



**City of Bayswater**  
**Local Climate Change Adaptation Action Plan**

**February 2013**

**Produced by the EMRC  
Environmental Services and  
the City of Bayswater**

## **FOREWORD**

The Australian Local Government Association notes that “addressing climate change is one of the greatest imperatives of the 21st Century” (ALGA 2010).

The City of Bayswater recognises that our climate is changing and that there is a need for the City and the Region to adapt to both the changes that are occurring, and the changes that are likely to follow in the decades to come.

The City also understands that some climate change impacts will develop slowly, while others will be in the form of big events. The City of Bayswater will need to adapt and be ready for these events.

Adaptation is about taking action to avoid, manage or reduce the consequences that will be brought about from climate events. Adapting to climate change must be integrated into day-to-day planning and risk management activities of Local Government and this discipline must be transferred within local communities.

The City of Bayswater, in partnership with the Eastern Metropolitan Regional Council (EMRC), has developed this Local Climate Change Adaptation Action Plan (LCCAAP) to address impacts of climate change that will create various challenges for Local Government, impacting not only on the environment but the City’s business operations and its communities.

The LCCAAP provides a strategic framework for actions that target a number of key environmental areas and environmental threats.

The City’s implementation of actions to assist in adapting to our changing climate will help further its aim to sustain communities, protect and enhance the environment, as well as open up opportunities to foster economic prosperity within the Eastern Region.

The City acknowledges that this Action Plan is one of the first steps in the adaptation process and that climate change needs to be addressed in an ongoing and sustained manner. As such, the LCCAAP will need to be regularly reviewed over time, in light of new events or knowledge that comes to hand in relation to the impacts of climate change, in order to develop and expand on local government adaptation actions.

Adoption and implementation of the LCCAAP will enable the City of Bayswater to establish local government leadership in the area of climate change adaptation and mitigation.

## **ACKNOWLEDGEMENTS**

The preparation of this report required considerable effort, resources and coordination between the City’s relevant officers and EMRC staff. The City of Bayswater would like to

thank its staff members for their contribution and support in this process. The City would especially like to thank the following staff who provided input into the development of the Regional and Local Climate Change Adaptation Action Plans during two workshops held in February 2009:

- Dean Cracknell, Strategic Project Coordinator/ Senior Planner
- Jeremy Maher, Environmental Coordinator
- Rod Strang, Manager Parks and Gardens
- James Riley, Manager Environmental Health
- Doug Pearson, Director of Technical Services
- Peter Grocott, Accountant
- George Rimpass, Manager Engineering services
- Des Abel, Director Planning and Development Services

The actions included in the LCCAAP were identified by the above group during the workshops.

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## INTRODUCTION

The City of Bayswater, known as the ‘Garden City’, covers an area of 33km<sup>2</sup> located just 8km north-east of Perth. It is home to over 55,000 residents, commercial districts and popular shopping precincts. It has over 10km of Swan River foreshore, 168 parks and reserves and a number of significant heritage buildings. The diverse and varied landscapes, activities and communities of the City are at risk from the impacts of climate change.

Scientists use computer models to predict climate change scenarios based on the amount of greenhouse gases in the atmosphere, along with other key indicators. Whilst there are no detailed climate change projections specifically for Perth’s Eastern Region, or the City of Bayswater, modelling undertaken at a broader scale (south-west Western Australia) can be applied to the City to give an indication of the likely impacts and magnitudes of climate related changes. The lack of detailed projections and scenarios for the region and the City is a constraint in undertaking precise impact assessment. However, this should not preclude climate change risk management activities being undertaken.

Scientific modelling indicates that the South West of Western Australia, including the City of Bayswater, will continue to be hard hit by forecast reductions in rainfall, increased temperatures, increased extreme weather events and further reductions in surface and groundwater resources.

<b>How climate change is likely to affect Perth’s Eastern Region</b>	
Climate change impacts for 2030 have been predicted to include:	Our predicted climate in 2070:
<ul style="list-style-type: none"> <li>• WA will be hotter, particularly in inland regions. Expected average temperature will increase 0.5 to 2 degrees.</li> <li>• Annual average number of days above 35 degrees could increase from the current 28 days to 29 – 48 days.</li> <li>• WA will be dryer, particularly in the South West. Rainfall reductions of 2% to 20% in annual rainfall with a 17% reduction in winter rain days and catchment runoff decreases of 5% to 40% are expected.</li> <li>• Sea-level will increase by 3 to 17 cm.</li> <li>• More frequent heat waves per year.</li> <li>• More frequent and severe droughts.</li> <li>• Increased bushfire risk.</li> <li>• Increased storm and flooding intensity.</li> <li>• More frequent and intense tropical cyclone occurrence.</li> </ul>	<ul style="list-style-type: none"> <li>• WA average temperature will continue to rise. Expected average temperature will increase up to 3 to 4 degrees.</li> <li>• Perth's annual average number of days above 35°C could increase from the current 28 days to 36 – 67 days.</li> <li>• WA will continue to become drier, with rainfall reductions of 5% to 20%.</li> <li>• Sea level will increase by 25 to 75 cm.</li> <li>• More frequent heat waves per year.</li> <li>• More frequent and severe droughts – up to 80% more droughts than current patterns.</li> <li>• Increased bushfire risk.</li> <li>• Increased storm and flooding intensity.</li> <li>• More frequent and intense tropical cyclone occurrence.</li> </ul>

Source: CSIRO and BOM (2007), IPCC (2007) and IOCI (2005)

These forecasted changes to the climate will create challenges for all levels of government, including the Local Government sector. Some of the key challenges for the City are likely to be the impacts on infrastructure, land use planning, human health, biodiversity, environmental health, fire and emergency services as well as parks and reserve management. Other broader key risks include the potential for changing economic viability of local industries and social dislocation.

The City has already taken some steps to reduce its contribution to climate change by reducing or mitigating its greenhouse gas emissions through implementation of EMRC's Achieving Carbon Emissions Reduction (ACER) Program and commitment to undertake the WALGA Reporting Platform that will enable the City to track and report their greenhouse gas emissions, energy consumption, and energy production. While mitigation continues to be important (as it is only through continuing to reduce carbon emissions that climate change trends can be slowed or even halted) it is now widely recognised that some climate change is unavoidable and that we will need to adapt to these changes.

Adaptation is about taking action to avoid, manage or reduce the consequences that will be brought about from our changing climate. Effective adaptation also requires recognising and taking advantage of the opportunities that new markets and new skills may present.

This Plan (LCCAAP) will help ensure that the City has the capacity and knowledge to adapt to these changing circumstances and can continue to provide a safe and peaceful environment promoting a harmonious high quality lifestyle to our community.

The LCCAAP provides a suite of actions that the City can implement to adapt to the anticipated impacts of climate change.

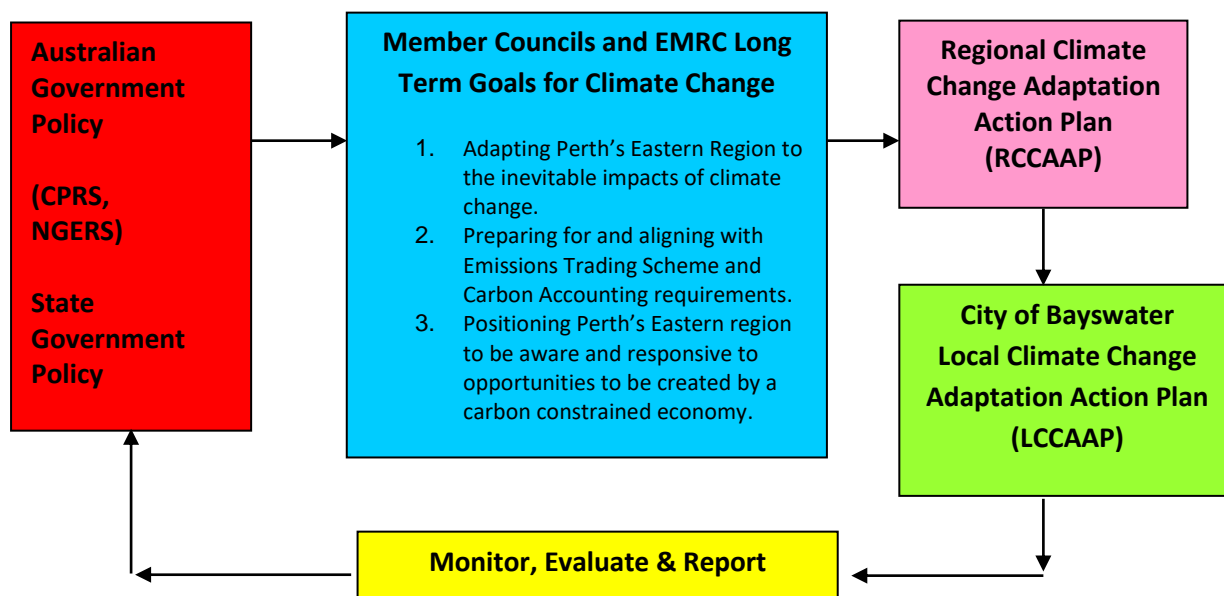
## REGIONAL STRATEGIC FRAMEWORK FOR CLIMATE CHANGE ADAPTATION

The potential impacts from climate change are both varied and extensive. In order to effectively adapt to the impacts of climate change, the City cannot act in isolation from the regional, state or national context.

For this reason, the City of Bayswater along with the EMRC and its other member Councils collaborated to undertake a comprehensive risk assessment to identify potential impacts and risks from climate change for the Perth Eastern Region. In addition, actions that could better prepare the Region to adapt to the pressures of climate change were identified. This formed the basis of a Regional Climate Change Adaptation Action Plan (RCCAAP) outlining what needs to be done at the regional level to adapt to climate change.

To consolidate and compliment the work done at the Regional level, the City has developed this Local Climate Change Adaptation Action Plan (LCCAAP). While the Regional Plan identifies actions which benefit from a regional approach, the LCCAAP focuses on actions related to the City's operations that are local in nature and/or partner with the community. This will ensure that climate change adaptation is integrated into the day-to-day planning and risk management activities of the City and its communities.

The relationship between the RCCAAP, the LCCAAP and the wider state and national context is described in the diagram below. The alignment of local and regional planning, within the wider context, will ensure a well planned and comprehensive approach for adapting to the challenges that are presented by climate change.



## STRATEGIC OBJECTIVES

### *"Our Community*

*Aspiration: A resilient community with a strong sense of purpose that is able to celebrate its diversity in numerous ways.*

### *"Our Natural Environment*

*Aspiration: We conserve and manage our natural environment, which makes the City of Bayswater a great place and we live in a sustainable way to protect our environment for future generations.*

*N2 A community which lives in a sustainable way.*

*N2.1 Promote the reduction of water and energy use to the community.*

*N2.2 Preserve and protect air quality.*

*N2.3 Encourage the community to have sustainable lifestyles.*

*N3 Reduce the City's carbon footprint.*

*N3.1 Reduce the City's water and energy use.*

*N3.2 Provide leadership in the delivery of sustainability initiatives.*

*N3.3 Regular communication with the community on the City's sustainability initiatives and achievements.*

To reflect this Vision, the City of Bayswater will implement a range of climate change adaptation and mitigation measures in order to better prepare, protect and inform its residents and rate payers for the anticipated impacts of climate change.

The Vision will be achieved through the application of a best practice risk management framework that sets strong, clear goals and is underpinned by sustainable principles that drive all actions outlined in this plan.

## AIM & PRINCIPLES

The aim of the LCCAAP is to provide a risk management approach and to clarify and develop local policy and planning actions to enable the City to adapt to the issues of climate change.

The LCCAAP will address key issues by aiming for the City to:

- Prepare itself and take necessary action so that it can adapt to the expected impacts of climate change with minimal impact to its operations and its community;
- Promote resilience and support local communities to partner with the City to improve the management of the local environment and community public assets;
- Encourage transport, planning and building systems that support low emissions and accommodate a changed climate;



- Support disadvantaged communities to adjust to the cost of a low emissions economy to reduce climate change impacts on these communities.

The following principles will underpin all future planning of initiatives relating to climate change adaptation while also addressing the key drivers for change.

The key principles are to:

- Continue to seek knowledge and improve our understanding of future climate change and its expected impacts;
- Engage with the community and other stakeholders in planning for climate change;
- Ensure that risk from climate change impacts are minimised and benefits to the community are maximised;
- Ensure that the City's planning schemes and development plans for commercial and residential development reflect the principles of future proofing for climate change;
- Ensure that local initiatives are supportive of the RCCAAP actions that are taken at a regional level; and
- Ensure community awareness and engagement occurs during planning and implementation processes.

## PRIORITY RISK AREAS

Nine priority risk areas, which contain actions for implementing climate change adaptation, have been identified. These align with the priority risk areas identified in the Regional Climate Change Adaptation Action Plan (RCCAAP) for Perth's Eastern Region.

The nine Priority Risk Areas, listed in no particular order, are found in the table below:

Priority Risk Areas	
1	Infrastructure Failure
2	Impacts on Essential Services (Power Loss and Water Availability)
3	Watercourse Damage and Loss
4	Water Decline and Reduced Water Quality
5	Greenhouse Gas Emissions and Related Air Pollution
6	Loss of Ecosystems and Provision of Public Open Space
7	Decline in Population Health and Wellbeing
8	Economic Challenges and Opportunities
9	Changing Leadership and Development Requirements

*Note: Some actions cross over more than one priority risk area.*

## RISK ANALYSIS

A risk matrix was applied to establish risk prioritisation values. A risk matrix presents combinations of consequence and likelihood, and aligns them to a risk level.

### Risk Matrix

LIKELIHOOD	CONSEQUENCE				
	Insignificant	Minor	Moderate	Major	Catastrophic
Almost Certain	Medium	Medium	High	Extreme	Extreme
Likely	Low	Medium	High	High	Extreme
Possible	Low	Medium	Medium	High	High
Unlikely	Low	Low	Medium	Medium	Medium
Rare	Low	Low	Low	Low	Medium

Following this matrix, an impact that is almost certain to occur, which has a Moderate consequence, is considered to be a High Risk. While an impact that is Unlikely to occur, and has a Minor consequence, is considered to be a Low Risk. The definitions for each risk level are presented below.

**EXTREME** priority risks demand urgent attention at the most senior level and cannot be simply accepted as part of routine operations. Actions required to treat an extreme priority risk are likely to be beyond the standard operational procedures and require additional human and/or financial resources.

**HIGH** priority risks are the most severe that can be accepted as part of routine operations, but they will be the responsibility of the most senior operational management. Senior management will be responsible for ensuring that adaptation actions towards management of the risk are implemented.

**MEDIUM** priority risks can be expected to form part of routine operations but they will be explicitly assigned to relevant managers for action and maintained under review.

**LOW** priority risks will be maintained under review but it is expected that existing controls will be sufficient.

In general, EXTREME and HIGH priority risks need to be treated immediately or subject to more detailed analysis. Low priority risks on the other hand, may be set aside with no further action to treat them apart from routine reviews to ensure that there has been no change that would make them more severe.

## **TIMEFRAMES**

The timeframes link to Local Government planning and budget cycles and were selected based on an understanding of the local context in which the action would be implemented. The LCCAAP will address each of the priority risk areas in turn and identify the actions necessary to achieve the objectives.

<b>Timeframe</b>	<b>Time</b>
Immediate	2013-2014
Short term	2013-2015
Medium term	2013-2017
Long term	2013-2027

## **MONITORING AND REVIEW**

The LCCAAP will be monitored annually to determine progress against the Plan.

A major review will be undertaken in 2015 to identify future action that might be needed. This review will coincide with a review of the RCCAAP and will take into account any changes to climate change action at a regional scale.

## PRIORITY RISK AREA 1 - Infrastructure Failure

Infrastructure plays a critical role in the community. It supports economic activity, links people to services, helps improve productivity and enhances our lives. Notably, the initial investment in infrastructure is typically significant. In addition, major infrastructure often has a long lifespan. Therefore, it is imperative that our infrastructure is designed, built, operated and maintained in a way that enables it to withstand current as well as future impacts, including climate change.

The provision and maintenance of infrastructure is one of the core responsibilities of local government and is vital for making the environment more practical and accessible for the community. The City's built environment positively contributes to the quality of life of residents, the image of the City and the amenity of the City's economic vitality. It comprises public infrastructure (e.g. roads, footpaths, rights-of-way, street lighting, drainage, parks and bushland) and public facilities (e.g. Council's buildings for community use).

Climate change factors such as drought, bushfires, extreme rainfall and flooding, extreme temperatures and acid sulphate soils will have the potential to impact upon this physical infrastructure. Infrastructure, including roads, buildings and drainage may all require higher costs for maintenance, more frequent repair and maintenance schedules and additional costs for upgrading. Similarly, consideration needs to be given to changing requirements in relation to higher building and construction standards when planning for and maintaining assets.

The City must be able to respond to any possible infrastructure failure in an effective and timely manner to ensure that there is minimal impact on local residents and the City's operations. This requires knowledge of the potential climate change impacts, vulnerability of infrastructure, likelihood of failure and appropriate response management plans.

### Objectives

- To ensure that the City's existing and new infrastructure is resilient to the impacts of climate change.
- To ensure the City is able to respond in the event of infrastructure failure.

The RCCAAP includes an action to 'advocate to Department of Water (DoW) to utilise and update existing flood modelling to identify priority areas and infrastructure across the region at high risk of flooding.'

	Action Required	Timeframe	Risk Level	Officer Resources	Budget
1.1	Continue with current practices in ensuring: <ul style="list-style-type: none"> <li>• Risk of exposure of actual or potential Acid</li> </ul>	Immediate	High	Planning	

	Action Required	Timeframe	Risk Level	Officer Resources	Budget
	<p>Sulphate Soils is considered for all developments, and conditions for further investigation and remediation are applied if required.</p> <ul style="list-style-type: none"> <li>Assessment of Acid Sulphate Soils risk is undertaken for Council construction works.</li> </ul>				
1.2	Install, where appropriate, signage to indicate flood prone areas.	Short	High	Health/Community Services	Subject to Funding
1.3	Review insurance for the City with relation to flooding.	Short	Medium	Building	Subject to Funding
1.5	Review the role of the City's Planning Scheme in considering the potential impacts associated with climate change.	Medium	High	Planning	Normal Budget Expenditure
1.6	Identify a prioritised list of infrastructure that is likely to be at risk of damage due to climate change impacts.	Medium	High	Planning	Subject to In-kind Resources

## PRIORITY RISK AREA 2 - Impacts on Essential Services

Power and water services are essential for the City's operations, the City's business and community sectors and households and residents. Interruption to or loss of these services for any period of time can have severe repercussions.

Disruption to electricity and fuel supplies may result in consequences such as increased electricity and fuel costs; lack of access to air conditioning and lighting; and disruptions to medical equipment, refrigeration and commercial equipment, resulting in various negative health and financial consequences.

Increased temperatures and decreased rainfall have reduced water availability in the south-west of Western Australia. This has implications for residential, rural and industrial/commercial water use and could result in increasing costs and further restrictions being placed on water consumption.

The provision of power and water are essential services provided for by the State Government and as such the City of Bayswater has limited ability to influence future proofing of these services other than through provision of assistance in emergency management, and action through advocacy.

The RCCAAP details a comprehensive range of advocacy actions that focus on pursuing positive and sustainable outcomes for the provision of these services in the Perth Eastern Region. While the EMRC will take the lead in advocating for the Region, the City will provide support and strength to these advocacy campaigns.

In addition, the City can take steps to ensure that it has the capability to cope with disruptions to these essential services with minimal impact on its operations and the community.

### Objectives

- To minimise the risk to the City from loss of power by undertaking appropriate energy management practices.
- To minimise the risk to the City from reduced water availability by undertaking appropriate water management practices.
- To minimise the risk to the City from extreme weather events which impact on power and water infrastructure and services.

	Action Required	Timeframe	Risk Level	Officer Resources	Budget
2.1	Promote to the community available grant funding for alternative energy and improve information provided to residents on energy efficiency.	Immediate	High	Environmental Services/ Planning and Development Services	Subject to In-kind Resources

	Action Required	Timeframe	Risk Level	Officer Resources	Budget
2.2	Promote passive solar building design via Council's website.	Immediate	High	Environmental Services	Subject to In-kind Resources
2.3	Promote the use of storm or rain water and recycled water, and promote these principles in new civic infrastructure.	Short	High	Environmental Services/Planning/Design & Construction	Subject to In-kind Resources
2.4	Undertake community education campaign with a focus on water and energy conservation.	Short	High	Environmental Services	Subject to Funding
2.5	Support community engagement programmes such as 'Living Smart'.	Short	High	Environmental Services	Subject to Funding
2.6	Support community engagement programmes such as 'Travel Smart'.	Short	High	Environmental Services/Engineering Services/Planning and Development Services/Community Services	Subject to Funding
2.7	Promote water efficient building and landscaping designs via Council's website.	Ongoing	High	Environmental Services/ Planning and Development Services	Subject to In-kind Resources
2.8	Promote and encourage PV panel installation within residential and commercial sector.	Ongoing	High	Environmental Services	Subject to In-kind Resources
2.9	Identify Emergency Management risks that may be heightened by predicted climate change events	Short	High	Emergency Management	Subject to In-kind Resources

### **PRIORITY RISK AREA 3 – Watercourse Damage and Loss**

The City's drains and watercourses play a vital role in collecting and distributing water, sustaining ecosystems and contributing to water supply. They support a high diversity of living organisms and play an important role in many physical, biological and chemical processes. The City's drains and watercourses are an important feature of the natural environment and as such, it is critical that their health and viability is maintained.

In addition to the existing pressures from land use, salinity and loss of vegetation, climate change will add further pressure by increasing erosion and subsidence, sedimentation, flooding and creating potential acid sulphate soils.

The City's drains and watercourses are likely to be impacted by alterations to sea levels and tidal and saltwater incursion further up the Swan River (Swan River Trust, 2007) leading to salt water incursion into wetlands and groundwater supplies, flooding of low lying areas and altered biodiversity. The consequences of increased periodic river flooding events include:

- Damage to infrastructure;
- Higher risks to public safety and therefore higher costs for management, e.g., signage for peak events, temporary road and park closures and diversion of traffic;
- Higher costs for storm water drainage maintenance, repairs and upgrades; and
- Higher emergency management and response costs.

Foreshore erosion and subsidence poses a significant risk to infrastructure, vegetation and habitat along waterways. It also can be a risk to public safety and amenity. Rigid building structures along the river foreshores such as dual use paths, bridges, jetties, retaining walls and sandy beach fronts are at risk from erosion and subsidence.

Drought conditions are likely to exacerbate erosion and downstream sedimentation. Higher sediment loads enter rivers following extreme rainfall events or extreme bushfire events, both of which are projected to increase with climate change. Changed climatic conditions are also likely to produce conditions that favour riparian and aquatic weeds and algal blooms (Australian Government Department of Climate Change, 2009). Sedimentation may also lead to increased blockage of gutters and drains

Falling groundwater tables and pressure for inner city high rise density development in and around waterways have the potential to expose potential acid sulphate soils (PASS).

The City's watercourses and foreshore areas are an invaluable environmental and community asset that will be under significant threat unless adaption measures are put in place sooner rather than later.

#### **Objectives**

- To reduce the impact of the drainage system on the City's watercourses.
- To facilitate the community in the rehabilitation and management of watercourses.



- To ensure that the City's planning and development activities create a positive impact on watercourses.

	Action Required	Timeframe	Risk Level	Officer Resources	Budget
3.1	Increase budget allocated to maintenance of the drainage system.	Immediate	High	Engineering Services	<b>Note:</b> Budget allocation to maintenance of the drainage system has been increased.
3.2	Increase sweeping and gutter educating to reduce sediment entering water ways.	Immediate	High	Engineering Services	<b>Note:</b> The City has purchased additional equipment for increased sweeping and gully educating.
3.4	Apply to Dept of Fire and Emergency Services (DFES) of Western Australia for grant funding to implement community education programs related to flood management.	Immediate	Low	Community Services	Subject to In-kind Resources
3.5	Apply for funding for foreshore protection infrastructure as funding opportunities arise.	Short	High	Environmental Services	Subject to In-kind Resources
3.6	Conduct a feasibility study to determine whether council land and drainage features are able to incorporate WSUD features, to maximise their ability to withstand more extreme weather events.	Medium	High	Engineering Services	Subject to funding

## PRIORITY RISK AREA 4 – Water Decline and Reduced Water Quality

With the current water shortage in Perth, water conservation is now a high profile issue. With consumption ever increasing and the unreliability of supply due to climatic changes (increased temperatures and decreased rainfall), water availability and water quality will be a continuing challenge to the City and its communities.

The consequences of reduced rainfall and declining groundwater tables include higher costs for managing natural water features in parks and reserves such as creeklines and lakes/wetlands. These costs may include management of botulism outbreaks at more locations and over longer periods than is current, replacement or re-establishment of vegetation lost through changing hydrology, higher costs for monitoring vegetation and for analysing and responding to observed changes.

Reduced water quality leading to illness and disease is also a concern with consequences such as increased prices and increased competition for water. This may also have an impact on public health programs and result in more demands on the City's environmental health officers.

The City is addressing water availability and water quality issues by participating in the *Water Campaign*<sup>TM</sup> Program, an initiative of the International Council for Local Environmental Initiatives (ICLEI). This Program provides a framework for Local Government to improve their water management and influence the community's water management.

### Objectives

- To decrease the City's water use and improve water quality through appropriate management activities.

	Action Required	Timeframe	Risk Level	Officer Resources	Budget
4.1	Continue to improve the City's Water Conservation Plan and Bayswater Brook Action Plan.	Immediate	Medium	Environmental Services/EMRC	Normal Budget Expenditure
4.2	Continue to implement water quality and water conservation actions through the <i>Water Campaign</i> <sup>TM</sup> and Waterwise Council Programs, including inventory and data management, action planning, water efficient appliances, and rainwater and greywater use.	Ongoing	High	Environmental Services/EMRC	Normal Budget Expenditure
4.3	Continue to implement	Immediate	Medium	Environmental	Normal Budget

	Action Required	Timeframe	Risk Level	Officer Resources	Budget
	community education on water efficient gardening and water efficiency including Great Gardens workshops and giveaways of native seedlings.			Services	Expenditure
4.4	Ensure that the City's watering regimes continue to meet State guidelines.	Immediate	Medium	Subject to cost in kind	Operational Services
4.5	Continue with drainage water quality monitoring.	Short	High	Environmental Services	Subject to normal budget expenditure; Subject to funding
4.6	Undertake a review of the City's Public Open Space to determine future watering requirements.	Immediate	Medium	Subject to cost in kind	Operational Services

## PRIORITY RISK AREA 5 – Greenhouse Gas Emissions and Related Air Pollution

The mitigation of greenhouse gases is an important component of climate change adaptation. The City has been reducing its emissions through participation in the Cities for Climate Protection program. However, the City needs to continue to build on the progress it has already achieved.

Ongoing initiatives to date include implementation of the Achieving Carbon Emissions Reduction (ACEr) Program and a commitment to utilise the WALGA Reporting Platform that will enable the City to track and report their greenhouse gas emissions, energy consumption, and energy production.

The City needs to continue to incorporate greenhouse friendly practices into its operations and in the building and retrofitting of its assets.

Transport is an area that continues to be a significant challenge for the City when it comes to reduction of greenhouse gas emissions and potential air pollution. The City contains heavy transport networks, large industrial sectors and lacks efficient public transportation services. All these aspects will give rise to vehicle dependency and increasing pollution.

The City also has a clear role to play in educating and facilitating the community to reduce its greenhouse gas emissions and to create a greater awareness and understanding of air quality issues.

### Objectives

- To undertake appropriate energy management practices including the use of alternative energies.

	Action Required	Timeframe	Risk Level	Officer Resources	Budget
5.1	Participate in the Achieving Carbon Emissions Reduction (ACEr) Program	Ongoing	High	Environmental Services/EMRC	Normal Budget Expenditure
5.2	Utilise WALGA Reporting Platform to track and report greenhouse gas emissions, energy consumption, and energy production.	Ongoing	High	Environmental Services	Normal Budget Expenditure
5.3	Undertake a costing study on different options for greening the City's car fleet including carbon neutral and hybrid cars	Immediate	High	Engineering Services	<b>Note:</b> The City has undertaken a study, which was used to purchase hybrid vehicles and diesel vehicles for the City.

	Action Required	Timeframe	Risk Level	Officer Resources	Budget
5.4	Undertake active involvement in regional transport planning initiatives (eg. EMRC's RITS).	Ongoing	Medium	Environmental Services / Planning	Normal Budget Expenditure

## **PRIORITY RISK AREA 6 – Loss of ecosystems and provision of public open space**

The City's natural ecosystems are already under stress and climate change will add further pressures. Natural ecosystems are important to all aspects of life as they provide ecosystem services essential for all life as well as supporting regional industries and economies.

The City has significant communities of flora and fauna and it is this biological heritage it is looking to maintain and enhance. Reduced rainfall and changed temperature regimes may result in local native species being unable to breed or survive in their current habitats. Failure to build resilience into our natural ecosystems and help them to adapt to climate change will result in far reaching consequences with many animal and plant species being lost forever.

A natural environment is also essential for the health and well being of local communities by providing recreational opportunities. Climate change presents a real challenge for maintaining the current level of provision and amenity of sporting, recreational and leisure facilities.

The City is required to balance finite resources against the community's expectations for increasing access to high quality public open space while also complying with a range of statutory obligations being placed upon them by State and Federal agencies relating to aspects of public open space provision. Falling groundwater levels and reduced groundwater allocations, increasing evaporation and urban expansion are also set to present a significant challenge for governance, policy development and management concerning the ongoing provision of irrigated sports grounds, public open spaces, verges and medians.

### **Objectives**

- Continue and improve the City's biodiversity and ecosystem protection and enhancement activities.
- Provide public open space that meets the community's needs and reflects the local ecosystems and environmental conditions.

	Action Required	Timeframe	Risk Level	Officer Resources	Budget
6.1	Continue to manage bushland and wetlands within the City.	Immediate	High	Environmental Services	Normal Budget Expenditure
6.2	Continue to use best practice turf management.	Immediate	High	Parks/Gardens	Normal Budget Expenditure
6.3	Continue with	Immediate	Medium	Environmental	Normal Budget

	Action Required	Timeframe	Risk Level	Officer Resources	Budget
	foreshore restoration, revegetation and maintenance.			Services	Expenditure
6.4	Review the City's Public Open Space Strategy to determine climate change adaptation requirements	Medium	Medium	Environmental Services	Normal Budget Expenditure
6.5	Continue implementation of the Collective Biodiversity Strategy	Medium	Medium	Environmental Services	Normal Budget Expenditure
6.6	Support local community to undertake biodiversity conservation activities.	Immediate	High	Environmental Services	Normal Budget Expenditure

## PRIORITY RISK AREA 7 – Decline in Population Health and Wellbeing

There is a growing recognition that climate change will have significant impacts on human health and populations. The increase in people suffering from disease and injury due to heatwaves and severe weather events such as floods, fires and storms will lead to ever increasing issues with mental health and stress and displaced and homeless people.

There may be an increased workload for the City's environmental health officers and management requirements to deal with potential health risks associated with changing climate including increased risk of vector, food and water borne disease as seasonal epidemics such as Ross River virus spread south with changing climatic conditions and increased injury levels sustained as a result of more frequent extreme weather conditions (floods, cyclones, gales).

There may be consequences for City facilities that may not have adequate heating and cooling particularly with aged care and childcare facilities. There may also be additional occupational health and safety concerns particularly for outdoor workers.

Displaced populations was identified as being a high risk to Local Government services and operations, with climate change possibly resulting in increased urban immigration on a regional, national and international level. Whilst managing displaced populations is essentially a Federal Government responsibility, rising sea levels could see "climate refugees" relocate to Australia with consequences for the City such as increased pressure for social services and social issues.

Pressure to develop current undeveloped lands may also result with a need to meet increasing housing pressure.

### Objectives

- To ensure that appropriate planning and policy mechanisms are in place to facilitate the management of increased health risks as a result of climate change.
- To ensure that appropriate policy, procedures and infrastructure are in place to protect the health and well-being of the City's staff and the community.

	Action Required	Timeframe	Risk Level	Officer Resources	Budget
7.1	Continue to monitor, treat and assess new potential mosquito breeding sites.	Immediate	Medium	Health Services	Normal Budget Expenditure
7.2	Continue enforcement of Health Local Law to prevent mosquito breeding and rodent breeding	Immediate	Medium	Health Services	Normal Budget Expenditure
7.3	Incorporate a heat emergency response	Short	High	Health/Community Services	Subject to In-kind



	Action Required	Timeframe	Risk Level	Officer Resources	Budget
	within the City's Emergency Plan, and ensure vulnerable groups are protected.				Resources
7.4	Incorporate a review of emergency evacuation plans and shelters into the City's local emergency management plan to ensure they meet known climate change impacts and help maximise the safety of the Bayswater community.	Medium	High	Health/Community Services	Subject to In-kind Resources
7.5	Review Occupational Safety and Health policies and procedures for all outside staff.	Short	High	Human Resources	Subject to In-kind Resources
7.6	Ensure City-wide infrastructure and facilities provide heat protection.	Medium	Medium	Planning/Development	Subject to In-kind Resources
7.7	Educate food businesses on the potential for increased risks associated with temperature control.	Medium	Low	Subject to In-kind Resources	Environmental Services
7.8	Consider what predicted impacts climate change may have on workforce planning.				

## PRIORITY RISK AREA 8 – Economic Challenges and Opportunities

Apart from the obvious environmental and physical impacts, climate change will also impact on business, industry, employment and the cost of resources, creating both economic challenges and opportunities. The City's role in dealing with these challenges and opportunities is two-fold. Firstly to maximise the efficiency of the City's operations so as to minimise the impact of rising resource costs. Secondly to help its communities adapt to these new challenges and opportunities.

Increased resource costs will impact on many aspects of the City's operations and services, including energy costs, water costs, road construction, building construction and waste management, not to mention the costs of adapting to climate change and participating in a potential carbon trading system. The City's residents will also be experiencing financial challenges from the increased costs of energy, water, fuel, food and services. It is important that the City minimises any costs that it may have to pass on through increased rates and cost of services.

Business and industry within the City may experience displacement due to climate change impacts. Industries that require high inputs of carbon/energy and imported materials will be vulnerable, whereas industries requiring low levels of imports and carbon energy will yield opportunities, such as service industries including health and education.

The growing role of Local Government in fostering economic development provides it with the mandate to support adaptation and innovation by existing industries; to facilitate a change in the industry mix to better match the altered climatic, economic and planning and regulatory conditions; and to attract new industries offering solutions to climate change. The City has a competitive advantage given its inland location from vulnerable coastal conditions and spread of existing residential, commercial and industrial areas; employment self sufficiency and self containment rates are also much better than other corridors of Perth's metropolitan area.

### Objectives

- Implementing a range of resource efficiency measures to reduce costs.
- Ensure the appropriate planning and policy mechanisms are able to support business to adapt to the impacts of climate change.

	Action Required	Timeframe	Risk Level	Officer Resources	Budget
8.1	Continue to conduct audits of Public Buildings to determine energy and water efficiency requirements.	Short	High	Subject to funding	Operational Services
8.2	Continue to implement ways to be water and energy efficient to decrease costs to	Short	Low	Environmental Services/Building Services	Normal Budget Expenditure

	Action Required	Timeframe	Risk Level	Officer Resources	Budget
	the City				
8.3	Implement the recommendations of the audit of Public Buildings to improve water and energy efficiency.	Medium	High	Subject to funding	Operational Services
8.4	Promote and provide energy efficiency education to local businesses.	Medium	Medium	Subject to funding	Economic Development Services; Environmental Services/EMRC
8.5	Investigate active transport access to activity centres located in the City of Bayswater to improve sustainability.	Medium	Medium	Planning and Development Services	<b>Note:</b> This has been included as part of the City's Transport Strategy.

## PRIORITY RISK AREA 9 – Changing Leadership and Development Requirements

The City's operations cover an extensive range of activities and extremely large asset portfolios. It is inevitable that most of these activities and assets will be impacted by climate change. The decisions that will come with climate change adaptation will be unprecedented and the City's decision makers will need to show both leadership and innovation.

In meeting the challenges that climate change will bring the City must be prepared to formally embed climate change into mainstream management and governance decision making. This means that climate change impacts and risks must be explicitly recognised and incorporated across all of the City's plans and procedures.

A broader issue for climate change adaptation will be to understand the legal liabilities that all levels of government will be faced with. This will require clarification of issues and associated legal responsibilities such as disclaimers and insurance requirements to protect local government from litigation as a result of climate change events. Insurers will also need to be transparent on matters of indemnification in order to make a level playing field for all. Liability issues are an emerging concern, with the Climate Risk Group, an advisor to government and business, advising that developers and Local Governments may face risk litigation for negligence if they fail to factor climate change into planning.

The City has many active environmental groups working to restore and protect our significant environmental bushland and wetland areas. These groups participate in on-ground activities (tree planting, rubbish collection, weed control), research (flora and fauna surveys), educational programs and strategic natural resource planning. The participation and involvement of the community in the management, rehabilitation and protection of the natural environment in the Swan Region is a key component in environmental management. The City will need to continue to nurture and support this community participation as it will be an invaluable asset in climate change adaptation.

### Objectives

- To build community and institutional capacity to meet the challenges of expected climate change impacts.
- To ensure the City has a clear understanding of its legal responsibilities related to climate change and insurance.

	Action Required	Timeframe	Risk Level	Officer Resources	Budget
9.1	Continue with community education on climate change through City programmes (eg. Perth Solar City, Future Proofing, ACER and Living Smart).	Immediate	High	Environmental Services/EMRC	Normal Budget Expenditure
9.2	Review existing insurance coverage to check whether flooding is	Immediate	Medium	Corporate Services	

	Action Required	Timeframe	Risk Level	Officer Resources	Budget
	covered.				
9.3	Develop indicator values/measures for the LCCAAP actions	Immediate	Medium	Environmental Services	Subject to In-kind Resources
9.4	Develop a Local Environment Strategy for the City	Immediate	Medium	Environmental Services/EMRC	Subject to Funding
9.5	Organise awareness raising seminar for Council staff with climate change expert presenters.	Short	High	Environmental Services/EMRC	Subject to Funding
9.6	Monitor the legal risks associated with climate change issues, such as incidences of legal precedence.	Ongoing	Extreme	Planning and Development Services/EMRC	Subject to Funding/Resources
9.7	Continue to support community organisations and their activities that relate to climate change impacts.	Ongoing	Medium	Environmental Services/EMRC	Subject to Funding
9.8	Undertake costing of the LCCAAP actions	Ongoing	Medium	Environmental Services/EMRC	Subject to In-kind Resources

## ACTIONS

### PRIORITY RISK AREA 1 - Infrastructure Failure

	Action Required	Timeframe	Risk Level	Officer Resources	Budget
1.1	Continue with current practices in ensuring: <ul style="list-style-type: none"> <li>Risk of exposure of actual or potential Acid Sulphate Soils is considered for all developments, and conditions for further investigation and remediation are applied if required.</li> <li>Assessment of Acid Sulphate Soils risk is undertaken for Council construction works.</li> </ul>	Immediate	High	Planning	
1.2	Install, where appropriate, signage to indicate flood prone areas.	Short	High	Health/Community Services	Subject to Funding
1.3	Review insurance for the City with relation to flooding.	Short	Medium	Building	Subject to Funding
1.5	Review the role of the City's Planning Scheme in considering the potential impacts associated with climate change.	Medium	High	Planning	Normal Budget Expenditure
1.6	Identify a prioritised list of infrastructure that is likely to be at risk of damage due to climate change impacts.	Medium	High	Planning	Subject to In-kind Resources

### PRIORITY RISK AREA 2 - Impacts on Essential Services

	Action Required	Timeframe	Risk Level	Officer Resources	Budget
2.1	Promote to the community available grant funding for alternative energy and improve information provided to residents on energy efficiency.	Immediate	High	Environmental Services/ Planning and Development Services	Subject to In-kind Resources

	Action Required	Timeframe	Risk Level	Officer Resources	Budget
2.2	Promote passive solar building design via Council's website.	Immediate	High	Environmental Services	Subject to In-kind Resources
2.3	Promote the use of storm or rain water and recycled water, and promote these principles in new civic infrastructure.	Short	High	Environmental Services/Planning/Design & Construction	Subject to In-kind Resources
2.4	Undertake community education campaign with a focus on water and energy conservation.	Short	High	Environmental Services	Subject to Funding
2.5	Support community engagement programmes such as 'Living Smart'.	Short	High	Environmental Services	Subject to Funding
2.6	Support community engagement programmes such as 'Travel Smart'.	Short	High	Environmental Services/Engineering Services/Planning and Development Services/Community Services	Subject to Funding
2.7	Promote water efficient building and landscaping designs via Council's website.	Ongoing	High	Environmental Services/Planning and Development Services	Subject to In-kind Resources
2.8	Promote and encourage PV panel installation within residential and commercial sector.	Ongoing	High	Environmental Services	Subject to In-kind Resources
2.9	Identify Emergency Management risks that may be heightened by predicted climate change events	Short	High	Emergency Management	Subject to In-kind Resources

### PRIORITY RISK AREA 3 – Watercourse Damage and Loss

	Action Required	Timeframe	Risk Level	Officer Resources	Budget
3.1	Increase budget allocated to maintenance of the drainage system.	Immediate	High	Engineering Services	<b>Note:</b> Budget allocation to maintenance of the drainage system has been increased.
3.2	Increase sweeping and gutter educating to reduce sediment	Immediate	High	Engineering Services	<b>Note:</b> The City has purchased additional equipment for

	entering water ways.				increased sweeping and gully educating.
3.4	Apply to Dept of Fire and Emergency Services (DFES) of Western Australia for grant funding to implement community education programs related to flood management.	Immediate	Low	Community Services	Subject to In-kind Resources
3.5	Apply for funding for foreshore protection infrastructure as funding opportunities arise.	Short	High	Environmental Services	Subject to In-kind Resources
3.6	Conduct a feasibility study to determine whether council land and drainage features are able to incorporate WSUD features, to maximise their ability to withstand more extreme weather events.	Medium	High	Engineering Services	Subject to funding

#### PRIORITY RISK AREA 4 – Water Decline and Reduced Water Quality

	Action Required	Timeframe	Risk Level	Officer Resources	Budget
4.1	Continue to improve the City's Water Conservation Plan and Bayswater Brook Action Plan.	Immediate	Medium	Environmental Services/EMRC	Normal Budget Expenditure
4.2	Continue to implement water quality and water conservation actions through the <i>Water Campaign</i> <sup>™</sup> and Waterwise Council Programs, including inventory and data management, action planning, water efficient appliances, and rainwater and greywater use.	Ongoing	High	Environmental Services/EMRC	Normal Budget Expenditure



	Action Required	Timeframe	Risk Level	Officer Resources	Budget
4.3	Continue to implement community education on water efficient gardening and water efficiency including Great Gardens workshops and giveaways of native seedlings.	Immediate	Medium	Environmental Services	Normal Budget Expenditure
4.4	Ensure that the City's watering regimes continue to meet State guidelines.	Immediate	Medium	Subject to cost in kind	Operational Services
4.5	Continue with drainage water quality monitoring.	Short	High	Environmental Services	Subject to normal budget expenditure; Subject to funding
4.6	Undertake a review of the City's Public Open Space to determine future watering requirements.	Immediate	Medium	Subject to cost in kind	Operational Services

#### PRIORITY RISK AREA 5 – Greenhouse Gas Emissions and Related Air Pollution

	Action Required	Timeframe	Risk Level	Officer Resources	Budget
5.1	Participate in the Achieving Carbon Emissions Reduction (ACER) Program	Ongoing	High	Environmental Services/EMRC	Normal Budget Expenditure
5.2	Utilise WALGA Reporting Platform to track and report greenhouse gas emissions, energy consumption, and energy production.	Ongoing	High	Environmental Services	Normal Budget Expenditure
5.3	Undertake a costing study on different options for greening the City's car fleet including carbon neutral and hybrid cars	Immediate	High	Engineering Services	<b>Note:</b> The City has undertaken a study, which was used to purchase hybrid vehicles and diesel vehicles for the City.

	Action Required	Timeframe	Risk Level	Officer Resources	Budget
5.4	Undertake active involvement in regional transport planning initiatives (eg. EMRC's RITS).	Ongoing	Medium	Environmental Services / Planning	Normal Budget Expenditure

### **PRIORITY RISK AREA 6 – Loss of ecosystems and provision of public open space**

	Action Required	Timeframe	Risk Level	Officer Resources	Budget
6.1	Continue to manage bushland and wetlands within the City.	Immediate	High	Environmental Services	Normal Budget Expenditure
6.2	Continue to use best practice turf management.	Immediate	High	Parks/Gardens	Normal Budget Expenditure
6.3	Continue with foreshore restoration, revegetation and maintenance.	Immediate	Medium	Environmental Services	Normal Budget Expenditure
6.4	Review the City's Public Open Space Strategy to determine climate change adaptation requirements				
6.5	Continue implementation of the Collective Biodiversity Strategy	Medium	Medium	Environmental Services	Normal Budget Expenditure
6.6	Support local community to undertake biodiversity conservation activities.	Immediate	High	Environmental Services	Normal Budget Expenditure

### PRIORITY RISK AREA 7 – Decline in Population Health and Wellbeing

	Action Required	Timeframe	Risk Level	Officer Resources	Budget
7.1	Continue to monitor, treat and assess new potential mosquito breeding sites.	Immediate	Medium	Health Services	Normal Budget Expenditure
7.2	Continue enforcement of Health Local Law to prevent mosquito breeding and rodent breeding	Immediate	Medium	Health Services	Normal Budget Expenditure
7.3	Incorporate a heat emergency response within the City's Emergency Plan, and ensure vulnerable groups are protected.	Short	High	Health/Community Services	Subject to In-kind Resources
7.4	Incorporate a review of emergency evacuation plans and shelters into the City's local emergency management plan to ensure they meet known climate change impacts and help maximise the safety of the Bayswater community.	Medium	High	Health/Community Services	Subject to In-kind Resources
7.5	Review Occupational Safety and Health policies and procedures for all outside staff.	Short	High	Human Resources	Subject to In-kind Resources
7.6	Ensure City-wide infrastructure and facilities provide heat protection.	Medium	Medium	Planning/Development	Subject to In-kind Resources
7.7	Educate food businesses on the potential for increased risks associated with temperature control.	Medium	Low	Subject to In-kind Resources	Environmental Services
7.8	Consider what predicted impacts climate change may have on workforce planning.				

### PRIORITY RISK AREA 8 – Economic Challenges and Opportunities

	Action Required	Timeframe	Risk Level	Officer Resources	Budget
8.1	Continue to conduct audits of Public Buildings to determine energy and water efficiency requirements.	Short	High	Subject to funding	Operational Services
8.2	Continue to implement ways to be water and energy efficient to decrease costs to the City	Short	Low	Environmental Services/Building Services	Normal Budget Expenditure
8.3	Implement the recommendations of the audit of Public Buildings to improve water and energy efficiency.	Medium	High	Subject to funding	Operational Services
8.4	Promote and provide energy efficiency education to local businesses.	Medium	Medium	Subject to funding	Economic Development Services; Environmental Services/EMRC
8.5	Investigate active transport access to activity centres located in the City of Bayswater to improve sustainability.	Medium	Medium	Planning and Development Services	<b>Note:</b> This has been included as part of the City's Transport Strategy.

### PRIORITY RISK AREA 9 – Changing Leadership and Development Requirements

	Action Required	Timeframe	Risk Level	Officer Resources	Budget
9.1	Continue with community education on climate change through City programmes (eg. Perth Solar City, Future Proofing, ACER and Living Smart).	Immediate	High	Environmental Services/EMRC	Normal Budget Expenditure
9.2	Review existing insurance coverage to check whether flooding is covered.	Immediate	Medium	Corporate Services	
9.3	Develop indicator values/measures for the LCCAAP actions	Immediate	Medium	Environmental Services	Subject to In-kind Resources

	Action Required	Timeframe	Risk Level	Officer Resources	Budget
9.4	Develop a Local Environment Strategy for the City	Immediate	Medium	Environmental Services/EMRC	Subject to Funding
9.5	Organise awareness raising seminar for Council staff with climate change expert presenters.	Short	High	Environmental Services/EMRC	Subject to Funding
9.6	Monitor the legal risks associated with climate change issues, such as incidences of legal precedence.	Ongoing	Extreme	Planning and Development Services/EMRC	Subject to Funding/Resources
9.7	Continue to support community organisations and their activities that relate to climate change impacts.	Ongoing	Medium	Environmental Services/EMRC	Subject to Funding
9.8	Undertake costing of the LCCAAP actions	Ongoing	Medium	Environmental Services/EMRC	Subject to In-kind Resources

## ACRONYMS AND ABBREVIATIONS

ACEr – Achieving Carbon Emissions reductions

AS – Australian Standard

ASS – Acid Sulphate Soils

ATSE – Australian Academy of Technological Sciences and Engineering

BCA – Building Code of Australia

BOM – Bureau of Meteorology

CCP – Cities for Climate Protection

CLAG - Co-ordinating Local Authorities Group

CPRS - Carbon Pollution Reduction Scheme

CSIRO – Commonwealth Scientific and Industrial Research Organisation

DEC – Department of Environment and Conservation

DFES – Department of Fire and Emergency Services

DIA – Department of Indigenous Affairs

DOH – Department of Health

DOHg – Department of Housing

DOW – Department of Water

DOP– Department of Planning

EMRC – Eastern Metropolitan Regional Council

EPA – Environmental Protection Authority

HCWA – Heritage Council of WA

IOCI - Indian Ocean Climate Initiative

IPCC - International Panel for Climate Change

LCCAAP- Local Climate Change Adaptation Action Plans

LGIS – Local Government Insurance Services

MRS – Metropolitan Regional Scheme

MRWA – Main Roads WA

NGERS - National Greenhouse and Energy Reporting System

PASS – Potential Acid Sulphate Soils

PER – Perth’s Eastern Region

PTA – Public Transport Authority

RCCAAP – Regional Climate Change Adaptation Action Plan

RAS – Regional Advocacy Strategy

RES – Regional Economic Strategy

RITS – Regional Integrated Transport Strategy

SHRMF – Swan and Helena River Management Framework

SRT – Swan River Trust

WALGA – WA Local Government Association

WAPC – WA Planning Commission

WC – Water Corporation

WP – Western Power

WQIP – Water Quality Improvement Plan

## GLOSSARY

Adaptation	Making adjustments to existing activities and practices so that vulnerability to potential impacts associated with climate change can be reduced or opportunities realised.
Adaptation Action	Specific tasks required to ensure that the adaptation measure is implemented.
Acid Sulphate Soil	A soil with naturally occurring sediments that contain sulfides that have or may have the potential to generate sulfuric acid when exposed to air.
Algal Bloom	Algal blooms are the proliferation of either macroalgae (seaweed) or surface scum accumulation or brightly coloured water due to microalgae (phytoplankton).
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.
Disease Vectors	An organism that does not cause disease itself but that transmits infection by conveying pathogens from one host to another, serving as a route of transmission.
Peak Oil	Peak oil is the point in time when the maximum rate of global petroleum extraction is reached, after which the rate of production enters terminal decline.
Resilience	The ability of human or natural systems to withstand, recover from or adapt to significant pressures and stresses without losing their essential characteristics.
Riparian	The area of land bordering a waterway, where the structure, function and composition of the landscape are influenced by the waterway.



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