



WALGA

CLIMATE CHANGE MANAGEMENT

**Guidelines for Incorporating Climate Change
impacts into the Local Government Planning
framework**

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CLIMATE CHANGE ADAPTATION

1 Introduction

According to the United Nations, climate change is “a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods” (United Nations, 1992, Framework Convention on Climate Change, Article 1).

One of the key roles of Local Government is to provide planning and associated decision making services for its community. By incorporating climate change considerations into these processes, Local Governments will be able to make decisions that not only limit their exposure to climate change impacts and potentially avoid future costs and liabilities but it will ensure its communities are resilient to climate change impacts.

Climate change science has a level of uncertainty regarding the extent and timing of changes due to global warming, and the science will continue to evolve. Consequently, it is difficult to state with a high level of certainty the exact impacts of climate change within a local government area. It is possible, however, to identify areas at risk to adverse impacts of climate change.

This guideline aims to highlight the adaptation issues requiring consideration by Local Governments as part of land use planning and decision making, providing some guidance as to how these issues may be addressed by the planning system. This document should be used as a guide only and local governments would need to consider its own climate change adaptation response that responds to local circumstances, based on specialist technical advice.

1.1 Mitigation and adaptation strategies

The threats from climate change demand a range of responses that may be broadly classified as mitigation and adaptation strategies. Mitigation strategies aim to reduce future climate change impacts by reducing greenhouse gas emissions. Effective mitigation requires international effort and can involve a range of measures including energy efficiency, adopting low emissions technologies, sequestering carbon dioxide and behaviour change actions such as changing our transport patterns and reducing waste.

Adaptation strategies aim to address the immediate and irreversible impacts of climate change and to take advantage of opportunities that climate change may present. They are developed by identifying the inevitable changes that climate change will cause regardless of mitigative actions and determining and implementing actions to manage these changes in the present and the future through the best practice management of environment, assets, infrastructure and planning processes.

The linkage between mitigation and adaptation strategies must be acknowledged, as many mitigation strategies serve to increase a community’s resilience to climate change impacts in both the short and longer term. For example, reducing the

emission of greenhouse gases through the development of renewable technologies such as off-grid solar and wind power reduces the dependence of a community on mains power supply.

Many Local Governments are actively pursuing strategies to reduce their greenhouse gas emissions and have been doing so for a number of years. Therefore this guideline focuses primarily on adaptation rather than mitigation and aims to raise awareness of and provide guidance for the need to prepare for and adapt to climate variability and the likely effects of climate change.

1.2 Addressing climate change

Reducing the long term impact and severity of climate change relies on the success of international agreements to reduce greenhouse gas emissions. However due to historical levels of greenhouse gases, some changes are unavoidable. These changes will have to be managed by all spheres of the community, including Local Government, who will feel the financial, infrastructure, water, land use planning, liability and social impacts of not addressing climate change most markedly (Bainbridge, 2009).

Whilst there is consensus in the scientific community that the climate is changing, the nature and extent of these changes is difficult to predict precisely. Changes will differ from region to region and there may be local variations as well. Local Governments should take this into consideration when developing their response to climate change, including the identification of the locations and resources most at risk from the impacts of climate change. Some of the key broad scale changes predicted for Western Australia are as follows:

- A 1.1m sea level rise due to thermal expansion and melting ice by 2100, based on advice from the Australia Government (Department of Climate Change 2009) from CSIRO and the Antarctic and Climate Ecosystems Cooperative Research Centre, leading to increased coastal erosion and flooding;
- Rainfall will increase in the north of the State but decrease in the south, including Perth (Garnaut 2008);
- Increased number and possible intensity of both winter and summer storms with associated storm surges and flooding (Garnaut 2008); and
- The drying climate in the south leading to increased fire risk (Garnaut 2008).

Local Government is considered to be a very vulnerable sector and is, at present not adequately resourced to cope with climate change risks and impacts. Adaptation requires decision makers to not only acknowledge the need to act but to commence action to reduce risk exposure in their areas of influence (Bainbridge, 2008). It also requires a flexible and iterative approach to policy and decision-making, which can accommodate changing understandings of environmental processes and new science and research.

Failure to consider climate change risks as part of Local Government decision making may result in legal challenges with consequent financial implications. Local Government decision makers must be aware of and plan for climate change implications in a very demonstrable way in order to meet the test of "reasonableness" in defence of legal challenge. For government and also industry it is untenable to claim there is insufficient knowledge about the risks, as regionalised climate

modelling clearly demonstrates the risks, likelihood and consequences as being beyond the threshold of probability which is all that is required for civil burden of proof (Ku-ring-gi Council, 2010).

Local Governments are therefore advised that they need to begin to take steps to show they have investigated the risks posed to their communities from climate change and put in place plans and actions to reduce the risk exposure (Taplin *et al* as cited in Ku-ring-gi Council, 2010). Ways in which Local Governments can integrate the consideration of the likely impacts of climate change into planning decision-making are outlined in section 2 below.

Whilst the focus of this guideline is on the planning system, Local Governments decisions on infrastructure provision within areas of risk and the maintenance of certain infrastructure should also take into account climate change impacts.

2 Local government planning response for climate change

With its responsibility for setting planning policy, its role as a land manager and custodian of open space with general responsibilities for environmental issues, Local Government is largely responsible for determining and implementing adaptation strategies. Local Government planning activities and decisions which may be subject to increasing litigation and legal challenge on the basis of climate change impacts include local planning strategies, local planning schemes and rezonings, local structure plans, advice on subdivision and development applications.

Climate change considerations should be integrated into all strategic planning initiatives and statutory planning decision-making, consistent with the precautionary principle and should address existing and future risk appropriate to scenarios as agreed to by Council.

WALGA has made a commitment to building the capacity of the Local Government sector on climate change issues, with a range of resources available from the www.walgaclimatechange.com.au website, including: -

- A Local Government Climate Change Adaptation Toolkit (ICLEI Oceania 2008);
- WALGA Climate Change Policy Statement (June 2009); and
- Local Government Climate Change Declaration (August 2011);

to provide clear direction for Local Government to address climate change issues.

This guideline has been prepared as a specific tool which outlines a variety of options that could be applied for inclusion of climate change issues into the planning process to address potential coastal impacts, natural hazards and disasters which may result from climate change.

2.1 Climate change as a relevant planning matter

The current Commonwealth Position Paper, '*Adapting to Climate Change in Australia*' determines that local government will be a key stakeholder in the climate change management 'space'. It also indicates that, "decisions about land use, infrastructure design, location and management of parks and reserves, investment in

agricultural systems, and rules about water management all need to take future climate change into account.” These are all, bar perhaps investment in agricultural systems, concerns and statutory responsibilities of Local Government at some level, thus the Commonwealth Government asserts that many of the functions of Local Government will be affected by climate change and that this will necessitate direct adaptation actions.

One of the purposes of the *Planning and Development Act (2005)*, is to “*promote the sustainable use and development of land in the State*”; therefore, the impacts of climate change must be taken into account to support the sustainable use and development of land. This is particularly important where land is most vulnerable to the impacts of climate change.

To provide more specific information about the inclusion of climate change into the planning framework, Table 1 outlines specific issues throughout the entire planning process, particularly relating to flooding, coastal processes, bushfires, erosion, water supply, and heatwaves. The table is provided as a guide for how to include climate change impacts into the planning system, but the list should not be considered exhaustive.

The information in the next section (section 2.2 to 2.4), outlines the rationale for the consideration of climate change issues into the main local government planning tools.

Table 1: Requirements to address coastal vulnerability, natural hazards and disasters

	District structure plan/ Region scheme amendment	Local structure plan	Local scheme amendment	Subdivision	Development
Flooding	Identify flood prone areas, including 1 in 100 year levels where known, together with a strategy for addressing at later stages of planning (i.e. Special Control Area, development control provisions, Local Planning Policy or alternative). Better Urban Water Management Plan.	Identify flood prone areas, with reference to the planning control mechanism intended to be used to control development. Better Urban Water Management Plan to address drainage issues and possible inundation of land outside of a floodplain area.	Include general development provisions for zone to manage development within the floodway, referring to Department of Water requirements. Better Urban Water Management Plan.	Development may not be permitted within flood-prone area unless consistent with Department of Water advice and zoning controls. Building envelopes may be required to restrict development to appropriate areas. Better Urban Water Management Plan to address drainage issues and possible inundation of land outside of a floodplain area.	Development should be consistent with Department of Water advice, building envelopes and/or zoning controls.
Coastal processes	Consider the level or capacity of the coastal landscape to absorb new activities. This will ensure that new development is not at risk from climate change impacts on coastal processes and that the proposed coastal foreshore will protect ecological values and provide for community access and use.	Undertake a coastal processes or storm surge assessment in areas identified at risk from climate change impacts on coastal processes. Provide an appropriate foreshore reserve including calculation of the development setback for physical processes consistent with Schedule 1 of SPP 2.6. Develop and implement a foreshore management plan.	Reserve the coastal foreshore as appropriate in the local scheme, vested in the State or Local Government. Include scheme provision which requires appropriate development controls and implementation of the foreshore management plan.	If not already completed, develop and implement a foreshore management plan. Incorporate appropriate planning, building design and siting criteria	Development in areas at risk from climate change impacts on coastal processes and/or storm surge will not be approved without a coastal processes and/or storm surge assessment that demonstrates that the proposal will not be at risk or detrimentally impact the area.
Bushfires	Identify the bushfire hazard level of the area and classify any bushfire prone areas. Actions should be consistent with <i>"Planning for Bushfire Protection"</i> .	Identify the bushfire hazard level of the area and classify any bushfire prone areas. Design of the local structure plan should be consistent with <i>"Planning for Bushfire Protection"</i> .	Scheme provisions to include appropriate development controls including implementation of a special control area for bushfire prone areas.	Subdivision design to be consistent with <i>"Planning for Bushfire Protection"</i> Guidelines including preparation of a Bushfire management plan where required.	Development to be consistent with requirements in <i>"Planning for Bushfire Protection"</i> Guidelines and appropriate standards in the Building Codes Australia (BCA).

	District structure plan/ Region scheme amendment	Local structure plan	Local scheme amendment	Subdivision	Development
Erosion	<p>Identify areas or landscapes at risk from coastal and/or waterway erosion.</p> <p>Include an objective to minimise and manage coastal and waterway erosion.</p>	<p>Develop and implement a coastal or waterway foreshore management plan.</p> <p>Develop an erosion and sediment control plan.</p>	<p>Include sediment and erosion controls as scheme provisions within the specific zone.</p>	<p>Implement erosion and sediment control plan as part of site works.</p>	<p>Implement erosion and sediment control plan including construction of sediment fences, controlled access and site management.</p>
WSUD – water supply	<p>District structure plan or region scheme amendment to be supported by a district water management strategy which addresses potable and non-potable water supply, maximising water efficiency and water reuse options.</p>	<p>Local structure plan to be supported by a local water management strategy which identifies options for water supply, requirements for water efficiency and targets to be met.</p>	<p>Protect any public drinking water source area via implementation of a special control area in the scheme consistent with SPP 2.7.</p>	<p>Subdivision to be supported by an urban water management plan which demonstrates how water efficiency and water reuse targets will be met. Refer to Better Urban Water Management Guidelines.</p>	<p>As per BCA, water efficient fixtures and fittings at the building permit stage.</p> <p><i>* See note</i></p>
Heatwaves	<p>Identify areas of vegetation and trees to be protected and revegetated and recognise the opportunity for “green buildings” and areas of green space (public open space, green buildings, landscaping and/or trees) in high density, industrial or commercial areas.</p> <p>Require provision of vegetated green space in high density, industrial and commercial areas to aid cooling.</p>	<p>Identify areas of remnant vegetation and trees in the Structure Plan and protect them appropriately through zoning, reservation, subdivision design, use of buffers, open space or appropriate.</p>	<p>Include appropriate development controls to retain vegetation (no clearing) and support climate-responsive design within appropriate zones or through clearing controls or a local planning policy.</p> <p>Design guidelines should acknowledge the opportunity for “green buildings” and public open space in high density, commercial and industrial areas.</p>	<p>Support the retention of existing vegetation and trees and revegetation in subdivisions.</p> <p>Ensure layout supports climate-responsive siting and includes areas of green space (public open space, landscaping and/or trees).</p>	<p>Support the retention of existing vegetation and revegetation in development proposals.</p> <p>Encourage “green buildings” in high density areas.</p> <p>Ensure buildings are insulated (BCA) and are designed for climate (appropriately sited, with breezeways and have eaves).</p> <p><i>* See note</i></p>

- *There may be specific locations or situations where design guidelines or a local planning policy may be prepared, to encourage a higher development requirement than the BCA’s minimum standards in order to promote better building sustainability.*

2.2 Local Planning Strategies

The context for local planning strategies includes both the existing state of development, natural resources and the environment (social, economic, natural, physical) as well as the state and regional policy context (strategies, policies, plans). As the strategic document that informs the preparation of the local planning scheme, the inclusion of climate change issues into the local planning strategy is essential to ensure that specific adaptation measures are incorporated into a local planning scheme's provisions.

The WAPC's Local Planning Manual suggests a range of background information to assist in the preparation of a local planning strategy (Appendix 5.2), specifically providing the following advice under section 2 – 'Physical features, climate, natural heritage and natural resource management': -

- Climate and anticipated climate change, including any significant impacts associated with climate change, for example reduced rainfall, increasing temperatures, inundation of coast and foreshore, changes in agriculture/aquaculture, changes in flora/fauna, increased bush fire risk.

The local planning strategy can therefore consider adaptation measures in respect to the following issues: -

- Facilitate planning and development outcomes that result in land uses, places and communities which minimise vulnerability and provide resilience to climate change;
- Consider the impacts of climate change including coastal impacts, natural hazards and disasters and climate variability;
- Manage urban sprawl in climate sensitive areas and identifying ecosystems that require protection;
- Minimise the heat island effects of high density urban areas;
- Retrofit existing urban areas including the modification of urban form to accommodate the adaptability of older communities to the adverse effects of climate change (e.g. thermal or heat stress);
- manage inundation, flooding and storm water; and in some instances,
- the planned strategic retreat from highly exposes areas.

Technical studies undertaken at this stage would need to identify specific climate change risks for a local government and the level of response required. As suggested by Department of Climate Change, the inclusion of Risk Based land use zoning is a concept that has been undertaken in Europe, New Zealand and the United States, which recognises that risks and hazards can change over time, that risks will vary spatially, that the lifespan of assets in the risk area will vary in longevity and be of different value to society, and essentially that a one-size-fits-all approach will not work.

The following table is an example of a risk based land use zoning, which would assist in the mapping of potential risks along the coastal areas and determine the response to be incorporated in the local planning scheme : -

Table 2 - Example

Potential approaches to land use zoning based on a hierarchy of standards for coastal areas

Risk Category	Application and planning response
Low risk areas	<p>Defined by areas where there is little or no risk of erosion, flooding or long-term inundation at less than 1-in-1,000 year return periods under worse-case climate change scenarios to 2100.</p> <p>Planning response: no constraints on land use planning because of physical climate processes.</p>
Medium risk areas	<p>Defined as shorelines, tidal watercourses and low-lying lands subject to erosion, inundation and flooding at a 1-in-500 to 1-in-1,000 year return period.</p> <p>Planning response: no new construction of essential and critical infrastructure and public utilities unless designed to be capable of remaining operational during extreme climate events (suitable for most other development).</p>
High risk areas	<p>Defined as coastal areas likely to be affected by erosion, inundation and flooding at a return interval of between 1-in-500 and 1-in-100 years.</p> <p>Planning response: approval only for developments that can be relocated or designed to withstand the impacts of extreme events or flooding without causing adverse consequences for adjoining coastal areas.</p>
Very high risk areas	<p>Defined as coastal areas subject to erosion, inundation and flooding at a return interval of greater than 1-in-100 under worse-case climate change scenarios.</p> <p>Planning response: approval only for developments that are compatible with a high degree of land surface disturbance; existing high value assets in such areas should be the subject of restrictions on new development and on the management of potential adverse consequences on adjoining areas, in the light of the ability of the community to protect those assets and support their relocation over time.</p>
<p>Note: Current planning is generally based on assessing risks from a 1-in-100 year event. Events less frequent than this, e.g. a 1-in-1000 year event, are significantly larger in magnitude.</p>	

Source: Department of Climate Change, 2009, Climate Change Risks to Australia's Coast: A first pass National assessment. Canberra.

2.3 Local Planning Schemes

In relation to the risks associated with climate change, most local planning schemes will have a clause similar to 10.2 (m) of the Western Australian Planning Commission's (WAPC) model scheme text, which states: -

“whether the land to which the application relates is unsuitable for the proposal by reason of it being, or being likely to be, subject to flooding, tidal inundation, subsidence, landslip, bush fire or any other risk....”

The inclusion of this clause within a local planning scheme ensures that the risks of climate change are relevant considerations for any planning decision.

Further, most local planning schemes will also have a clause similar to 10.2 (e) of the model scheme text, which identifies *“any relevant policy or strategy of the*

Commission and any relevant policy adopted by the Government of the State” as relevant considerations for any planning decision. In this context, the WAPC Position Statement on coastal setbacks for sea level rise is relevant, as are the objectives of State Planning Policy 3.4: Natural hazards and disasters.

It is also supported that a local planning scheme contain a clause similar to 9.2 (c) of the Model Scheme Text, requiring “*any specialist studies that Local Government may require the applicant to undertake in support of the application such as traffic, heritage, environmental, engineering or urban design studies*”. Environment can refer to climate change impacts, although the specific clause could be amended to include a specific reference to climate change (i.e. requirement for climate impact assessment). This clause could assist in addressing the uncertainty regarding predicting the nature and extent of climate change at a particular location.

Clause 5.6 of the Model Scheme Text also provides the opportunity for specific environmental conditions to be incorporated into a local planning scheme via a Schedule, to reflect the environmental statements prepared via sections 48F and 48G of the *Environmental Protection Act 1986*.

Where the boundaries of a high risk area can be accurately and clearly defined, a special control area in the local planning scheme can further define any additional requirements for planning decision making within this area. Special control areas for climate change impacts are already used to address the following issues:

- *Bush fire prone areas*: Used in circumstances where control of housing and other vulnerable forms of development need to be controlled with reference to their location, access requirements, materials of construction, refuge provisions, water supplies and where notification of risk to prospective purchasers of property is appropriate, for example, by way of a memorial or notice on title imposed as a condition of subdivision or planning approval.
- *Flood-prone land*: Used in circumstances where (in relation to the floodway) impediment of flood flows is likely to cause significant effects up-stream, and where (in relation to the flood fringe) development may be subject to inundation during flood events, where controls are required to protect property and where notification of risk to prospective purchasers of property is appropriate.
- *Water catchments*: Used in circumstances where there is a need to protect the water resource and control potentially polluting activities within surface or groundwater catchments associated with public potable water supplies. The inclusion of a special control area to protect public drinking water is in accordance with State Planning Policy 2.7.

As clauses to specify development provisions are then incorporated into a local planning scheme, it can address requirements for these special control areas as shown the local planning scheme map. Generic examples of several existing development provisions within a local planning scheme are shown in the following section and are provided as a guide only.

FLOOD PRONE AREAS

- (a) Flood Prone Areas are defined on the Scheme Map in accordance with the 1 in 100 year flood levels defined by the Department of Water.

Note: the designation of particular parts of the district as Flood Prone Areas should not be interpreted to imply that the areas outside of the designated areas are necessarily free from risk associated with flood or extreme rainfall events

- (b) In addition to development which otherwise requires planning approval under the Scheme, planning approval is required for development within a Flood Prone Area, which involves the construction or extension of any building or earth works. Such development is to be subject to the discretion of the local government notwithstanding that the use may be designated a 'P' use under the Scheme.

COASTAL MANAGEMENT AREA

In deciding whether to grant consent to development within the Coastal Management Area, the Council shall take into consideration:

- a) the likelihood of the proposed development adversely affecting, or being adversely affected by, coastal processes;
- b) the likelihood of the proposed development adversely affecting any dune or beach of the shoreline or foreshore;
- c) the likelihood of the proposed development adversely affecting the landscape or the scenic or environmental quality of the land in the locality;
- d) whether adequate safeguards and rehabilitation measures have been, or will be, taken to protect the environment;
- e) any comments made by the Department of Transport, Department of Water and the Department of Planning.

DESIGNATED BUSHFIRE PRONE AREAS

- (1) A Designated Bushfire Prone Area is any area identified on the Bush Fire Hazard Assessment maps with a bush fire hazard level of medium, high or extreme. Dwelling construction within a Bushfire Prone Area will be subject to the relevant bushfire prone area building requirements pursuant to the Building Code of Australia and Australian Standard 3959 - 1999.
- (2) In its determination of any application for planning approval, and its advice in relation to land subdivision, the Council is to have particular regard to:
 - a) the potential hazards occasioned by the vegetation, topography and prevailing winds during the bush fire season, and the extent (if any) to which any change in land use may increase such hazards;
 - b) the design and siting of buildings, works and access with reference to the Scheme requirements and performance standards set out in Planning for Bush Fire Protection and Australian Standard 3959, Construction of Buildings in Bushfire-Prone Areas
 - c) avenues of escape in the event of a bush fire, and the level of hazard associated with any vehicular access facilities;
 - d) practicability of ameliorating the risk associated with bush fire events, including fire breaks, reduction in fuel load and roof/wall irrigation systems;
 - e) the effects of any proposed fire protection measures on the amenity and environmental characteristics of the locality, including landscape values, remnant vegetation and soil stability;
 - f) availability and adequacy of fire services including water supplies and equipment for use in fire fighting; and the adequacy of any fire prevention plan or fire response plan which may have been adopted for the locality.

2.4 Local planning policies

Local planning policies do not form part of a local planning scheme, but are given recognition through schemes as one of the matters to be given 'due regard' in Local Government consideration of applications for planning approval. As such, local planning policy cannot impose any mandatory requirement upon development, but may guide the formulation of applications (by developers) and their subsequent assessment (by officers) and determination (by or on behalf of Council).

It may be appropriate to prepare a local planning policy that addresses all or some of the following climate change impacts, or review/amend existing policies where appropriate:-

- Sea level rise
- Flooding
- Storms, cyclones and storm surge
- Bush fires
- Erosion – coastal and waterways
- Drought
- Earthquakes
- Heatwaves
- Stormwater run-off reduction
- Salt water intrusion
- Reduced rainfall
- Increased temperature
- Landslides

As the level of risk, relevance and importance of each issue varies across the State according to local and regional climates, landscapes and development patterns, accordingly, a local planning policy should suit the particular circumstances and risk priorities of the individual Local Government.

Each Local Government is encouraged to undertake a climate change risk assessment for their area, identify the risks that require a planning response and identify how best to address these. This is essentially the process for developing a climate change adaptation strategy, as outlined on the WALGA climate change management toolkit. The risk assessment and adaptation strategy will then inform the development of an appropriate local planning policy that meets the needs of the particular Local Government.

The following are examples of local planning policies that have been developed by the WA Local Government sector:

- Shire of Busselton – Floodplain Development and Management Policy (Aug 1994)
- Shire of Busselton - Bush Fire Protection Local Planning Policy Provisions (draft)
- Town of Bassendean – Floodplain management and development policy (Dec 2008)
- City of Melville - Energy Efficiency In Building Design (October 2011)
- Shire of Boddington - Planning policy 6 -Development in Flood Affected Areas
- Shire of Mundaring – Stormwater Management
- Shire of Kalamunda - Policy ENV4 - Flood and Stream Management
- Shire of Kalamunda - Policy ENV6 - Hillside Protection
- Bunbury – Development in Flood Affected Areas

This list is not exhaustive, and will be updated periodically. There are also relevant policies developed by Local Governments in other states and countries which address climate change issues.

3 Additional considerations

Where development exists in an area at risk from coastal impacts, natural hazards and disasters and/or climate variability, it is imperative to ensure community awareness and readiness for implementation of an appropriate disaster response plan. The information contained within this section outlines other variables and information that may be needed in the inclusion of adaptation measures into the local government planning framework.

3.1 Identifying risk

Local Governments should identify areas at risk from coastal impacts, natural hazards and disasters and climate variability. The assessment should be based on current and agreed benchmarks including appropriate climate scenarios and modelling, and have consideration of residual and cumulative impacts. This will require flexibility in both policy and practice to ensure that new information can be applied to the framework at reasonable temporal and spatial scales. It may also require a Local Government to agree on a 'most likely' climate change scenario to apply to its decision making processes.

The identified areas of risk should form the basis for consideration when developing a climate change adaptation strategy, which should propose appropriate responses and resources for the level of identified risk, including land use controls where necessary. This should include both management measures to mitigate short term impacts and adaptive management measures for medium to longer term impacts.

The findings of the climate change adaptation strategy should be incorporated into the Local Government's local planning strategy and reported to the community.

Further information regarding the development of a climate change adaptation strategy is provided in the WALGA climate change management toolkit.

<http://www.walgaclimatechange.com.au>).

3.2 Access to latest information

There are four main information needs for adaptive response in urban planning and management: -

- a) To assess the vulnerability of particular communities and locations
- b) To provide historical and current information that informs and supports future adaptation
- c) To fill information gaps that hinder or obstruct adaptation; and
- d) To provide information management strategies, and decision tools to guide information producers and consumers towards useful information with which to adapt to climate change.

Local Governments should endeavour to maintain currency with any federal or State-adopted climate change predictions or strategies. Planning decisions should be consistent with any applicable international or national benchmarks, such as those contained in IPCC or CSIRO reports.

Other documents that are of relevance are as follows: -

- (i) *State Planning Policy No.1: State Planning Framework.*
- (ii) *State Planning Policy No 2: Environment and Natural Resources*
- (iii) *State Planning Policy N 2.6: Coastal Planning Policy*
- (iv) *State Planning Policy No 2.9: Water Resources*
- (v) *State Planning Policy No 3.4: Natural Hazards and Disasters*
- (vi) *Kyoto Protocol*
- (vii) *Environment Protection and Biodiversity Protection Act 1999*
- (viii) *Environmental Protection Act 1986*
- (ix) *Local Government Act 1960*
- (x) *Bush Fires Act 1954*
- (xi) *Building Codes of Australia*
- (xii) *Australian Standards*
- (xiii) *Position Statement - State Planning Policy No. 2.6 State Coastal Planning Policy Schedule 1 Sea Level Rise (WAPC, 2011)*
- (xiv) *Better Urban Water Management (WAPC, 2008)*
- (xv) *Engineering Guidelines (Subdivision)*
- (xvi) *Planning for Bushfire Protection (Edition 2) 2010*

3.3 Managing Council operations to reduce vulnerability

Local Government has a substantial role in engaging and educating the community in climate change adaptation actions and leading by example. Another important role for Council is to plan and design its own operations and works to minimise vulnerability to coastal impacts, natural hazards and disasters and/or climate variability. This includes the management of biodiversity assets and coastal areas. Doing so will not only demonstrate Council commitment to managing climate change impacts but also likely reduce future costs when impacts eventuate.

3.4 Appropriate monitoring, reporting and review

The effects of, as well as any efforts to address and adapt to climate change impacts should be actively monitored and reported against agreed indicators and benchmarks. It is recognised that these indicators and benchmarks are likely to change over time, and should be reviewed and updated as models and scientific research / information is updated. There is also a need to regularly review climate change plans, policies, strategies and benchmarks to ensure currency and consistency with the most up-to-date science and predictions.

3.5 Appropriate information with planning applications

In order to facilitate the appropriate consideration by Council, any planning proposal that is in an area that may be affected by coastal impacts, natural hazards and disasters and/or climate variability should address the identified risk and outline the proposed response including the avoidance, mitigation or management of the likely impact. One way to ensure that proposals are supported by appropriate information and facilitate the appropriate consideration by Council is outlined in the following table.

Table 3: Supporting information to accompany planning proposals

Planning proposal Information Required	District structure plan/ Region scheme amendment	Local Structure Plan	Local scheme amendment	Subdivision	Development
Flooding, WSUD and water supply					
District Water Management Strategy	*	-	O	-	-
Local Water Management Strategy	-	*	*	-	-
Urban Water Management Plan	-	-	-	*	O
Coastal processes					
Coastal setback /foreshore	*	*	*		
Coastal vulnerability assessment	-	*	-	-	O
Storm surge assessment	-	*	-	-	O
Coastal foreshore management plan	-	-	-	*	-
Bushfires					
Bushfire hazard assessment	*	*	*	-	-
Bushfire management plan	-	*	-	*	
Erosion					
Preliminary Site Investigation	*	*	*	-	-
Preliminary Acid Sulfate Soil Report	*	*	*	-	-
Wetland /waterway Management Plan	-	*	-	-	-
Landscaping and Vegetation Retention Management Plan	-	*	-	O	-
Erosion and sediment control plan	-	-	-	*	
Erosion and sediment control measures	-	-	-	-	*
Heatwaves					
Solar efficiency & breezeways lot layout	-	*	-	*	-
Solar Efficiency Design Guidelines	-	*	-	*	-

* required

O provisional (at the discretion of the Local Government)

4 Interpretations

For the purpose of this guideline, the following definitions apply.

Adaptation - The process of adjustment to climate changes that will occur despite efforts to reduce greenhouse gas emissions. Adaptation can help human and natural systems reduce their vulnerability and increase resilience to climate change and create new economic opportunities.

Climate change - A change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods. [UNFCCC]

Mitigation - A human intervention to reduce the sources or enhance the sinks of greenhouse gases [IPCC].

Natural hazard - A naturally occurring event which poses a threat to human health, life and the built or natural environment. Climate change will increase the intensity, predictability and frequency of natural hazards that can be geological (e.g. landslides), hydrological (e.g. flooding), climatic (e.g. droughts, heatwaves, storms) or bushfires. For the purpose of this document, inundation by sea level rise is also considered a natural hazard.

Precautionary principle – Where there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.

Resilience - The capacity of a system to absorb disturbance and reorganise while undergoing change, so as to still remain essentially the same function, structure, identity, and feedbacks.

Risk - The likelihood of an adverse outcome, estimated from the combined probability of a natural hazard and the severity of the potential consequences. Potential consequences are determined by the level of vulnerability and the exposure of an asset or system to that hazard.

Vulnerability - Susceptibility of social, environmental or economic assets to harm that influences the level of risks posed by a natural hazard. It is a function of exposure of a system, the sensitivity of that system to change and the capacity of the system to adapt (Climate Change Risks to Australia's Coast: A First Pass National Assessment)

5 Useful resources

Local government perspectives from Queensland. (Bajracharya, B., Childs, I., and Hastings, P., 2011).

http://www.prres.net/papers/Bajracharya_Childs_Hastings_Climate_change_disaster_management_and_land_use_planning.pdf.

An assessment of Australian and NSW legislation and government policy provisions relating to climate change relevant to regional and metropolitan coastal councils (prepared by the Environmental Defenders Office for the Sydney Coastal Councils Group, 2008).

<http://www.sydneycostalouncils.com.au/sites/default/files/coastalcouncilsplanningforclimatechange.pdf>

Planning for Climate Change: Leading Practice Principles and Models for Sea Change Communities in Coastal Australia. (Gurran, N., Hamlin, E., and Norman, B., 2008).

<http://www.seachangetaskforce.org.au/Publications/PlanningforClimateChange.pdf>

Planning for coastal climate change. An insight into international and national approaches (prepared by Barbara Norman for the Victorian Department of Planning and Community Development, 2009).

http://www.climatechange.vic.gov.au/_data/assets/pdf_file/0017/73250/Planningforcoastalclimatechangev1.pdf

Planning policy and practice: The right mechanism to tackle climate change? (Maddocks, 2010). <http://www.maddocks.com.au/uploads/articles/planning-policy-and-practice-the-right-mechanism-to-tackle-climate-change-update-september-2010.pdf>

Sea level rise, coastal development and planned retreat: analytical framework, governance principles and an Australian case study (Abel, N., Gorddard, R., Harman, B, Leitch, A., Langridge, J., Ryan, A., and Heyenga, S., 2011, Environmental Science & Policy 14 (279 - 288)). http://www.lgsa-plus.net.au/resources/documents/Planned_retreat_governance_principles_2011.pdf

Your Development - a web resource for sustainable urban residential development (from CSIRO). <http://www.csiro.au/Organisation-Structure/Flagships/Climate-Adaptation-Flagship/YourDevelopment.aspx>

6 References

Adapting to Climate Change in Australia. An Australian Government Position Paper 2010 - <http://www.climatechange.gov.au/en/media/whats-new/adapting-to-climate-change.aspx>

Bainbridge, 2009, *Western Australian Local Government Association (WALGA) Climate Change Policy Background Paper*, Western Australian Local Government Association, Perth, April 2009

Bainbridge, M. 2008, *Western Australian Local Government Association Submission to the Standing Committee on Climate Change, Water, Environment and the Arts – an inquiry into climate change and environmental impacts on coastal Communities*, Western Australian Local Government Association, Perth.

Department of Climate Change, 2009, *Climate Change Risks to Australia's Coast: A first pass National assessment*. Canberra, ACT, Australian Government.

Garnaut, R., 2008, *The Garnaut Climate Change Review: Final report*. Port Melbourne, Cambridge University Press.

IPCC, 2007, *Climate Change 2007 The Intergovernmental Panel on Climate Change Fourth Assessment Report* <http://www.ipcc.ch/>

Ku-ring-gai Council, 2010, *Draft Climate Change Adaptation Strategy*, Ku-ring-gi Council, NSW.

National Climate Change Adaptation Framework www.coag.gov.au/coag/framework.pdf

United Nations, 1992, Framework Convention on Climate Change, Article 1. http://unfccc.int/not_assigned/b/items/1417.php

WALGA Climate change management toolkit: <http://www.walgaclimatechange.com.au>

WALGA, 2009, *Policy Statement on Climate Change*, Western Australian Local Government Association, Perth, WA.