Act to ensure notifications reflect relevant hazards at present and over a fixed future timeline.[h]	Context, Structure	Low	Moderate	Moderate	Moderate	Moderate	Moderate

Key to Table Colours ⬤ Low Cost or High Benefit ⬤ Moderate Cost or Moderate Benefit ⬤ High Cost or Low Benefit

Notes

[a] Acquiring up-to-date climate information at the local level is dependent upon external collaboration with scientific institutions.

[b] Depending on the level of expertise within Council, external assistance may be necessary to undertake such analyses.

[c] Identification of vulnerable assets, infrastructure and populations likely requires up-to-date information on the distribution of hazards, demographics and socio-economic conditions

[d] Such investments are non-trivial and require collaboration from both public/private institutions.

[e] For example, a range of tools for coastal management are at or near readiness for evaluation by Local Government. In addition, a range of tools are available such as LOICZ (see http://www.loicz.org/) and there may be value in examining how other nations, and governments have informed their adaptation processes (see http://oceanservice.noaa.gov/topics/coasts/dmtools/).

[f] Such workshops could be conducted in partnership with scientific institutions and could be conducted on a regional basis with representatives from multiple Local Governments (e.g., under the auspices of the SCCG).

[g] For example, Councils may already be aware of inadequacies within existing data bases regarding the spatial distribution of hazards within Council. Such reviews could also help prioritise specific areas where there may be a cause for concern given anticipated changes in future climate conditions or extremes.

[h] At present, 194 planning certificates only provide information under section 149(2) in relation to "land subject to flood related development controls." The amount of information associated with 194 notifications is limited and, according to the NSW flood manual, "planning certificates are not, and therefore should not be used as, a general community education tool. Emergency response considerations are inappropriate matters for inclusion on planning certificates." This restriction represents a missed opportunity for assisting Local Government and communities in understanding and managing risk.

6.3.2 Adaptation actions associated with the "Plan for Change" stream

Whilst Councils have taken significant steps towards reducing greenhouse gases, mitigation alone will be insufficient to avoid climate impacts. While there are a broad range of Local Government policies that make reference to climate and/or climate change, there is little in the way of planning or risk management policy that specifically addresses the emerging or additional risks associated with future climate change. For example, Local Environment Plans (LEPs) and Development Control Plans (DCPs), in particular, currently lack attention to climate change adaptation. Local Government cannot be held solely responsible for such gaps in planning, however. The development of LEPs and DCPs is mandated by the New South Wales State Government through the Local Government Act of 1993. As a consequence, this instrument is key to guiding Local Government in the incorporation of climate adaptation into planning, but such specific guidance is currently absent. In addition, Councils do not feel they have sufficient legal and policy support to implement planning adjustments in the absence of such guidance, as the implementation of a patchwork of different planning mechanisms and standards across Local Governments would be inefficient and contribute to a range of social, economic and legal consequences. It is also imperative that the role of Federal Government in providing a common playing-field across the nation with respect to planning is not overlooked. For example, as one of its potential areas of action, COAG's *National Climate Change Adaptation Framework* (pg. 17) states that,

> All jurisdictions will evaluate and share relevant information about the extent to which planning and development systems promote decisions that increase resilience to the impacts of climate change and discourage decisions that increase vulnerability, and consider changes where appropriate. The Local Government and Planning Ministers' Council would coordinate a national report based on these assessments.

This brief action statement represents an important opportunity for harmonising effort across the three levels of government and ensuring changes in planning are both equitable and effective.

In light of the above, the specific adaptation options recommended under the "Plan for Change" stream represent opportunities for accounting for climate change within Local Government planning instruments and policies. While some useful non-statutory actions could be implemented by Council autonomously, such as the development of climate change adaptation strategies or designation of at-risk areas, the implementation of statutory requirements in response to such activities or changes in planning instruments will likely require significant cooperation and, in fact, guidance from the top-down via State Government policy. As such, the opportunities for Local Government are largely associated with lobbying efforts and collective bargaining to pressure State Government to assume responsibility for establishing appropriate guidelines that can be taken up by Local Government. As a consequence, major shifts in planning are unlikely to be undertaken solely by Local Government. Instead, such changes will emerge over time as local and State planning policy becomes harmonised to address the needs of both levels of government. This will likely take some time and significant coordination, although it is important to realise that incorporating consideration for climate change into planning instruments may be one of the most important actions with respect to achieving direction reductions in climate vulnerability.

Table 11. Evaluation of Adaptation Options in the "Plan for Change" Adaptation Stream

Adaptation Options	Evaluation Criteria						
	C-S-P-O Orientation	Cost to Councils	Speed of Implementation	Need for Cooperation	Co-Dependency	Learning-by-Doing	Vulnerability Reduction
1. Review existing planning instruments to assess their continued relevance and robustness in light of climate change[a]	Context	Low	High	Low	Moderate	High	Low
2. Establish/update hazard zones for coastal hazards, bushfire, and urban and riverine flooding that reflect current and future climate risk[b]	Structure	Low	Moderate	Moderate	Moderate	High	Moderate
3. Incorporate climate change hazards during routine revisions to DCPs and LEPs[c]	Structure	Moderate	Moderate	Moderate	Moderate	High	High
4. Work through the Local Government and Planning Ministers' Council to secure clear actions from COAG with respect to harmonising planning instruments for adaptation across the three tiers of government[d]	Structure	Moderate	Moderate	High	High	High	Low
5. Establish clear lines of responsibility for management of different areas and assets (e.g., public vs. private utilities, public amenity, infrastructure)[e]	Process	Moderate	Moderate	Moderate	Moderate	High	Moderate
6. Develop Local Government strategic action plans (e.g., emergency management, natural resources management) for climate change that are reviewed periodically[f]	Outcome	Low	Low	High	Low	High	Moderate

7. Lobby State Government for an adaptation certification program that can rate existing and proposed developments for their degree of "climate-proofing" and provide indemnity against liability[g]	Structure, Process	Low	Low	Moderate	Moderate	Moderate	Moderate
8. Review existing mitigation policies and activities to identify opportunities for modifications that can generate simultaneous benefits in regard to adaptation[h]	Structure, Process	Low	High	Low	Low	Moderate	Low
9. Exploit opportunities to surrender planning and management responsibility for State and Federal assets for which appropriate guidance and resources for management are lacking[i]	Structure, Process	Low	Moderate	Moderate	Moderate	Low	Moderate
10. Appoint a climate change officer to the SCCG to champion climate change adaptation and integrate adaptation into other SCCG and Local Government lobbying, policy and management efforts[j]	Context	Moderate	Moderate	Low	Low	High	Low

Key to Table Colours	🟢 Low Cost or High Benefit	🟡 Moderate Cost or Moderate Benefit	🔴 High Cost or Low Benefit

Notes

[a] This action is a fundamental starting point to support climate change adaptation.

[b] Councils can proceed with defining non-statutory hazard zones that reflect current and future risk without necessarily mandating additional requirements with respect to development. This can aid in educating the public and private sectors about risk and can form the basis for the gradual phase in of statutory requirements as planning policy and legal instruments develop.

[c] The incorporation of hazard zones and planning benchmarks into LEPs and DCPs will likely necessitate some additional guidance and policy development on behalf of State Government.

[d] The goal of COAG's National Climate Change Adaptation Framework is reported to be "*to support decision-makers understand and incorporate climate change into policy and operational decisions at all scales and across all vulnerable sectors*." As such, COAG is a potentially important policy organisation for ensuring Local Government needs are incorporated into Federal and State policy. However, Local Governments should also work directly with the NSW State Government in the rationalisation of planning policy.

[e] This area of uncertainty is an ongoing source of confusion across all levels of government. Resolution of such issues is important not only for progressing adaptation but also for ensuring that adaptation actions do not cause adverse externalities to other parties.

[f] A range of existing examples of municipal strategic plans currently exist both within Australia (e.g., City of Melbourne, City of Port Phillip), and from other developed nations. Within the SCCG region, Local Adaptation Planning grants for Mosman and Leichardt as well as ICELEI adaptation pilot projects in Hornsby Shire and City of Sydney provide additional examples.

[g] This is a novel strategy that has yet to be implemented or tested, yet is a potentially useful risk-spreading mechanism provided the terms and conditions of such a program can be agreed.

[h] Given many Local Governments have been involved in greenhouse gas mitigation efforts for a number of years, it is likely that some of these actions also have some benefits with respect to vulnerability reduction.

[i] Local Government would be wise to shed risk associated with assets for which they do not have ownership rights yet which may carry significant management burdens in a changing climate. Continued management of such areas should be contingent upon receiving appropriate guidance and resources from State and Federal Government to support continued management activities.

[j] Reforming planning processes to adapt to climate change will be a major undertaking for Local Government and will require some degree of professional expertise. While every Council should seek to increase the capacity of their staffs to support adaptation, utilising the existing structure and relationships within the SCCG may be the most cost-effective approach for Member Councils.

6.3.3 Adaptation actions associated with the "Get Smart" stream

A fundamental need for any institution attempting to cope with new challenges is securing the knowledge and skills necessary to support effective decision-making. This makes education a core strategy for capacity-building. Hence, the actions identified in the "Get Smart" stream focus on this aspect of capacity building. However, for governments, education takes on a number of dimensions. For Local Government, one of the key priorities is to ensure that there is knowledge and expertise within Council to assist key decision-makers with managing the complexity and inter-disciplinary nature of climate change and adaptation. In this regard, there are likely two goals: a) raising the level of knowledge across Council and b) cultivating subject matter experts that can take a leadership role on adaptation issues. Furthermore, there are a range of more general skills that need to be maintained in Councils including geographic information systems, city and regional planning, social planning, finance, engineering and risk management. Experience throughout this project has demonstrated that capacity in these areas varies throughout Local Governments depending on the size and financial resources of Council. While such differences are normal, efforts should be made to secure some base level of capacity and resource availability within Local Governments.

In addition to education and resources within Local Government, to some extent, Local Government operations and decision-making are mirrors of the communities they represent. As such to ensure communities that are supportive of Local Government efforts on climate adaptation and to enhance social cohesion around the need for adaptation, communities themselves have to be active participants in learning about climate adaptation. Local Government has an obvious role to play with respect to community consultation and education on climate change. This education can be facilitated through multiple channels including message delivery through the media as well as direct education and social marketing to residents and businesses through communication materials, focus groups and town hall forums. In addition to community education, there are additional opportunities for Local Governments to engage in outreach activities with other Local Governments, community groups and non-governmental organisations to support education efforts and identify new pathways to influence public opinion and public policy at higher levels of government.

While the aforementioned areas of action target short-term capacity building within Local Government and associated communities, there are more pervasive, long-term education challenges across geographic scales that need to be addressed. For example, having a scientifically literate public is an important component of ensuring a productive dialogue regarding policy can be undertaken between government and the community. Meanwhile, many of the aforementioned skills are dependent upon education and training. These issues lie beyond Local Government, sitting instead with school-based education. While school-based education reform is an area that has continued to experience significant interest at State and Federal tiers of government, in relation to climate change it is an area that requires further discussion. There are currently issues with core skills shortages in science, and issues to do with rewards for teachers and the status of teaching as a profession. Recommendations for short-term actions to address climate change within the schools-based education system, such as development of special curricula and delivery by external providers, is fraught with a range of investment, skills building, and pedagogical issues. However, education is pivotal to Australia's long-term resilience to climate change.

Table 12. Evaluation of Adaptation Options in the "Get Smart" Adaptation Stream

Adaptation Options	Evaluation Criteria						
	C-S-P-O Orientation	Cost to Councils	Speed of Implementation	Need for Cooperation	Co-Dependency	Learning-by-Doing	Vulnerability Reduction
1. Initiate community education program on climate change risk and adaptation[a]	Process	Moderate	Moderate	Low	Low	High	Low
2. Exploit opportunities to partner with other organisations in developing education opportunities (e.g., ICLEI, NGOs, CSIRO, etc.)[b]	Structure	Low	High	Moderate	Low	High	Low
3. Identify and cultivate champions within Local Government for climate change adaptation[c]	Context, Process	Low	High	Low	Low	Moderate	Low
4. Implement a reward program to recognise members of the community (homeowners, businesses, etc.) that are adaptation champions[d]	Context	Low	High	Low	Low	Moderate	Low
5. Implement an international adaptation "sister city" program to draw attention to Council activities and share actions and challenges[e]	Context	Low	Moderate	Moderate	Low	Moderate	Low
6. Appoint a communication officer to the SCCG to assist in delivering messages on SCCG and Member Council activities to the media and other stakeholders[f]	Context	Moderate	Moderate	Low	Low	High	Low
7. Lobby State and Federal education agencies in support of strategic education policy to address skills shortages relevant to Local Government[g]	Structure, Process	Low	High	Low	Low	Low	Low

8. Provide financial support and leave opportunities to existing Council staff to receive additional training in climate change management and sustainability[h]	Context	Moderate	High	Low	Low	High	Low

Key to Table Colours	🟢 Low Cost or High Benefit	🟡 Moderate Cost or Moderate Benefit	🔴 High Cost or Low Benefit

Notes

[a] Effective community education on climate change and adaptation will likely require a long-term commitment as opposed to a short-term, one-off investment. Therefore, communication strategies should be designed that can be sustained and delivered through multiple channels (e.g., publications, Council website, media comments, community forums).

[b] Many organisations actively involved in climate change issues have extensive experience in public communication as well as relevant technical experience.

[c] Champions should be in a sufficiently elevated position within Council to command attention and influence attitudes and decision-making.

[d] This approach may be particularly useful for issues such as water conservation and bushfire management.

[e] To maximise learning, Councils should look to partner with Local Governments that are either well-advanced in adaptation planning or have similar issues to manage.

[f] Communications within staff also can take a more active role in communicating on adaptation. However, it may be useful to have an individual with dedicated responsibilities in this arena. Locating such an individual within the SCCG enables Member Councils to receive the most benefit at least cost.

[g] This strategy has little near-term benefits to Local Government, but over the long-term can help ensure Local Governments have access to staff with the appropriate set of skills to manage climate and sustainability programs and projects.

[h] Retraining existing staff is likely a lower-cost capacity-building option than hiring additional staff. A number of universities around Australia are developing new programs in the arenas of sustainability and climate change to serve the needs of professionals.

6.3.4 Adaptation actions associated with the "Act, Watch and Learn" stream

Both the workshops and interviews conducted with Council staff as part of this project provided no evidence of systematic monitoring and evaluation of outcomes of initiatives relating to climate change planning, infrastructure, or community engagement. While interview participants did offer some anecdotal information regarding observed impacts of climate variability and change and subsequent attempts to update management in response, these were not widely shared with colleagues within Council or across Councils. Interviewees did highlight the extensive reporting that Councils undertake through mechanisms such as the State of Environment Reports and Annual Reports. However, such instruments do not currently distinguish between climate change adaptation and other Council initiatives. To effectively monitor and evaluate climate change adaptation and explain Council commitments to residents and beyond, it is recommended that Councils include climate change adaptation initiatives in their reporting outputs.

This gap in evaluation and monitoring can be attributed to a number of factors, not the least of which is the current lack of guidance from State Government with respect to the development of evaluation, monitoring and reporting programs for Local Government. The COAG National climate Change Adaptation Framework stated that a framework implementation plan would be completed in 2007. As part of that implementation plan, "Monitoring and evaluation components will also be outlined, including arrangements for review and reporting." This reflects the importance of top-down leadership and coordination to develop evaluation, monitoring and reporting standards that provide useful information for tracking progress with minimal additional burden upon Local Government. However, to date, COAG's implementation plan has yet to be released. It should also be noted that there are few, if any, governments anywhere in the world that are well-placed to monitor and report on adaptation efforts. Adaptation strategies at local, state/province, and national scale have only begun to emerge in the past two years. This means there are few models to draw from for developing such programs. On the other hand, this also means there is ample opportunity for Australia to take a leadership role in this arena, provided all levels of government are willing to work together to achieve good outcomes.

In light of the importance of evaluation, monitoring and reporting for the long-term progression of adaptation policy within Local Government, the following recommended options represent opportunities to facilitate capacity building in this critical area of adaptation policy development.

Table 13. Evaluation of Adaptation Options in the "Act, Watch and Learn" Adaptation Stream

Adaptation Options	Evaluation Criteria						
	C-S-P-O Orientation	Cost to Councils	Speed of Implementation	Need for Cooperation	Co-Dependency	Learning-by-Doing	Vulnerability Reduction
1. Review existing metrics within monitoring and reporting mechanisms to identify those relevant to climate adaptation[a]	Process, Outcome	Low	High	Low	Low	Moderate	Low
2. Work within and across Local Governments to identify new metrics useful for the monitoring of climate risk and adaptation efforts not captured by existing metrics[b]	Structure, Outcome	Low	Moderate	Low	Low	High	Moderate
3. Work with Local Governments to incorporate new adaptation metrics into existing reporting requirements of Local Government (e.g., SOE reports)[c]	Process, Outcome	Moderate	Moderate	Moderate	Low	High	Low
4. Investigate international models for evaluation, monitoring and reporting of climate change adaptation[d]	Process, Outcome	Low	High	Low	Low	Moderate	Low
5. Undertake periodic monitoring of community concerns with respect to climate risk and adaptation policies and measures[e]	Structure, Process, Outcome	Moderate	Moderate	High	Low	High	Low
6. Lobby through COAG for the timely completion and release of the implementation plan for the national adaptation framework to provide guidance on evaluation, monitoring and reporting[f]	Structure, Process	Low	Moderate	High	Moderate	High	Low

Key to Table Colours	🟢 Low Cost or High Benefit	🟡 Moderate Cost or Moderate Benefit	🔴 High Cost or Low Benefit

Notes

[a] A number of metrics currently utilised in reporting are likely also relevant to climate adaptation. The explicit identification of these would be one approach for capturing adaptation with little or no adjustment to existing monitoring and reporting frameworks.

[b] Academics have made some cursory attempts to define appropriate adaptation metrics. However, this activity should perhaps be left to practitioners who must ultimately use them.

[c] Reporting requirements are not solely determined by Local Government, and thus guidance will have to be developed for Local Government with respect to how existing reporting is adopted to reflect adaptation.

[d] Some emerging adaptation strategies from other nations contain some guidance for conducting evaluation, monitoring and reporting of adaptation. For example, the United Nations Development Programme has produced a draft report entitled, Monitoring and Evaluation Frameworks for Climate Change (http://www.undp.org/climatechange/adapt/downloads/Adaptation_ME_DRAFT_July.pdf). While largely focused on developing nations, there is useful information within for developed nations as well.

[e] Community attitudes are an important barometer of expectations of Council and can help inform Local Government as to when different types of policies may be supported or when additional demands or services are expected.

[f] Local Government should be aware that State and Federal Governments have already pledged to provide guidance on the development of monitoring and reporting programs and frameworks. Local Government can therefore call upon COAG to accelerate delivery of such information and actively participate to ensure such programs meet the needs of Local Government.

6.3.5 Adaptation actions associated with the "Put the House in Order" stream

Like the need to give greater regard to climate change issues within planning frameworks, there is a need for Councils to prioritise climate change issues across all elements of Council business. Many interviewees reported that responsibility for climate change was usually left to the environment departments of Councils, and even though most respondents discussed social and economic impacts, there was a perception that climate change and its management was an environmental issue. For Councils to deal effectively with climate change adaptation, it needs to be both prioritised and mainstreamed within Councils (and across Council operations), and also be resourced accordingly. This is one area where Local Government largely has free reign to operate and where Local Governments can rapidly increase their capacity with respect to managing climate change.

The process of arranging institutions and their operations to maximise effectiveness in adapting to climate change can extend beyond individual Local Governments, as a broad array of formal and informal relationships can be developed that greatly enhance the institution of Local Government. For example, one of the issues facing Councils is the lack of "science" to underpin their decision-making. Many interviewees noted capacity issues in terms of understanding climate change vulnerabilities and appropriate responses across all three regional barriers (planning, infrastructure, and communities). There are significant opportunities for Councils to proactively plan for and acquire data and information to underpin decision-making through both inter-Council collaboration and targeted collaboration with knowledge providers (e.g., research institutions). The collaboration should be extended to other governments and businesses where there are interdependencies such as in the case of some infrastructure. To date, this relationship has been largely one of commissioning specific consulting through a purchaser-provider model. However, while consultancies are needed for some specific actions, given the exploratory nature of climate change adaptation considerations, significant leverage of resources could be made through strategic research partnerships. This is a productive approach to facilitating some of the recommended actions under the "Know Your Enemy" stream (Section 6.3.1). Similar to industry, Councils should consider the potential benefits of investing a small portion of their revenue in research and knowledge acquisition.

Table 14. Evaluation of Adaptation Options in the "Put the House in Order" Adaptation Stream

Adaptation Options	Evaluation Criteria						
	C-S-P-O Orientation	Cost to Councils	Speed of Implementation	Need for Cooperation	Co-Dependency	Learning-by-Doing	Vulnerability Reduction
1. Implement a whole-of-government approach within Councils on climate change and adaptation and identify relevant responsibilities for each department[a]	Process	Low	High	Low	Low	High	Low
2. Explore possibility of adaptation policy officers in Local Government (perhaps funded through State Government)[b]	Process	Moderate	High	Low	Low	High	Low
3. Expand resources of regional organisations to enable leadership role with respect to adaptation and enhance collaboration across Local Governments[c]	Structure, Process	Moderate	Low	Moderate	Low	Moderate	Low
4. Develop ongoing collaborative body on climate adaptation among SCCG Member Councils or an even larger association of Local Governments[d]	Structure	Low	High	Moderate	Low	High	Low
5. Develop a "Super ROC" across the Sydney metropolitan area to enhance the lobbying power of regional Local Governments[e]	Structure	Moderate	Moderate	Moderate	Moderate	Moderate	Low
6. Enhance partnership arrangements with catchment management authorities to coordinate adaptation efforts and identify needs particularly with respect to natural resources management[f]	Structure, Process	Low	Moderate	Moderate	Moderate	Moderate	Low

7. Work with insurance companies to explore novel coverage arrangements to spread Council liability and incentivise the internalisation of climate risk in decision-making[g]	Structure, Process	Low	Moderate	Moderate	Moderate	Moderate	Moderate
8. Develop formal research partnership arrangements with relevant scientific research institutions to simultaneously facilitate applied research and delivery of useful information to Local Government[h]	Structure, Process	Moderate	Moderate	Moderate	Low	High	Low

Key for Table Colours	🟢 Low Cost or High Benefit	🟡 Moderate Cost or Moderate Benefit	🔴 High Cost or Low Benefit

Notes

[a] Climate adaptation will have to be pursued across multiple areas of Council including asset and risk management, infrastructure development, social and community services, and environmental management. Local Government therefore needs a management structure that reflects this complexity. This could mean appointing staff with adaptation responsibilities to positions that sit across different departments, or assembling inter-departmental teams that are comprised of individuals that reside in different parts of Council.

[b] See note above.

[c] ROCs such as the SCCG already play a role in coordinating activity across different Local Governments and interacting with other institutions and levels of government to communicate the needs of Local Government. This may therefore be a useful model for pursuing an adaptation agenda, provided Member Councils are willing to provide additional financial support. Other forms of strategic partnership across Councils also may be useful. See the guidance paper, *Collaboration and Partnerships between Councils*, published by the New South Wales Department of Local Government.

[d] Adaptation will be a long-term management effort. Local Government should seek mechanisms by which an ongoing dialogue can be maintained about adaptation to maximise learning across Councils and ensure a consistent level of effort is invested.

[e] ROCS such as SCCG can develop arrangements to form a lobbying body in conjunction with other ROCS (e.g., South Sydney ROC, Western Sub-ROC, etc.) to pursue fundamental policy reforms needed for Local Government.

[f] Local Government and CMAs have shared responsibilities with respect to NRM and both forms of governance must contend with resource constraints. Partnerships between Local Government and CMAs could provide an opportunity to leverage available resources and support regionally consistent approaches to adaptation.

[g] The insurance industry is already an active player in climate adaptation, one with significant incentives to facilitate anticipatory management of climate risk on behalf of Local Governments and the broader community.

[h] The SCCG already conducts research projects in conjunction with the University of New South Wales – a model that could be readily expanded. Councils (or ROCs) also should consider the feasibility of placing preferred research providers on retainer. Several funding programs currently exist to help facilitate these research partnerships (e.g. Australian Research Council Linkage grants).

6.3.6 Adaptation actions associated with the "Money Talks" stream

A common barrier identified both within Council workshops as well as interviews with Council staff was the finite financial resources within Councils for undertaking climate adaptation, particularly if such adaptation necessitates large-scale investments in personnel, research, data and consulting and/or infrastructure. The mandate to provide a broad range of services and incentives with limited resources is to some extent an inherent challenge for government. Furthermore, in the development of measures of adaptive capacity as part of the vulnerability mapping undertaken for the SCCG region as part of this project, it was noted that greater access to financial resources does not necessarily equate to greater capacity to cope with climate change.   Therefore, successful adaptation is not simply a function of acquiring sufficient financial capital. For example, many of the recommendations presented in this report could be undertaken with little cost to Council. That said, a range of recommendations are made that would in fact incur costs, some of them quite significant. As such, it is important to identify those areas where financial constraints limit the capacity of Local Government to address climate change and recommend potential actions to circumvent these constraints.

There are some options available to Local Government to expand revenue streams to facilitate adaptation. For example, special levies (e.g., stormwater or environment levies) are a common tool utilised by Local Government to increase revenue for specific management activities. Such a mechanism could be utilised for adaptation, although adaptation is such a broad management activity, that it would be more useful to expand existing levies to ensure resources are available to incorporate consideration for climate change into particular Council activities than develop an entirely new levy system. Such levies could also be leveraged through development taxes associated with particular at-risk areas or the exploration of options for privatising public assets to reduce management burden on Councils and also reduce liability. However, such tools should be used quite cautiously, and the devil is in the details with respect to where, how and when such instruments might be effective. Furthermore, it is probably unrealistic to expect Local Government to bear the entire financial burden of adapting to climate change. Local Governments have a responsibility for managing assets that they do not necessarily own, such as crown lands, and they provide services for many individuals regardless of whether or not they live within Council borders. Hence, Local Governments should lobby for any additional revenue raised within Council to be leveraged through cost sharing with State or even Federal Government. Furthermore, State and Federal Governments should also be seeking to fund adaptation actions that a) provide general capacity throughout Local Governments in Australia and b) support targeted adaptation of assets (such as beaches, coastal amenities and critical infrastructure) that are of importance across local, State and Federal Government.

Table 15. Evaluation of Adaptation Options in the "Money Talks" Adaptation Stream

Adaptation Options	Evaluation Criteria						
	C-S-P-O Orientation	Cost to Councils	Speed of Implementation	Need for Cooperation	Co-Dependency	Learning-by-Doing	Vulnerability Reduction
1. Explore opportunities to implement climate adaptation levies within Local Government, possibly in conjunction with matching funds from State Government[a]	Structure, Process	Moderate	Moderate	Low	Low	Low	Low
2. Lobby State and Ausralian Government for the development of new grant programs to specifically facilitate adaptation and capacity building (e.g., LAP process)[b]	Structure, Process	Low	High	Moderate	Moderate	High	Low
3. Increase financial contribution of SCCG Member Councils to the SCCG to enable a broader leadership role with respect to adaptation and enhance collaboration across Local Governments[c]	Process	Moderate	High	Low	Low	Moderate	Low
4. Establish a Council (or ROC) research fund to support formal partnerships between Local Government and research institutions and/or serve as seed money for research grants[d]	Context, Process	Moderate	High	Moderate	Low	High	Low
5. Lobby NSW State Government to expand Section 94 of the Environmental Planning and Assessment Act to enable contributions based upon potential risk and future demand for emergency services as a means of offsetting the costs of Council adaptation efforts and to assist in signalling the potential risk being accepted by developers[e]	Structure, Process	Low	Moderate	Moderate	Moderate	Moderate	Moderate

6. Lobby State and Australian Government for a loan program that Local Governments can use to acquire assets and property in at-risk areas[f]	Structure, Process	Low	Moderate	High	Moderate	Moderate	High
7. Explore opportunities for the privatisation of public assets to spread and/or defer risk[g]	Process	Low	Moderate	Moderate	Moderate	Moderate	Moderate
8. Lobby NSW State Government for an ongoing infrastructure development fund to assist with climate change preparedness. This fund would be used to incentivise anticipatory infrastructure upgrades and development by Local Government as opposed to waiting for infrastructure failures.[h]	Process	Low	Moderate	Moderate	Low	Moderate	High

Key for Table Colours   ⬤ Low Cost or High Benefit   ⬤ Moderate Cost or Moderate Benefit   ⬤ High Cost or Low Benefit

Notes

[a] While the direct financial costs to Council would be low (and in fact such levies would increase the flow of revenue to Council), there are additional political costs that could arise in the form of public opposition/dissatisfaction with having to bear adaptation costs. Hence, it is recommended that such levies be pursued through cost-sharing with State Government. For example, if State Government is willing to match funds obtained by Local Government, then the benefits to the community would outweigh community costs.

[b] For example, the Local Action Plan process funded though the Australian Government Department of Climate Change is an example of how targeted and modest grants can be used to enhance the capacity of Local Government to assess climate vulnerability and develop response strategies.

[c] Given the inherent inter-disciplinary nature of climate adaptation and the recognised importance of working across Councils and levels of government, drawing upon existing institutions such as ROCs to drive forward adaptation may be the most cost-effective strategy for Local Government as it spreads the costs across Councils as opposed to each Council attempting to enhance its own resource base.

[d] The size of such a fund (and therefore the necessary contributions by Councils) would be dependent upon the scope of the research and the nature of the relationship with research institutions.

[e] The utility of this recommendation is highly dependent upon setting an appropriate price point as well as having a rigorous definition of what constitutes an at-risk area.

[f] Low or zero-interest loans to Local Government would enhance financial mechanisms for managing at-risk assets while enabling Local Governments to attain ownership and management control.

[g] Privatisation or selling-off of Local Government assets is could potentially increase future vulnerability of the community if poorly managed. However, to the extent that privatised assets continue to be managed in a manner consistent with Council goals, this mechanism could facilitate Local Governments in divesting themselves of potentially problematic and/or costly assets.

[h] The goal of such a fund would be to minimise the disincentives that currently exist for major infrastructure projects for risk management such as coastal defences. By waiting until critical infrastructure fails, Councils can secure a greater proportion of funding from the State for repairs and upgrades than would otherwise be the case. Therefore by creating a mechanism to reward Councils who are willing to co-invest in anticipatory measures to reduce climate vulnerability, upgrades can be made in advance of failures.

7   IMPLEMENTING RECOMMENDATIONS

In addition to simply listing recommended actions for increasing the adaptive capacity of Local Government to address climate change, it is also useful to briefly discuss some core considerations regarding their implementation. For example, a range of actions that are recommended in Section 0 are already being pursued to varying degrees within SCCG Member Councils. While such actions are not as yet comprehensive or sufficient, failing to acknowledge existing efforts may create a false sense of the state of adaptation in Local Government. Furthermore, it is useful to present some scheme for prioritising actions. While Councils should, and most certainly will, have their own criteria for prioritising actions, some general distinctions can nevertheless be made, particularly in regard to distinguishing those actions that are more easily pursued from those that are more difficult. Finally, it is worth noting that there are substantial benefits to 'learning-by-doing.' As such, one important component of any adaptation action is the monitoring and evaluation of its implementation to ensure Councils learn from that action, thereby improving their own policy development and implementation as well as that of others.

7.1   Existing Actions

In determining which of the aforementioned recommendations Councils should pursue, some acknowledgement needs to be made of actions that are already being undertaken. While the review of SCCG Member Council documents through 2007 revealed minimal information specifically pertaining to climate change adaptation (Section 2), this is somewhat misleading for two reasons:

1. Adaptation planning is relatively new areas of policy development across all levels of government, and therefore actions are being pursued that may not yet exist formally in Local Government strategies and plans; and

2. Many actions Councils are engaged in on a day-to-day basis, while relevant to climate adaptation, may not necessarily be labelled as such by Councils themselves.

Therefore, all of the SCCG Member Councils were asked to report on current climate adaptation activities (independent of the *Systems Approach to Regional Climate Change Adaptation Strategies in Metropolises* project), and these were subsequently mapped to the same adaptation streams upon which recommendations were based (Table 16). A number of Councils reported they were largely engaged in greenhouse gas mitigation activities and therefore were only at the beginning of thinking about adaptation (as reflected in Section 0). However, these Councils also suggested that additional efforts on adaptation were likely to emerge in the relatively near future. With respect to adaptation actions, responses varied significantly across Local Government with respect to what types of activities were included as adaptation. For example, a number of Councils appropriately reported work being done to combat vulnerabilities to current climate challenges (e.g., recent drought). Others, however, failed to mention such actions, likely due to the perception that they represent actions to deal with present rather than future climate risk. Similarly, none of the Councils reported on their efforts in the implementation of BASIX, although improvements in the sustainability of the built environment are certainly consistent with the concept of adaptation. As such, developing robust understanding of how adaptation is progressing across a region is difficult without more concerted efforts to form a standard definition of adaptation.

Nevertheless, one of the most commonly reported activities SCCG Member Councils are currently engaged in included those consistent with the "Know Your Enemy" adaptation stream. Specifically, the majority of Councils indicated they were involved in activities to increase their understanding of the risks associated with climate change, particularly in the context of coastal and flood hazards. While for some Councils such actions were being pursued as part of the DCC's Local Adaptation

Pathways program or ICLEI's risk assessment pilot projects, most Councils were undertaking some kind of risk assessment activity independent of these programs.

Furthermore, as suggested in Sections 4.2 and 0, Councils are attempting to "Plan for Change." For example, Councils reported a wide variety of activities that included steps to formally recognise climate adaptation in LEPs and DCPs, the review and updating of management plans for natural hazards management and natural resources management, and upgrading or new design of infrastructure. Many of these actions are consistent with recommended actions, and while efforts are not necessarily being pursued across all SCCG Member Councils, there is enough experimentation and trialling of different approaches to enable all Councils in the region to learn from one another.

Table 16. Current climate adaptation actions reported by SCCG Member Councils.

Stream Name	Description of Current Actions	Relevant SCCG Councils
"Know Your Enemy"	• Coastal monitoring • Modelling of sea-level rise, coastal inundation and erosion • Development of local climate change risk assessments, particularly for flood and coastal hazards • Development of GIS coastal vulnerability assessment tools	Hornsby; Leichhardt; Manly; Pittwater; Randwick; Rockdale; Sutherland Shire; Warringah; Willoughby
"Plan for Change"	• Development of comprehensive climate change action plans incorporating mitigation and adaptation • Development of local climate adaptation plans • Development/update of coastal/estuary management plans to account for climate change • Development/update of floodplain management plans to account for climate change • Investigations of flooding implications for EP&A 149 certificates • Development/update of coastal engineering and flood works to account for climate change • Integration of climate change clauses into LEPs and DCPs • Development/update of water management strategies • Climate-proofing of recreational fields • Bushfire hazard reduction • Ecosystem, forestry and biodiversity management and planning	Botany; Leichhardt; Manly; Mosman; North Sydney; Pittwater; Randwick; Warringah; Willoughby
"Get Smart"	• Lobbying NSW Department of Planning for guidance • Examining adaptation activities occurring within other Local Government areas • Preparing background information for senior managers and Councillors on climate adaptation • Implementation of and participation in community education • Sharing of information on climate change planning and management with peer Councils • Development of community volunteer groups that can champion community education efforts on climate change	Botany; Manly; Pittwater; Willoughby
"Act, Watch and Learn"	• N/A	N/A

"Put the House in Order"	• Development of internal climate change working groups to improve coordination across Council • Investigating budget requirements for preferred actions • Review of existing climate change policies and measures and prioritising areas for future action	North Sydney; Warringah; Waverley; Woollahra;
"Money Talks"	• Implementation of a climate change levy	Manly

Perhaps what is most informative, however, is what is missing from the recommended actions. Generally, some of the core capacity issues, such as internal institutional arrangements, funding, and monitoring and evaluation were neglected. There were surprisingly few activities related to community education and outreach specifically on adaptation, given that Council staff repeatedly stressed Local Government's connection with the community. A few Councils indicated they were attempting to develop greater internal awareness and collaboration to enhance their own capacity to respond. Manly Council reported on its pursuit of a climate change levy to enhance funding, and it was assumed that all Councils pursue various Federal and State grants on a regular basis. No Councils mentioned any actions specifically related to the monitoring and reporting of progress in climate adaptation. Therefore, while many different things are being tried in the SCCG region, it is clear that there is scope to broaden adaptation efforts into other areas and secure more comprehensive participation in adaptation among all of the SCCG Member Councils.

7.2 Demonstration Projects

Given the inherent uncertainty and complexity relating to climate change impacts and responses, a fundamental consideration is the ability of local Councils to learn from their climate change adaptation initiatives. One mechanism for building the capacity for learning from climate change adaptation initiatives in the region is through demonstration projects. These projects will enhance learning through:

- Capturing expectations – what Councils and other stakeholders expect the demonstration project will achieve and how it will be enacted?

- Assessing the implementation – what was done and why, what needed troubleshooting, how arising issues were resolved, and what was required to design and implement (e.g. resources)?

- Assessing the impact – what was achieved and were the expectations met?

The demonstration projects should be seen as "management experiments", whereby both mistakes and successes are made explicit. A monitoring and evaluation framework that focuses on context-structure-process-outcomes criteria will provide a diagnostic for Councils to identify how to improve the broader roll-out of adaptation options in other localities in the SCCG region. Consideration should be given to selecting demonstration projects that cover the range of adaptation streams detailed in section 6.

There is value is proceeding with some of the aforementioned recommendations, particularly if they are pursued in the spirit of adaptive management – implement, monitor, evaluate and adjust.

8 CONCLUSIONS

The face-to-face interviews undertaken as part of the case study stage of the current project provide first-hand information regarding how the issue of adaptation to climate change is perceived within SCCG Member Councils. In addition to revealing valuable information into how the issue of adaptation is currently conceptualised by Local Government staff and Councillors, the interviews also reveal much about the challenges Local Government in Australia, and New South Wales in particular, face with respect to barriers to adapting to climate change. Based upon these interviews, as well as the information emerging from the 15 climate change workshops conducted within each of the SCCG Member Councils, it is possible to draw a range of conclusions about the adaptive capacity of regional Local Governments:

The issue of climate change is nothing new for Local Government. For some time, Councils have been engaged in efforts to reduce greenhouse gas emissions and waste within both Council and the larger community. This reflects the widespread awareness of climate change across society and the growing momentum for substantive actions to reduce emissions. Such efforts do not, however, address the issue of adapting to the effects of climate change that cannot be avoided through mitigation. It was clear from interviews that current thinking about climate change policy was biased toward consideration of the emissions side of the issue. As such, there appears to be significant scope for building awareness on the meaning of adaptation and, particularly, how adaptation links into the existing management responsibilities of Local Government.

Local Governments are still coming to terms with progress towards climate adaptation. Local Government's efforts on climate change adaptation illustrate the evolution of thinking and policy that manifests around emergent issues of public concern. Although promising, such efforts are at present tentative and ad hoc, comprised of a mixture of community engagement and geotechnical risk assessment. Interviews with Council staff and Councillors generally provided a clear indication that Local Government would like to exercise a leadership role in ensuring communities are appropriately prepared. However, there are limits to how far and how fast Local Governments can proceed with adaptation.

One of the unmistakable suites of barriers to adaptation by Local Government propagates from the top-down, in the sense that its origins lie in the policy environment created by Federal and State policies. While existing State legislation and management manuals create a mandate within Local Government to identify and manage risks to the community, such legislation continues to assume a stable climate. As a consequence, there is little explicit guidance to Councils regarding how consideration for climate change should be incorporated into standard planning instruments. This is exacerbated by the fact that other legislation places restrictions on Local Government authority and decision-making with respect to building codes, rate increases, and limits on growth and development. Collectively, these issues create strong disincentives for progressive action by Local Government with respect to climate adaptation.

Adaptation barriers also propagate from the bottom-up, through the organisational structure of Local Government, resource availability and decisions about the prioritisation of climate risk. Such barriers are largely a function of the limited capacity of Councils to cope with a broad range of regulatory and service demands with limited resources including financial capital, technical information and expertise. In addition, Local Government is inherently structured around thematic 'silos', which compartmentalise expertise in core operational areas, but which limit the diffusion of knowledge. As a consequence, some activities that are critical for successful adaptation have yet to recognise the relevance of climate adaptation to their work.

There are strong feedbacks between top-down and bottom-up adaptation barriers. For example, alleviating the resource limitations within Local Government for addressing climate risk will depend to some extent upon the delivery of greater support to Councils by higher levels of government and/or relaxation of policies that limit Councils' freedom-of-movement. Similarly, securing more robust legislation and policy guidance from Federal and State Government can be aided by more concerted

action within Local Government to prioritise adaptation and communicate its needs not only to higher levels of government but also the community at large.

Despite the challenges, through collaborative effort across the three levels of government, communities and the private sector, there is ample opportunity to increase the adaptive capacity of local Councils. While this report had identified a broad range of specific options to address adaptation barriers, there are six broad 'adaptation streams' around which adaptation options can be organised:

1. **Know Your Enemy** − Enhancing understanding regarding existing and future climate hazards and social and ecological vulnerability

2. **Plan for Change** − Incorporating climate change into existing and novel Local Government planning frameworks

3. **Get Smart** − Implementing education and outreach programs to increase the knowledge of Council and the broader community with respect to climate change, vulnerability and adaptation

4. **Act, Watch and Learn** − Implementing monitoring, evaluation and reporting measures for Local Government to track outcomes with respect to policies and measures associated with climate adaptation

5. **Put the House in Order** − Developing both internal and external institutional arrangements that build adaptive capacity within and across Councils and other levels of government

6. **Money Talks** − Enhancing revenue streams to Councils to assist in financing adaptation and cost-sharing mechanisms to spread the burden among multiple tiers of government

Some options for increasing adaptive capacity can be more readily pursued than others. Actions which are associated with low costs and with little legislative or inter-institutional entanglements should be pursued at the earliest opportunity. At the opposite extreme, there are a range of options that will necessitate interventions from higher levels of government which also have significant policy and economic implications. While it is never too late to start laying the groundwork for such actions, substantive progress may be some time in coming. In the middle lie a range of actions that will certainly require some effort and investment, but which may nevertheless generate positive outcomes. Such actions should be pursued, but some caution should be exercised to avoid potential conflicts.

There is significant advantage to be gained in getting some 'runs on the board'. Policy positions based upon preservation of the status quo offer little in the way of benefits. Such a stance does nothing to reduce future vulnerability of local Councils and the communities they serve, nor does it facilitate learning that will place Local Government in position to make more informed decisions in the future. Therefore, Councils need to continue to push the issue, even if through tentative steps, so that society can get on with the process of adaptation and continually test and improve potential solutions.

Adapting to climate change is a shared responsibility. This report is one output of a larger project specifically focused on adaptation within Local Government. However, one of the clear implications of this work is that for adaptation to be successful, collaboration will have to become the new standard model for governance in Australia. There is ample 'low-hanging fruit' upon which Local Government can capitalise over the short-term. Yet the major stumbling blocks to adaptation will only be circumvented through partnerships and good-faith 'give-and-take' among relevant organisations. Ultimately, such collaboration represents a 'win-win' for all involved as it increases the efficiency of governance by leveraging knowledge, talent and resources in pursuit of common interests.

9 REFERENCES

Adger, W. N. (1996). "Approaches to vulnerability to climate change." Working paper no. GEC 96-05, Centre for Social and Economic Research on the Global Environment, University College, London.

Adger, W. N. (1999). "Social vulnerability to climate change and extremes in coastal Vietnam." World Development, 27(2), 249-269.

Adger, W. N. (2000). "Institutional adaptation to environmental risk under the transition in Vietnam." Annals of the Association of American Geographers, 90(4), 738-758.

Adger, W. N. (2003). "Social capital, collective action and adaptation to climate change." Economic Geography, 79(4), 387-404.

Adger, W. N., Dessai, S., Guoulden, M., Hulme, M., Lorenzoni, I., Nelson, D., Naess, L. O., Wolf, J., and Wreford, A. (2008). "What do we know about limits and barriers to adaptation to climate change? A background paper." Climatic change, in press.

Adger, W. N., and Vincent, K. (2005). "Uncertainty in adaptive capacity." C.R. Geoscience, 337(4), 399-410.

ATSE (2008). Assessment of Impacts of Climate Change on Australia 's Physical Infrastructure. ATSE, Parkville, Victoria;

Bellamy, J., Smith, T., Taylor, B., McDonald, G., Walker, M., Jones, J. and Pero, L. 2005, Criteria and Methods for Monitoring and Evaluating Healthy Regional Planning Arrangements, Tropical Savannas Management CRC.

Dovers, S. (2003). "Processes and Institutions for resource and environmental management: Why and how to analyse?" Managing Australia's environment, S. Dovers and S. Wild River, eds., Federation Press, Sydney, 3-12.

Folke, C., Hahn, T., Olsson, P., and Norberg, J. (2005). "Adaptive governance of social-ecological systems." Annual review of environment and resources, 30(1), 441-73.

Füssel, H.-M. (2007). "Adaptation planning for climate change: concepts, assessment approaches, and key lessons." Sustainability Science 2, 265-275.
Holling, C. S. (1978). Adaptive environmental assessment and management, John Wiley, London.

Langridge, R., Christian-Smith, J., and Lohse, K. A. (2006). "Access and resilience: Analyzing the construction of social resilience to the threat of water scarcity." Ecology and Society, 11(2), 18.

Lebel, L., Anderies, J. M., Campbell, B. D., Folke, C., Hatfield-Dodds, S., Hughes, T. P., and Wilson, J. (2006). "Governance and the capacity to manage resilience in regional social-ecological systems." Ecology and Society, 11(1), 19.

Malone, E. L., and Rayner, S. (2001). "Role of the research standpoint in integrating global-scale and local-scale research." Climate Research, 19(2), 173-178.

Naess, L. O., Bang, G., Eriksen, S., and Vevatne, J. (2005). "Institutional adaptation to climate change: Flood responses at the municipal level in Norway." Global Environmental Change, 15(2), 125-138.

Naess, L. O., Norland, I. T., Lafferty, W. M., and Aall, C. (2006). "Data and processes linking vulnerability assessment to adaptation decision-making on climate change in Norway." Global Environmental Change, 16(2), 221-233.

NSW Environmental Defenders Office (2008). Coastal Councils Planning for Climate Change: An assessment of Australian and NSW legislation and government policy provisions in relation to climate change relevant to regional and metropolitan NSW coastal Councils. A report commissioned by the Sydney Coastal Councils Group.

O'Riordan, T., and Jordan, A. (1999). "Institutions, climate change and cultural theory: Towards a common analytical framework." Global Environmental Change- Human and Policy Dimensions, 9(2), 81-93.

Ostermeier, D. M. (1999). "The role of institutions in ecosystem management." Ecosystem management for sustainability, J. D. Peine, ed., Lewis Publishers, Boca Raton, Florida, 457-472.

Pelling, M., High, C., Dearing, J., and Smith, D. (2008). "Shadow spaces for social learning: a relational understanding of adaptive capacity to climate change within organisations." Environment and Plannning A, 40(4), 867-884.

Pielke Jr., R. (2006). The Honest Broker: Making Sense of Science in Policy and Politics. Cambridge University Press, Cambridge.

Pielke Jr., R., Prins, G., Rayer, S., and Sarewitz, D. (2007). Climate change 2007: lifting the taboo on adaptation. Nature, 445, 597-598.

Preston, B.L., Smith, T., Brooke, C., Gorddard, R., Measham, T., Withycombe, G., McInnes, K., Abbs, D., Beveridge, B., and Morrison, C. (2008). *Mapping Climate Change Vulnerability in the Sydney Coastal Councils Group*. Prepared for the Sydney Coastal Councils Group by the CSIRO Climate Adaptation Flagship, Canberra.

Sen, A. (1981). Poverty and Famines, Clarendon Press, Oxford.

Smith, T.F., Preston, B.L., Gorddard, R., Brooke, C., Measham, T.G., Withycombe, G., Beveridge, B., and Morrison, C. (2008). *Regional Workshops Synthesis Report: Sydney Coastal Councils' Vulnerability to Climate Change. Part 1*. Prepared for the Sydney Coastal Councils Group by the University of the Sunshine Coast and the CSIRO Climate Adaptation Flagship, Maroochydore and Canberra.

Smith, T.F. and Smith, D.C. 2006, 'Institutionalising Adaptive Learning For Coastal Management', in Lazarow, N., Souter, R., Fearon, R. and Dovers, S. (eds.) 2006, Coastal Management in Australia: Key institutional and governance issues for coastal natural resource management and planning, CRC for Coastal Zone, Estuary and Waterway Management, Brisbane, pp. 115-120.

Tompkins, E. L., and Adger, W. N. (2004). "Does adaptive management of natural resources enhance resilience to climate change?" Ecology and Society, 9(2), 10 (online) www.ecologyandsociety.org/vol9/iss2/art10.

United Nations Development Programme (draft 2007). Monitoring and Evaluation Framework for Adaptation to Climate Change.

Victorian Government (2007). Infrastructure and climate change risk assessment for Victoria. Department of Sustainability and Environment, Melbourne, Victoria.

Vogt, K. A., Gordon, J. C., Wargo, J. P., Vogt, D. J., Asbjornsen, H., Palmiotto, P. A., Clark, H. J., O'Hara, J. L., Patel-Weynand, T., Larson, B., Tortoriello, D., Perez, J., Marsh, A., Corbett, M., Kaneda, K., Meyerson, F., and Smith, D. (1997). Ecosystems: Balancing science with management, Springer Verlag, New York.

Walters, C. J. (1986). Adaptive management of renewable resources, McGraw Hill, New York.

Wilbanks, T. J. (2002). "Geographic scaling issues in integrated assessments of climate change." Integrated Assessment, 3(2-3), 100-114.

Woolcock, M. (1999). "Managing risk, shocks and opportunity in developing economies: The role of social capital." Dimensions of development, G. Ranis, ed., Yale Center for International and Area Studies, New Haven, Connecticut.

Woolcock, M., and Narayan, D. (2000). "Social capital: Implications for development theory, research and policy." The World Bank Observer, 15(2), 225-249.

Yohe, G., and Tol, R. S. J. (2002). "Indicators for social and economic coping capacity: Moving towards a working definition of adaptive capacity." Global Environmental Change, 12(1), 25-40.

APPENDIX I. EXPLORING THE MEANING OF ADAPTIVE CAPACITY

One of the aims of the present project is to analyse the capacity of Councils to respond to climate change. But what exactly is adaptive capacity? In the climate change context, adaptive capacity refers to the ability of a system to adjust to climate change (including climate variability and extremes) to moderate potential damages, to take advantage of opportunities, or to cope with the consequences. In a broader sense however, adaptive capacity can be thought of as the domain 'within which adaptation decisions are feasible' (Adger and Vincent 2005, pg. 402).

A number of factors contribute to adaptive capacity. Yohe and Tol (2002) describe the following key determinants:

1. the range of available technological options for adaptation;

2. the availability of resources and their distribution;

3. the structure of critical institutions;

4. the stocks of human and social capital;

5. access to risk spreading mechanisms;

6. the ability of decision-makers to manage risks and information; and

7. the public's perceived attribution of the source of stress and the significance of exposure to its local manifestations.

Furthermore, Naess et al. (2006) identify three issues that are important to how climate change assessments are used:

1. Institutional capacity and structures and their impact on the capacity to handle information, as well as the incentives they provide for action;

2. The communication of climate change and people's perceptions (mental models); and

3. The ability of institutions to learn and change.

A discussion of adaptive capacity therefore needs to consider the following key aspects: resources and social capital, institutional arrangements, and knowledge production and social learning.

Resources and social capital

Early research on vulnerability and food security recognised the importance of entitlements – actual resources or calls on resources available to an individual or household (Sen 1981; Adger 1996). The same principles can be applied to assessments of climate change vulnerability. Research in coastal Vietnam by Adger (1999) found that increases in the concentration of wealth from aquaculture production decreased community capacity to buffer external shocks. Within the Sydney coastal region, Preston et al. (2008) found that when resources and wealth were not equally distributed across communities within the region the adaptive capacity of Councils varied considerably. Councils whose communities displayed lower socioeconomic attributes had a lower adaptive capacity to adapt to climate change compared to Councils demonstrating higher socioeconomic attributes. Exploring California's water resources, Langridge et al. (2006) showed how the creation of social resilience is linked to historical mechanisms to gain, control, and maintain access to water. Access mechanisms include technology, capital, authority, markets, identity, knowledge and networks, and resilience can be increased by diversifying the array of structural and relational access mechanisms.

Adaptation is a social process, and, over time, interactions between people builds social capital, or the norms and networks that allow people to act collectively (Woolcock and Narayan 2000). Different types of social capital include bonding social capital (between members in a group), bridging social

capital (between groups) and linking social capital (between scales) (Woolcock 1999). Collaborative capacity, which involves initiating and facilitating collaborative problem solving, enables groups to be innovative and creative (Ostermeier 1999). Social capital, and relations of trust, reciprocity and exchange, can be seen as the 'glue' for adaptive capacity (Adger 2003). Social networks can be key mechanisms for drawing on social memory of past changes to systems and for enhancing collaboration and information flow across scales (Folke et al. 2005). Research in the Caribbean by Tompkins and Adger (2004) found that social networks set up to enable co-management of natural resources are also available for dealing with climate related hazards, and that the functioning of social networks and response capacity were closely linked.

Institutional arrangements

Another way of approaching adaptive capacity is to consider the institutional arrangements within which adaptation decisions are made. Institutions can be defined as socialised ways of interacting as well as the structures and organizations that influence resource allocation (Adger 2000). They are the multiple means for holding society together, for giving it a sense of purpose, and for enabling it to adapt (O'Riordan and Jordan 1999). One crucial barrier to adaptation is disconnected organisational and institutional relationships between various actors. In relation to the management of coastal zone issues by Local Government Middle (2004), recommends all spheres of government recognise that a lack of integration leads to inefficiencies and less than optimal management.

While the scale of agency (the direct causation of actions) is often intrinsically localised, this takes place in the context of relationships whose scale is regional, national or global (Wilbanks 2002). Adaptation can occur at all scales from the individual to communities and countries, and so adaptive capacity is a scale-dependent concept. The nested nature of adaptation decision-making means that each individual action is constrained by prior development (eg. capital works) and regulatory decisions (Adger and Vincent 2005).

The types of institutional arrangements that might facilitate adaptation have been discussed extensively in the literature. Dovers et al. (2003) propose five core principles for adaptive institutions:

Persistence – initiatives and processes are properly supported and maintained over time, for example through legal mechanisms;

- Purposefulness – policy and management need to be driven by widely supported goals and objectives;
- Information-richness and sensitivity – learning depends on close monitoring of the environment as well as policy and management 'experiments', with wide ownership of the information produced;
- Inclusiveness of those involved and affected; and
- Flexibility and the preparedness to learn and change.

Using the Norwegian floods of 1995 as case study, Naess et al. (2005) examined factors that constrain or facilitate the ability of local level institutions to carry out adaptation measures. Their research investigated how institutional relationships (such as guidelines, laws and budgets) frame the ability to adapt; the extent to which local room for manoeuvre changes as a result of extreme events such as floods; and how actions at other scales shape outcomes. The study found that local power structures and limited social learning lead to favouring of technical solutions. A high degree of personalized rather than institutionalized learning, high reliance on key individuals, and established local institutional relations and power structures acted as a filter through which new perspectives must pass, slowing down the process of social learning.

Knowledge production and social learning

The capacity to cope with the surprises that climate change may bring requires openness to learning (Lebel et al. 2006). The importance of social learning for the management of dynamic systems has been widely recognised and is fundamental to theories of adaptive management (Holling 1978; Walters 1986; Vogt et al. 1997). There are three main factors to consider in the process of scientific communication and learning for climate adaptation. Firstly, there is often a mismatch between the science that is available to guide decision-making and its perceived certainty and relevance for the local-scale. Secondly, people have different understandings of their system and these 'mental models' guide their perceptions of what adaptation actions are necessary. They build these models from diverse sources which can include the scenarios or model results presented to them by scientists, but may also factor in personal experience of weather or social memory of climatic events such as storms or floods. Lastly, the diverse and incommensurable values held by decision-making agents will lead to paralysis of adaptation action if these values are not effectively deliberated (Adger et al. 2008). Incorporating the idea of learning allows us to think of adaptive capacity as a shifting property rather than a static attribute, and adaptive behaviour emerging at one scale may be the result of learning that has been ongoing amongst a range of actors networked across different scales (Pelling et al. 2008). In essence, social learning should facilitate the creation of knowledge in such a way that it "becomes a dynamic process that defines management structures and adaptive approaches" (Smith and Smith, 2006).

A lens for adaptive capacity

As discussed, adaptive capacity needs to consider resources and social capital, institutional arrangements, and knowledge production and social learning; however, assessments of adaptive capacity can be enhanced by understanding capacity at various scales (temporal and spatial) and also across capacity dimensions. Because this study only focused on Local Governments over a 2-year period, cross-scale understanding was limited. However, the methodology was purposeful in its design to include various capacity dimensions; that is, the contextual, structural, procedural, and outcome influences on adaptive capacity, which builds on regional natural resource planning assessments by Bellamy et al. (2005). These capacity dimensions recognise the importance of understanding the context in which adaptation takes place (eg. acceptance by communities); the structures that affect adaptation (eg. legislation and policies); the processes that affect adaptation (eg. financial and human resources); and outcome measures to inform the success or failure (learning) from adaptation initiatives (eg. monitoring and evaluation). By understanding adaptive capacity through those dimensions, interventions to build adaptive capacity can be targeted, and feasibility of those interventions better understood.

APPENDIX II. SMALL GROUP DISCUSSION TOPICS

Table 17. Discussion group topics included as relating to one of the three cross-cutting barriers

Community	Infrastructure	Planning
• Social Cohesion • Community Value • Change behaviour • Community expectations • Human health, social wellbeing • Public health, social impacts • Values, community expectations and consumption • Human Health	• Property damage and infrastructure • Infrastructure • Assets – Built • Transport • Development, Infrastructure • Public assets and aging Infrastructure • Property development, asset management, green space • Infrastructure, asset management • Infrastructure, funding • Development Control/ Infrastructure	• Land use, Population and development • Development control • Land use planning for climate change • Urban development, redevelopment, vehicle usage, public transport • Development, recreational demand, urban form • Development Control/ Infrastructure • Property development, asset management, green space

Table 18. Topics of discussion groups for each of the focus Councils

Leichhardt	Sutherland	Mosman
• Property development, asset management, green space • Public health, social impacts • Values, community expectations and consumption	• Community Value • Coastline impacts • Land use, population & development	• Sea level rise • Extreme rainfall, flooding

Note: For a full listing of all discussion topics for all Sydney Coastal Councils, please refer to the *Regional Workshop Synthesis Report* (Smith et al., 2008).

APPENDIX III. INTERVIEW QUESTIONS

Local Councils and responding to climate change: a process for understanding and adaptation in Sydney

This interview is part of a climate adaptation project developed by the Sydney Coastal Councils Group Inc (SCCG) in collaboration with CSIRO and the University of the Sunshine Coast. It is funded by the Australian Government Department of Climate Change. This integrated assessment project is focused on climate vulnerability in the Sydney coastal region and the adaptive capacity of Councils to address regional climate change adaptation issues. The project explores themes of systems approaches to climate vulnerability, the need for integration, participation of stakeholders, and partnering for science impact.

Information from these interviews will be grouped and reported thematically rather than by Council. Any direct quotes will be reported anonymously. To assist us with keeping a record of the discussion, we would like to record the interview. Please note that any recorded information will only be used for the purposes of research. If at any time you would like the recording stopped, please advise us to do so. Please also advise us of any information you would like to be kept out of the research process due to its sensitivity.

If you have any inquiries about the project or the interview process please contact any of the following team members:

Geoff Withycombe, Sydney Coastal Councils Group Inc. 02 9246 7791
Dr. Tom Measham, CSIRO Sustainable Ecosystems 02 6242 1789
Dr. Cassandra Brooke, WWF Australia 02 8202 1219
Dr Tim Smith, University of the Sunshine Coast 07 5456 5042

I understand that I have been invited to take part in this research and have provided all information on a voluntary basis. I understand that this interview data will be used for research only and will not be used for commercial purposes. I agree to CSIRO recording the interview and understand that I can have the recording stopped at any time.

Signature or initial:………………….…………………………………..……. Date……………

- -

Introduction

1. What role does Local Government currently play in adapting to climate change?

Questions about Planning issues

2. To what extent is climate change accepted as an issue for planning?
    In what types of planning?
    Within Council management? By the CEO, Councillors, residents, or cross-boundary?

3. Is climate change embedded in Council plans and policies?
    If so, which ones?
    In what ways?

4. How do you operationalize policies about climate change?
     How do you plan for uncertainty?

5. How do you measure success in relation to planning for climate change?
     What are the signs of successful adaptation? How do you report climate change adaptation?

Questions about infrastructure

6. How has climate change risk been factored into infrastructure management and planning?

7. What are the scope and boundaries of Council's responsibility for infrastructure?

8. What is the process for incorporating climate change into infrastructure planning?
     Who is or needs to be involved (maintaining, upgrading and new infrastructure)?

9. How do you know when your infrastructure is adequate for climate change?

Questions about community

10. What factors are leading to diverse climate change perceptions within Council?

11. What factors are leading to diverse climate change perceptions within community residents?

12. What is Council's mandate to facilitate consensus on climate change?
     Does Council have a formal role in influencing perspectives on climate change?

13. How do Councils facilitate consensus on climate change?
     What are the tools used to do this?

14. How do you know when you have enough consensus for adaptation to climate change?

Conclusion

15. Overall, what role should Local Government play in adapting to climate change?
     Currently and into the future?
     (What's special about Local Government in relation to climate change adaptation?)

16. Overall, What would local Councils need to do differently in order to effectively adapt to climate change?
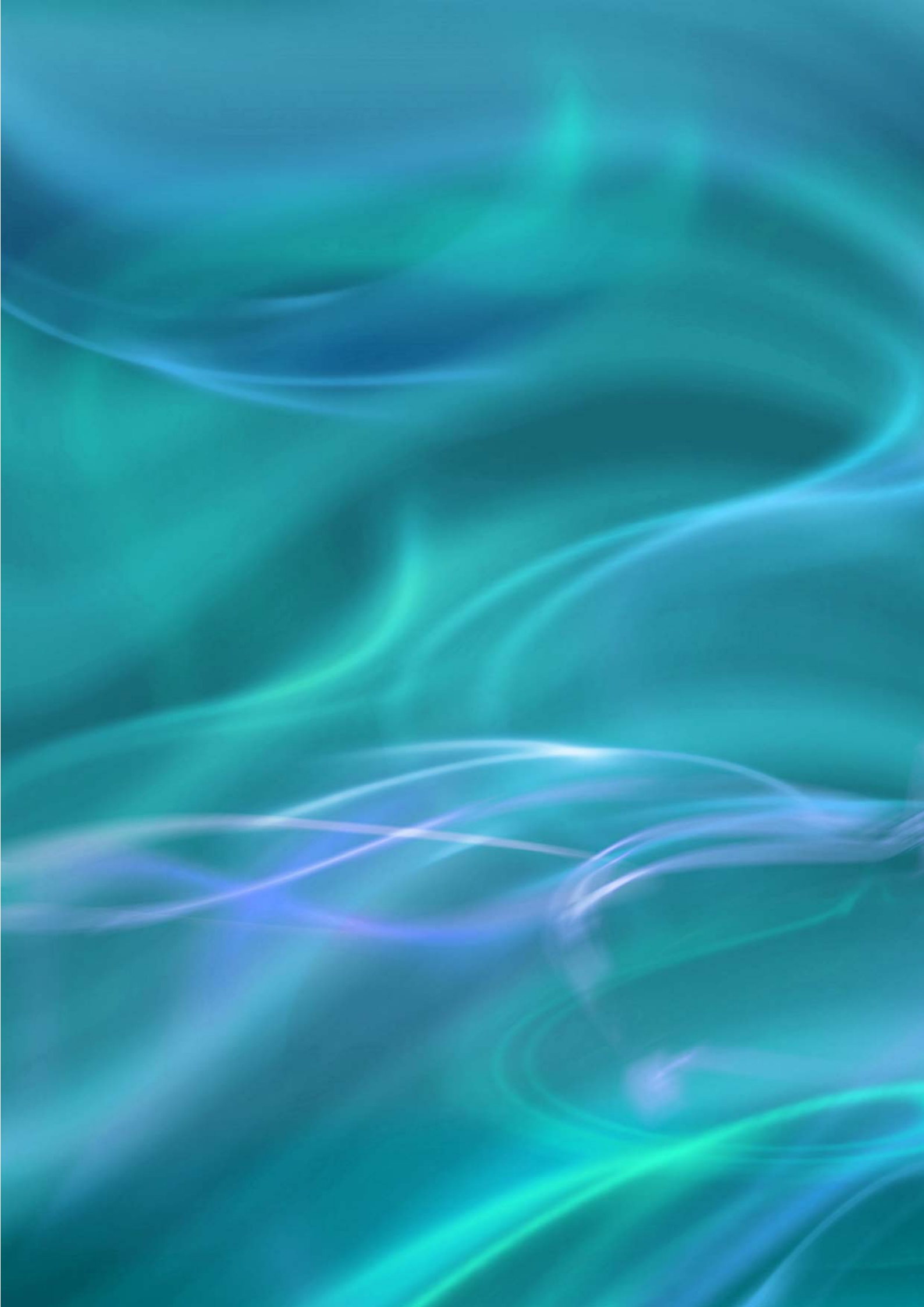
17. Do you have any further comments?

18. What would you like to see come out of this phase of the project and the project overall?

Thanks for participating in this research process.

Case Studies of Adaptive Capacity

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