

Report 9 of 2023

Climate change risk management



Report of the Auditor-General

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Climate change risk management

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First Session, Fifty-Fifth Parliament

By authority: M. Dowling, Government Printer, South Australia

2023

*The Auditor-General's Department acknowledges and respects
Aboriginal people as the State's first people and nations, and
recognises Aboriginal people as traditional owners and occupants of
South Australian land and waters.*



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Enquiries about this report should be directed to:

Auditor-General
Auditor-General's Department
Level 9, 200 Victoria Square
Adelaide SA 5000

ISSN 0815-9157



Level 9
State Administration Centre
200 Victoria Square
Adelaide SA 5000
Tel +618 8226 9640
ABN 53 327 061 410
audgensa@audit.sa.gov.au
www.audit.sa.gov.au

26 October 2023

President
Legislative Council
Parliament House
ADELAIDE SA 5000

Speaker
House of Assembly
Parliament House
ADELAIDE SA 5000

Dear President and Speaker

**Report of the Auditor-General:
Report 9 of 2023 *Climate change risk management***

Under section 31(2) of the *Public Finance and Audit Act 1987* (PFAA), I have conducted a performance audit of the South Australian Government's management of climate change risks.

I present to each of you my independent assurance report on the findings of the audit.

Copies of this report have also been provided to the:

- Treasurer
- Minister for Climate, Environment and Water
- Minister for Human Services
- Minister for Infrastructure and Transport
- Minister for Police, Emergency Services and Correctional Services
- Minister for Primary Industries and Regional Development.

Content of the report

We reviewed a sample of six public authorities (agencies) to form an independent view of the effectiveness of arrangements currently in place across the SA Government for managing physical climate risks. We also reviewed the central coordination of climate change risk management. The agencies we reviewed were the:

- Department for Environment and Water
- Department for Infrastructure and Transport
- Department of Primary Industries and Regions
- South Australian Fire and Emergency Services Commission
- South Australian Housing Trust
- South Australian Water Corporation.

My responsibilities

Performance audits conducted under section 31(2) of the PFAA are assurance engagements that assess whether public sector programs or activities are achieving economy, efficiency and effectiveness in using available resources. These engagements conclude on the performance of the programs or activities evaluated against identified criteria.

The Auditor-General's roles and responsibilities in conducting performance audits are set out in the PFAA. Section 31 of the PFAA empowers me to conduct these audits, while sections 37 and 38 outline the reporting arrangements.

The audit was conducted in line with the Standard on Assurance Engagements ASAE 3500 *Performance Engagements*. We complied with the independence and other relevant ethical requirements for assurance engagements.

Acknowledgements

The audit team for this report was Salv Bianco, Philip Rossi, Simon Altus and Jodie Fitzgerald. They were assisted by Jacobs Group (Australia) Pty Ltd.

We appreciate the cooperation given by staff of the agencies reviewed during the course of our audit. We are particularly grateful for their constructive approach and helpful assistance.

Yours sincerely

A handwritten signature in black ink, appearing to read 'Richardson', with a long horizontal flourish extending to the right.

Andrew Richardson
Auditor-General

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Audit snapshot

What we reviewed and why

Climate change is a known risk that could have catastrophic economic and social consequences and could impact the SA Government's ability to meet its objectives.

We reviewed six public authorities (agencies) to form a view on the effectiveness of arrangements in place across the SA Government for managing climate change risk. We also reviewed the central coordination of climate change risk management across the SA Government.

Effective climate change risk management practices are essential to ensuring the SA Government has the best understanding of the State's exposure to climate change risks and their consequences, and can help it to:

- build climate resilience
- prioritise appropriate responses to risks and optimise the use of resources
- reduce the costs of maintaining and upgrading key infrastructure assets.

What we concluded

Government agencies recognise the importance of managing climate change risk and act on climate change impacts across a broad range of their operations. Various initiatives to respond to climate change are in place or planned by both individual agencies and at the whole-of-government level.

As government agencies are mostly in the early stages of adopting climate change risk management practices, key elements of good practice were either still being developed or not yet implemented. Because of this, we concluded that there is still much to do before the SA Government can demonstrate effective climate change risk management.

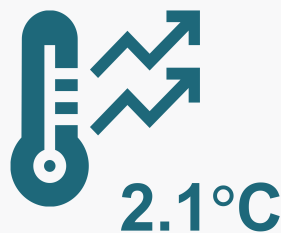
Effective central coordination and monitoring is critical to establishing sound climate change risk management arrangements. The SA Government needs to resolve which central agencies will have this role.

Key facts

31 May 2022



Climate emergency declared by the South Australian Parliament



The projected rise in South Australia's daily maximum temperature by 2050

June to August 2023



The Earth's hottest three-month period on record

1 Executive summary

1.1 Introduction

Climate change is a known risk that could have catastrophic economic, environmental and social consequences and could impact the SA Government's ability to meet its objectives.

In May 2022, both Houses of the South Australian Parliament passed a motion to declare that South Australia is facing a climate emergency. This reinforces that urgent action is required to respond to climate change, including government agencies establishing sound practices to effectively manage the climate change risks they face.

In November 2022, the Department for Environment and Water (DEW) noted that:

The climate of South Australia is changing. Temperatures have been increasing and rainfall has been declining. There have been longer, hotter and more frequent heatwaves, an increase in dangerous fire weather, an increase in the intensity of heavy rain events and rising sea levels along our coast. Projections of future climate indicate these changes are likely to continue over coming decades, increasingly affecting communities, industries, infrastructure and the environment in every part of the state and requiring every sector of society and the economy to adapt.¹

Climate change impacts can adversely affect critical public infrastructure and services, and governments play an important role in minimising the impacts and costs to the community.

Having effective and coordinated climate change risk management practices across the public sector will help ensure the SA Government has the best understanding of the State's exposure to climate change risks and their consequences. This will help it to implement the most appropriate responses to these risks.

Climate risk management is an emerging practice in the SA Government and more generally across some other sectors.

We reviewed a sample of six agencies to form an independent view of the effectiveness of the SA Government's current arrangements for managing physical climate change risks. Agencies have no specific obligations or central guidance in this area. Our work with the agencies enabled us to identify evidence-based next steps for them in responding to climate change risk. We also identified examples of good practice. The agencies we reviewed were:

- Department for Environment and Water
- Department for Infrastructure and Transport
- Department of Primary Industries and Regions

¹ Department for Environment and Water 2022, *Guide to climate projections for risk assessment and planning in South Australia 2022*, Government of South Australia, through the Department for Environment and Water, Adelaide, November, p. 8.

- South Australian Fire and Emergency Services Commission
- South Australian Housing Trust
- South Australian Water Corporation.

We also reviewed the central coordination of climate change risk management across the SA Government. Details of our audit mandate, objective and scope are provided in Appendix 1.

1.2 Conclusion

The government agencies we reviewed recognise the importance of managing climate change risk and act on climate change impacts across a broad range of their operations. Various initiatives are in place, or planned, by both individual agencies and at the whole-of-government level.

As these agencies are mostly in the early stages of adopting climate change risk management practices, key elements of good practice were either still being developed or not yet implemented. Because of this, we concluded that there is still much to do before the SA Government can demonstrate effective climate change risk management.

The SA Government and individual agencies need to progress and implement a range of key actions to effectively respond to existing and future climate impacts. This will be challenging, and the pressing need to address climate change means that these actions will inevitably compete with other government priorities.

The key actions include:

- establishing a central coordination and monitoring function charged with leading climate change risk management across the SA Government
- helping agencies determine their approach to managing climate change risks, which includes performing climate change risk assessments, increasing staff capabilities and establishing reporting and review arrangements.

Effective central coordination and monitoring is critical to establishing mature climate change risk management arrangements. The Department of the Premier and Cabinet (DPC) and the Department of Treasury and Finance (DTF) have the authoritative standing to lead and play key roles in ensuring a range of whole-of-government strategies and ensure they progress satisfactorily. We concluded that managing climate change risk requires such leadership. The SA Government needs to resolve which agencies will have this role.

1.3 What we recommended

As climate change risk management is an evolving area, our recommendations seek to constructively identify priority areas for improvement as the SA Government progresses its climate change risk management practices. These are summarised below.

1.3.1 Central leadership, coordination and monitoring

Central leadership, coordination and monitoring are necessary to ensure that climate change risks are understood, managed and prioritised from a whole-of-state perspective, in a manner consistent with Parliament's climate emergency declaration. This will necessarily include establishing clear lines of responsibility, leadership and accountability to ensure climate change risk management practices progress.

It will be necessary to involve central government agencies like DPC and DTF to clarify roles, provide guidance to agencies and influence the progress of climate change risk management practices.

DEW has been progressing some elements of central coordination and monitoring, but it does not have formal responsibility for all of the required elements as some still need to be settled. To advance the State's central leadership, coordination and monitoring practices, DEW should:

- communicate the availability of central guidance documents once it finalises them and establish a process to help SA Government agencies apply them
- work with DPC and DTF to establish a framework that clearly defines and allocates roles and responsibilities for key aspects of climate change risk management across the SA Government
- work with DPC and DTF to help deliver the SA Government's objective to embed climate change risk management into government policy and practice
- work with DPC and DTF to determine and implement an ongoing whole-of-state level climate change risk monitoring function, which should be built into its climate change risk management framework and guidance
- continue to obtain feedback from agencies on the effectiveness of training materials after they have been implemented
- implement actions to improve its engagement with SA Government agencies to better understand their climate information needs.

Further details on these recommendations and our audit observations for central leadership, coordination and monitoring can be found in section 3.

1.3.2 Climate change risk management practices at individual agencies

Climate change risk is pervasive, and all government agencies must respond according to their exposure and role. To effectively respond to future climate impacts, agencies should:

- establish an approach for managing their climate change risks
- provide guidance to their staff on the unique characteristics of climate change risks and how to assess them

- perform strategic and operational climate change risk assessments
- define a target level of climate change risk management capability, assess their current level of capability, where relevant, and identify any actions needed to achieve their capability target
- define and assign roles and responsibilities for climate change risk management processes
- assess whether using adaptive planning concepts will help them to better plan and respond to their climate change risks
- establish reporting to senior management and governance groups on climate change risks
- when their climate change risk management practices are developed, integrate them into their overall risk management processes.

Further details on these recommendations and our audit observations for individual agencies can be found in sections 4 to 8.

1.4 Responses to our recommendations

We provided a detailed management letter to DEW outlining our central leadership, coordination and monitoring observations and recommendations. DEW responded positively, outlining the actions it has underway or proposed for each of our recommendations. DEW's Acting Chief Executive also advised that:

I acknowledge, as you have, that this is the start of an important transformation that my agency, the government and the whole State needs to undertake and address consistently over the coming years to manage climate change risk for the benefit of our communities, environment and economy.

We also provided detailed management letters on our observations and recommendations about their individual practices to the six agencies we reviewed. This helped us to test the recommendations we made. We have incorporated them into this report and we trust that they will provide agencies with useful information for their responsibilities.

All agencies responded positively to our observations and advised us how they would action our recommendations.

Appendix 3 contains the responses to this report that we received from the Chief Executives of the six agencies we reviewed.

1.5 Key challenges for the SA Government

Effective climate change risk management for the State requires a coordinated effort, with input and action across the SA Government and the community. Our audit identified a range of actions to effectively respond to climate change impacts. In this section we recognise some of the challenges to implementing these actions.

Appropriate governance will help to ensure that climate change risks are identified, prioritised, owned and addressed. It will be a challenge to adjust often long-standing governance arrangements to ensure there is clear direction and leadership centrally and within individual agencies. Establishing sound governance arrangements should help to meet the challenge of having a visible, integrated and consistent approach to managing climate change risk.

Any delays in adaptation and mitigation actions pose a variety of challenges, including the risk of cost escalation, locking-in infrastructure, stranded assets, and the reduced feasibility and effectiveness of options.²

Climate change risk management is an area of risk management that requires the input of people who understand climate change and the agency's operations. This can help ensure robust discussions about climate change risks and responses.

Risk assessment processes need to be adequately resourced if they are to be managed and governed effectively. Resources may also need to be allocated or redirected to risk mitigation/climate change adaptation, where there is a clear business case.

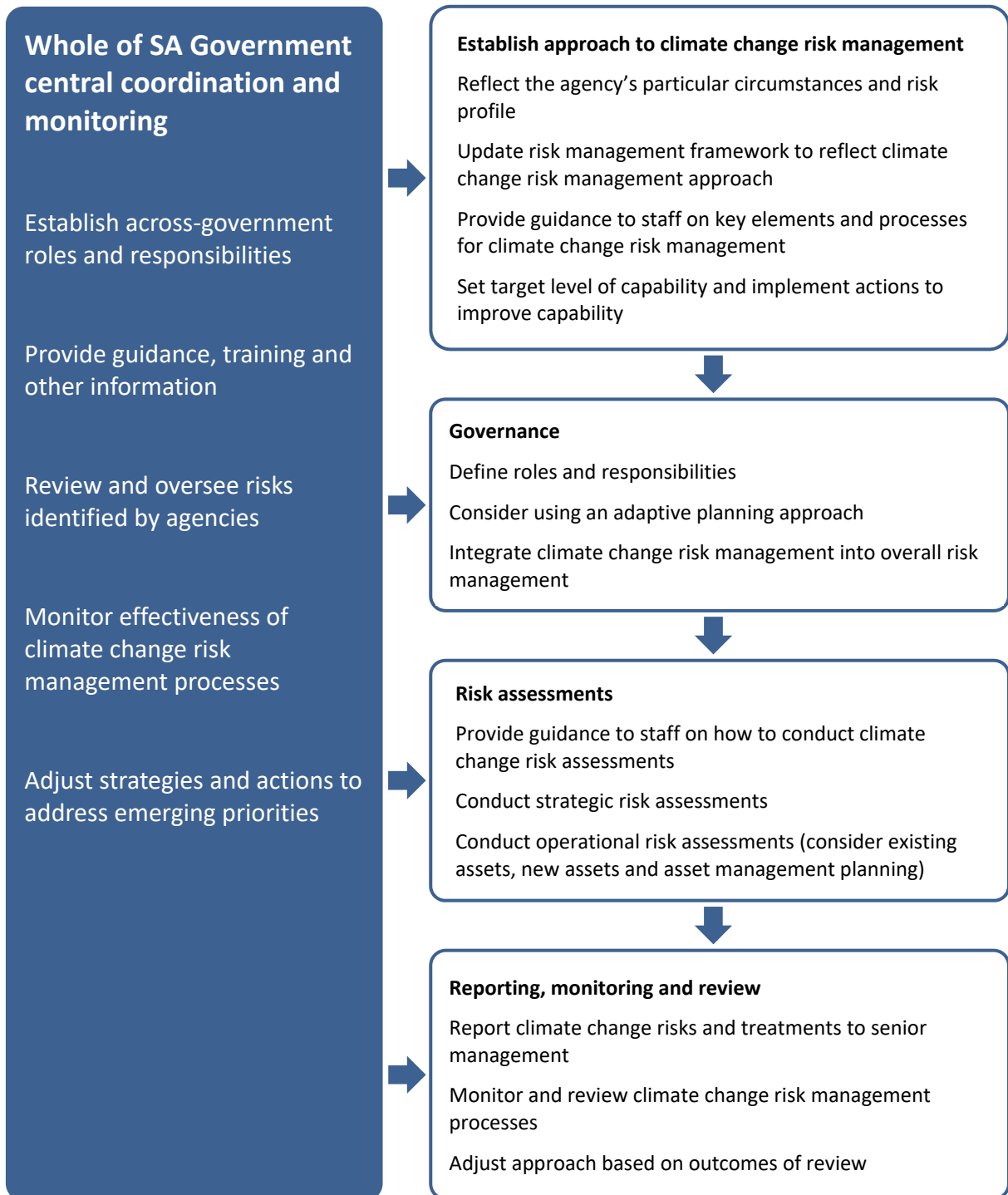
Climate change science and risk practices are dynamic. Effective climate change risk management requires keeping up to date with the best available science on climate change and updating practices in line with it, and with industry good practice as it evolves. There will be challenges in developing consistent and complementary practices across government and having the resources and capability to do this.

1.6 Key actions for climate change risk management

Section 1.3 summarises our recommendations for progressing the SA Government's climate change risk management. Figure 1.1 summarises actions that should be taken for whole-of-government central coordination and for individual agencies.

² The Intergovernmental Panel on Climate Change 2023, Summary for Policy Makers in *Climate Change 2023: Synthesis Report*, Geneva, Switzerland, p. 26.

Figure 1.1: Key actions to embed climate change risk management across the SA Government



2 Background

2.1 Impacts of climate change

The climate of South Australia, and globally, is changing. We are already observing increases in average temperatures, more very hot days, declining rainfall and rising sea levels.

DEW has observed that:

Average temperatures in South Australia are now more than 1°C warmer than in 1960. The state's daily maximum temperature is projected to rise by as much as 2.1°C by 2050.

Across Australia, 2019 records show that 2019 was both the warmest and driest year on record. For South Australia, the overall mean temperature was 1.45°C above average, making it the state's second-warmest year on record and warmest since 2013.³

The world, our nation and the State have been impacted by climate changes such as changed long-term weather patterns and the increased frequency and intensity of weather events.

The impacts have included:

- higher temperatures
- changes to existing hazards such as bushfires and floods
- changes in the natural environment and habitats.

The European Union-funded Copernicus Climate Change Service reported that the period from June 2023 to August 2023 was the earth's hottest three-month period on record. It also reported that global sea surface temperatures continued to rise in August 2023.⁴

These impacts can adversely affect critical public infrastructure and services, disrupting transport and water systems, communication and energy infrastructure. Events like extreme heatwaves can increase hospital presentations, putting more pressure on health systems, and present health risks for those living in public housing.

2.2 SA Government climate change actions

The SA Government's *South Australia – Responding to Climate Change* information sheet outlines the priority actions it will focus on in the near term to build a strong, net zero emissions future and adapt to climate change. It builds on the *South Australian Government*

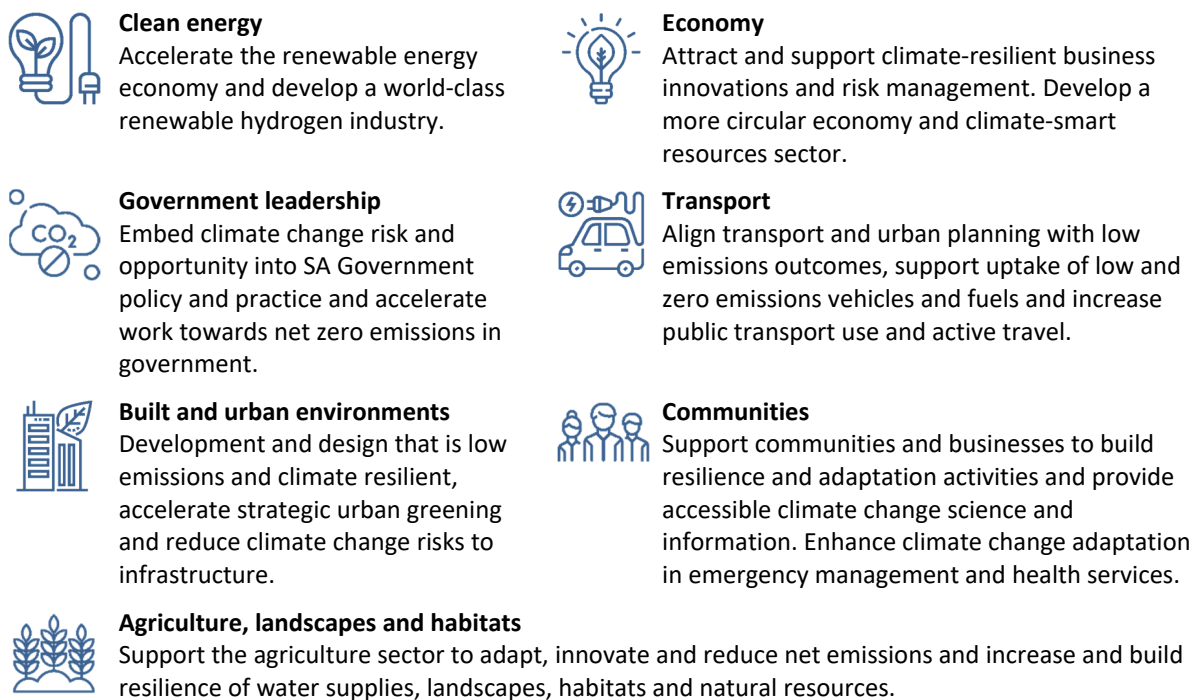
³ Department for Environment and Water 2022, *Climate change science and knowledge plan for South Australia 2022*, Government of South Australia, Adelaide, p. 2.

⁴ Copernicus Climate Change Service 2023, *August 2023, second warmest month closes the warmest summer*, <<https://climate.copernicus.eu/august-2023-second-warmest-month-closes-warmest-summer>>, viewed 29 September 2023.

Climate Change Actions document, which outlines practical actions that agencies are taking to ensure that climate change-related risks and opportunities are addressed in policy and practice.

DEW and other SA Government agencies have been assigned specific actions to help build a strong, climate-ready economy, further reduce greenhouse gas emissions and support adaptation to a changing climate. Figure 2.1 describes the objectives that the actions are intended to achieve.

Figure 2.1: Objectives of the SA Government’s climate change actions

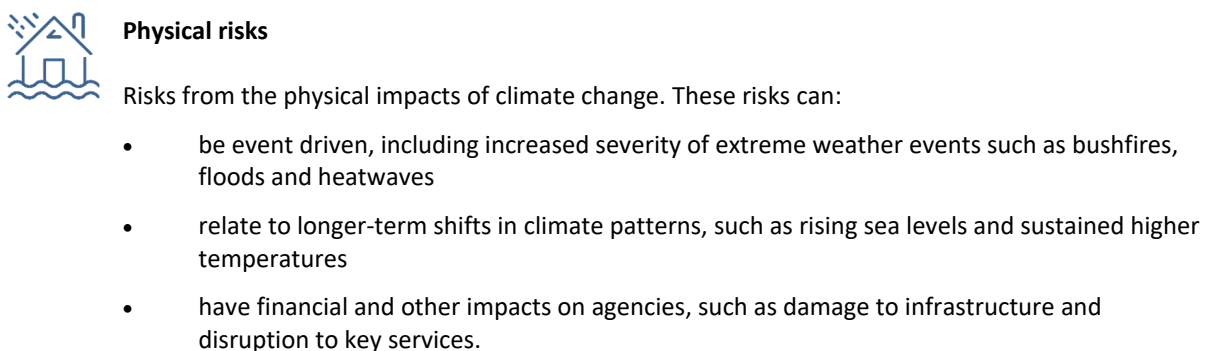


Source: *South Australian Government Climate Change Actions*.

2.3 Types of climate change risks

Figure 2.2 explains the main types of climate change risks that agencies need to manage.

Figure 2.2: Types of climate change risks





Transition risks

Risks from the way agencies manage and adapt their activities to the transition to a lower-emissions economy and society, including:

- responding to the nature and timing of policy changes and regulations to reduce emissions or promote climate adaptation
- impacts of changes in technology that support the transition
- market risks such as changes to supply and demand for goods and services
- reputational risks from how agencies are perceived by the community as contributing to the transition to a lower-emissions economy.

The nature, speed and focus of these changes will present different levels of risks to agencies and can also provide opportunities for them to benefit from.



Liability risks

Risks from people or businesses seeking compensation for losses they may have suffered due to climate change, including from physical and transition risks.

Source: Developed from the *Recommendations of the Task Force on Climate-related Financial Disclosures*.

Our audit focused on assessing the SA Government's arrangements for managing physical climate change risks.

2.4 The benefits of managing climate change risks

Governments play a vital role in minimising impacts and costs to the community in responding to natural disasters and other climate change impacts. Work is undertaken by many government agencies to help communities build resilience, reduce natural disaster risks and enhance emergency management in response to the changing climate.

Effectively managing climate change risks can help to:

- build climate resilience
- prioritise responses to risks and optimise the use of resources
- reduce the costs of maintaining and upgrading key infrastructure assets.

2.5 Managing climate change risks is complex and evolving

There is growing awareness of the factors influencing climate change and its impact on the natural environment, infrastructure, society and economy. Managing climate change risks is complex and is continuously evolving due to:

- the availability of better climate data and projections
- the development of policies and regulations
- experiences of climate change impacts
- greater capabilities and access to expertise and technical skills

- the release of frameworks, methodologies and standards
- markets and governments responding to opportunities to secure economic benefits
- community concerns and political pressures.

2.6 Unique features of climate change risk management

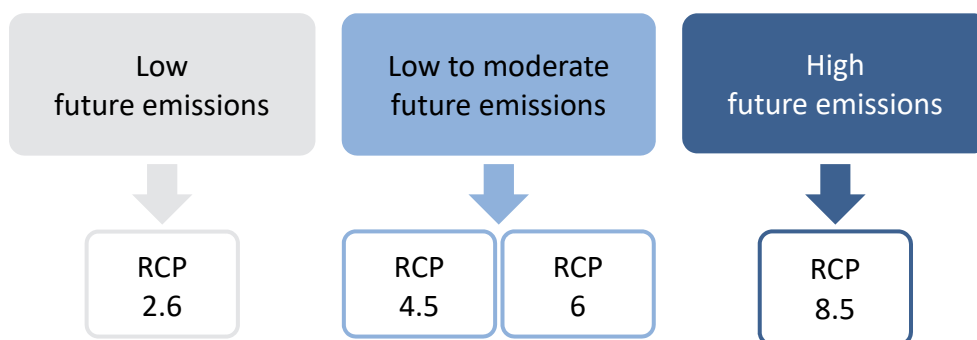
Climate change risk management has unique features, such as:

- the greater need for a forward focus on conditions that are different to what is being experienced today or what has been experienced historically
- longer time horizons for some climate change risks.

Obtaining and using the best available science, specifically climate change data and projections, is one of the core activities that distinguishes a climate change risk assessment from other risk assessments. Agencies also need to develop a range of scenarios to understand risks and the different scales and time frames of their impact.

Climate change projections are based on a range of greenhouse gas scenarios called Representative Concentration Pathways (RCPs). RCPs were developed by the Intergovernmental Panel on Climate Change (the United Nations body for assessing the science related to climate change) and presented in its Fifth Assessment Report.⁵ They make predictions about how concentrations of greenhouse gases in the atmosphere will change in future as a result of human activities.⁶ The four commonly referenced RCPs are shown in figure 2.3.

Figure 2.3 Representative Concentration Pathways (RCPs)



Source: DEW's *Guide to climate projections for risk assessment and planning in South Australia 2022*.

⁵ Climate modelling underpinning the Intergovernmental Panel on Climate Change's Sixth Assessment Report (AR6) assesses climate system responses to five 'shared socio-economic pathways' (SSPs), representing scenarios of possible future development. The five SSPs in AR6 will eventually replace the RCPs. The AR6 modelling and the SSPs are yet to be incorporated into industry tools providing regional projections for Australia.

⁶ Department for Environment and Water 2022, *Guide to climate projections for risk assessment and planning in South Australia 2022*, Government of South Australia, Adelaide, November, p. 9.

When selecting which climate projections to use for climate change risk assessments, the lifetime of the decision or matter being assessed (eg new asset or operational project) needs to be appraised. DEW's *Guide to climate projections for risk assessment and planning in South Australia 2022* advises that the range of future emissions represented by the medium (RCP 4.5) and high (RCP 8.5) scenarios are sufficient for planning and risk assessments.⁷

Managing climate change risks presents unique challenges due to the uncertainty about:

- determining the extent, nature and timing of climatic changes
- the progress made in reducing greenhouse gases
- changes in future emissions due to future economic and technological developments
- the adaptive capacity of human and natural systems
- determining how climate change will affect individual locations.

⁷ Ibid, p. 11.

3 Central leadership, coordination and monitoring

3.1 Progress in central coordinating activities

One of the key priority actions in its *South Australia – Responding to Climate Change* information sheet is the SA Government building its capacity to ensure climate change risks are understood, integrated into decision making and acted on.

The *South Australian Government Climate Change Actions* identifies embedding climate change risk and opportunity into government policy and practice as one of the SA Government’s key objectives. All SA Government agencies (including DEW) have been assigned a specific action to ‘ensure climate risk and opportunity are addressed across government policy and practice’.

As part of its central coordinating role, DEW has completed or is progressing a number of initiatives, including those discussed below.

3.1.1 Government Climate Risk Management Program

DEW has developed the Government Climate Risk Management Program to help SA Government agencies to address climate change risk and opportunity. The program commenced development in April 2022 and is expected to be completed in December 2024.

The key deliverables from the program are:

- the Climate Ready Agency Framework (the framework)
- the Climate Risk Management Guide (the guidelines)
- climate change information and tools that can be used in assessing climate change risks
- climate change risk management training and support services to help build agencies’ capacity to address climate change risks.

In developing the framework and guidelines, DEW has taken a thorough approach that included consulting extensively with other SA Government agencies.

The framework and guidelines are in draft and DEW plans to release them at the end of 2023.

We acknowledge that DEW is currently in the process of implementing the Government Climate Risk Management Program. Our observations and recommendations in section 3.2 are based on our discussions with staff and review of documents that were still in draft at the time of the our audit.

3.1.2 Draft Climate Ready Government policy

One of the stated aims of the Government Climate Risk Management Program is for DEW to work with DPC and DTF to ensure there is an appropriate authorising framework for the implementation of climate change risk management across government.

DEW has prepared and consulted on a draft climate ready government policy (intended to be implemented as a Premier and Cabinet Circular) as well as drafting proposed changes to current legislation. When it is finalised and implemented, the policy is expected to set out the climate change risk management requirements for SA Government agencies. The process and time frame for implementing the circular had yet to be settled at the time of our audit.

3.1.3 Procurement of consulting services

DEW has procured consulting services for two projects:

- Climate change risk assessment for South Australia – this project intends to provide a robust evidence base to identify priority climate change risks and opportunities for South Australia, assess what is being done about them and identify where further action is required to build resilience to climate change.
- Priority infrastructure climate change risk assessment – a key deliverable of this project will be a risk report that identifies priority risks and treatment options for up to 12 SA Government agencies.

These projects recognise the importance of climate change risks being identified and understood at a whole-of-state level.

3.1.4 Climate change risk management guidelines and training

DEW is developing the Climate Risk Management Guide, along with training and communication materials to assist agencies with their climate change risk management and build their climate change risk management capability. These are due for release in late 2023.

3.1.5 Climate projections

DEW releases climate projections for South Australia through its *Guide to climate projections for risk assessment and planning in South Australia*. This is made available, along with other climate change information, on DEW's website so that agencies can use it when assessing climate change impacts. Updated climate projections, released in November 2022, summarise the likely changes to key climate variables such as temperature, rainfall, days of severe fire danger and rising sea levels. The projections are provided for specific regions across South Australia.

3.2 Audit recommendations and observations

3.2.1 Central guidance on climate change risk management for SA Government agencies

Recommendation

When the Climate Ready Agency Framework and Climate Risk Management Guide are finalised and approved for circulation, DEW should:

- communicate with all government agencies to ensure that they have been told about the availability of the documents and understand where to find them
- implement a process to answer questions on the application of the framework and guidelines.

Audit observation

DEW has drafted the Climate Ready Agency Framework and the Climate Risk Management Guide to help agencies understand and implement climate change risk management. It plans to issue them at the end of 2023.

Some of the agencies we reviewed told us that they are waiting for guidance and direction on climate change risk management from the SA Government. The framework and guidelines will help agencies to:

- develop their own policies and procedures for climate change risk management
- have a clear understanding about the SA Government's approach to climate change risk so they can implement processes in line with these expectations
- make decisions that are in line with SA Government priorities and directions in an environment that is subject to uncertainty.

The draft framework and guide are:

- informed by the recommendations of the Task Force on Climate-Related Financial Disclosures and international standards on risk management and adaptation to climate change
- easy to read, with clear steps that can be followed by agencies and include useful context on why climate change risk management is important.

These documents will help agencies understand the unique nature of climate change risks and the practical steps that can be followed to implement climate change risk management.

3.2.2 Assigning cross-government climate-related roles and responsibilities

Recommendation

DEW should continue to work with central agencies such as DPC and DTF to implement an authorising framework for climate change risk management across government that will clearly document the specific roles and responsibilities for SA Government agencies.

The allocation of roles and responsibilities should include:

- the central review, monitoring and coordination functions that help to ensure that agencies are effectively implementing climate change risk management
- requirements for agencies to implement climate change risk management
- arrangements for ongoing agency training and support
- reporting requirements within SA Government to facilitate monitoring and review processes and to help ensure that climate change risk management practices are progressed.

DEW should also continue to work with DPC and DTF to promote the delivery of the SA Government's objective to embed climate change risk management into government policy and practice.

Audit observation

DEW's role in helping agencies to understand and implement climate change risk management has been established through its Government Climate Risk Management Program. However, the ongoing role for agencies undertaking climate change risk management processes and the oversight, monitoring and coordination of climate change risk management development across government have not yet been established.

The Government Climate Risk Management Program states that DEW will work with DPC and DTF to ensure that there is an appropriate authorising framework for implementing climate change risk management across government.

For this authorising framework, DEW has drafted the Climate Ready Government policy. At the time of our audit, the draft policy had not been approved internally and its implementation process and time frame were uncertain. DEW advised us that it was still consulting on the draft policy and proposed changes to current legislation.

The roles and responsibilities in the draft policy focus on individual agencies being responsible for their climate change risk management processes and for monitoring the effectiveness of their own approach.

While the draft policy requires agency reporting to DEW on progress made to implement climate change risk management arrangements, it does not assign responsibility for:

- following up with agencies that have not established effective arrangements or who do not meet reporting requirements
- the ongoing role of preparing supporting and educational material to assist agencies with understanding and implementing climate change risk management
- centrally reviewing climate change risks identified by agencies to identify shared risks and prioritise climate-related risks at a whole-of-SA Government level.

Climate change risk management is an emerging focus for SA Government agencies as the impacts of a changing climate are being experienced. The unique and evolving nature of climate change risk management is also new to many agencies. Without the clear assignment of roles and responsibilities for all agencies, there is an increased risk that they will not prioritise climate change risk management.

3.2.3 Ongoing processes to understand climate change risk priorities for the State

Recommendation

DEW should work with central government agencies such as DPC and DTF to establish an ongoing whole-of-state climate change risk monitoring function. The arrangements for this should be built into its framework and guidance.

Establishing and implementing a central monitoring function should include:

- developing a clear purpose statement for the central review function and settling how key risks and associated risk treatments will be addressed at a state level (eg developing action plans and resource allocations as agreed by agencies)
- the clear allocation of responsibilities for the central monitoring agency and SA Government agencies that are impacted by key risks
- information requirements for the central monitoring agency to effectively perform its role.

Audit observation

An ongoing process for reviewing identified climate change risks and mitigation treatments across agencies has not been included in the draft framework. Reviewing the climate change risks identified by agencies would identify:

- significant climate change-related risks for the State
- shared climate change risks across multiple agencies.

DEW has procured services to undertake a climate change risk assessment for priority infrastructure and a climate change risk assessment for South Australia. While these projects will identify the significant risks to the State at a point in time, the information will need to be refreshed for evolving changes to the climate and to government operations and priorities.

The draft guidelines and draft climate ready government policy indicate that agencies will be required to contribute to whole-of-government reporting on climate change risk management, but they do not provide for the collation and review of climate change risks identified by agencies.

With limited available resources, the SA Government will need to make decisions about which climate change risks need to be addressed in the short, medium and long term. This will need input from individual agencies, who have the best understanding of how climate change risks are likely to impact the sectors of the community they serve.

It is also important for the SA Government to understand the climate change risks that affect multiple agencies and the actions each agency proposes to address them. A coordinated approach to these shared risks:

- increases the likelihood of them being efficiently addressed and not overlooked
- decreases the possibility of duplicating the effort to mitigate them.

3.2.4 Training and communication materials to assist agencies with climate change risk management

Recommendation

After releasing training and communication materials, DEW should continue to obtain feedback from agencies on their effectiveness and possible areas for improvement or expansion. In this way DEW can continuously improve training to help agencies develop their climate change risk management capability.

Audit observation

DEW is developing climate change risk management training and communication materials and guidelines to assist agencies with their climate change risk management and to build their climate change risk management capability. DEW plans to release these to SA Government agencies with the framework and guidelines in late 2023.

The training and communication products DEW is developing provide a sound approach to introducing climate change risk management for SA Government agencies. They appropriately target both agency leaders and staff involved in risk identification and management.

DEW advised us that some agencies have provided feedback on the training content. It also intends to evaluate the materials after their initial roll-out. The scale, scope and timing of the review are still to be decided.

Climate change risks have unique characteristics and complexity, which means that SA Government agencies may not have the understanding or experience to properly identify, assess and mitigate them within their current risk management frameworks. As this is an evolving area of risk management, it is important that SA Government agency staff be provided with training and guidance that will help them to understand and implement it.

3.2.5 Engaging with users of climate projections and climate science information provided by DEW

Recommendation

In implementing the actions identified in its *Climate change science and knowledge plan for South Australia*, DEW should continue to engage with agencies as they develop their climate change risk management practices, including:

- continuing to send periodic surveys and questionnaires to users
- creating a climate projection and climate information request form on the climate science and information web page
- conducting workshops with agencies to identify climate projection and information needs.

DEW should also actively monitor the implementation of actions documented in the plan and communicate progress made to internal and external stakeholders.

Audit observation

Using climate change projections is one of the core activities that distinguishes climate change risk assessment from a standard risk assessment process.⁸ To enable SA Government agencies to implement effective climate change risk management, it is important that climate change projections are available and meet their specific information needs.

We identified an opportunity for climate projections and science information produced by DEW's Science and Information Branch to better meet the needs of the SA Government agencies undertaking climate change risk management activities, including other divisions within DEW.

We acknowledge that DEW has been proactive in making climate projections and climate science information available to SA Government agencies. Feedback from the agencies we reviewed indicated that:

- most were aware of DEW's climate projections and science information
- some thought the information needed to undertake climate change risk assessments relevant to their operational areas was not available

⁸ Department of Planning, Industry and Environment 2021, *Climate Risk Ready NSW Guide*, New South Wales Government, March, p. 43.

- some staff were either not aware that climate projections were available or did not know how to use them.

Staff from DEW's Science and Information Branch acknowledged that there is scope to improve DEW's engagement with the users of its climate information to identify their specific information requirements. This is also reflected in DEW's *Climate change science and knowledge plan for South Australia*.⁹ The plan aims to help decision-makers identify, apply and use science and knowledge to make informed decisions.

⁹ Department for Environment Water 2022, *Climate change science and knowledge plan for South Australia 2022*, Government of South Australia, Adelaide.

4 Agency approaches to climate change

4.1 Audit recommendations and observations

4.1.1 Approaches to climate change risk management and guidance provided to staff

Recommendation

Agencies should establish their approaches for identifying and managing climate change risks at the strategic and operational levels. In doing this they should review and update their risk management frameworks, policies and procedures to include their approaches for climate change risk management.

Agencies should provide staff with details and guidance on the key elements and processes for climate change risk assessments and the characteristics of assessing and managing climate change risks that are different to other risk assessment processes. This should include elements such as: identifying relevant climate variables; selecting time horizons; using climate projections and emission scenarios; and information and tools available internally and externally.

Audit observation

We found that all six agencies we reviewed have a risk management framework that establishes principles and requirements for how the agency manages its risks. However, for most agencies the frameworks did not:

- establish the agency's approach to climate change risk assessments
- explain the unique characteristics of climate change risks and the main activities that distinguish climate change risk assessments from standard risk assessment processes
- provide guidance on the key inputs and steps for climate change risk assessments, such as the use of climate information and data including climate projections and scenarios.

Climate change risk management is an evolving area of risk management that has different characteristics, complexity and challenges to standard risk assessment processes. The nature of climate change risks requires a different assessment and management approach, due to factors such as:

- uncertainty about the nature and timing of climate change and regional variation in its impacts
- longer time horizons and the need for entities to assess a range of scenarios.

We found that some agencies did provide sound guidance on conducting climate change risk assessments for certain aspects of their operations. For instance, the Department for Infrastructure and Transport (DIT) has drafted an updated guideline which includes a

standardised framework for assessing climate change risks for its new transport infrastructure projects. Case Study 1 provides the key steps in this framework.

Case Study 1: DIT Climate Change Adaptation Guideline

A standardised framework for consistent climate change risk assessment

The Guideline provides a framework that is intended to ensure consistency in climate change risk assessment and adaptation planning. It helps project teams to efficiently and iteratively identify, assess, document and address climate risks and responses through project life cycles. The risk assessment process aligns with relevant standards.

The Guideline provides summaries of some South Australian regional climate change projections and a standard climate change risk assessment reporting template.

DIT has developed a standardised climate change risk register for transport infrastructure. It provides a comprehensive list of risks to which rail, road and marine transport infrastructure projects may be exposed. With appropriate contextualisation for a specific project and location, the standardised risk register can improve the efficiency and consistency of climate change risk assessments and selection of appropriate treatments.

Planning	Step 1: Establish project/ asset context	Determine the project’s level of exposure to climate hazards and identify project assets
	Step 2: Identify risks	Identify relevant risks from the standardised risk register and assess asset criticality
	Step 3: Transfer climate change risks	Transfer climate risks and treatments to the project risk register and design documentation
	Step 4: Document CCRA	Detail assessment outcomes in a report
Design	Step 5: Review planning phase CCRA	Review initial assessment to confirm if suitable for detailed design and revise if necessary
	Step 6: Evidence of mitigating climate change risks	Confirm risk treatments are implemented into final design
Construction	Step 7: Evidence of mitigating climate change risks	Confirm risk treatments are implemented into construction

Key features

- Focus on long-term planning and risk management
- Use of climate projections based on emissions scenarios
- Provides a systematic process to assist staff in assessing climate change risks and identifying suitable treatments

Source: Developed from DIT Climate Change Adaptation Guideline.

We also noted that DEW has developed a draft climate change risk management guide for national parks in South Australia to help park managers identify and manage climate change risks for natural and built assets and related programs. Once implemented it will provide sound guidance on the key elements needed to conduct effective climate change risk assessments. For example, it provides guidance on determining assessment time frames, climate change projections and scenarios. As shown in Case Study 2, it adopts a two-tiered approach for park managers to assess and develop responses to climate change risks that best meet their needs.

Case Study 2: Climate Risk Management Guide for Parks in South Australia

The Department for Environment and Water is preparing a Climate Change Risk Management Guide for Parks in South Australia. The guide outlines two assessment types which cover the key elements of climate change risk assessments:

Scan risk assessment

An approach that can be used for a high-level identification and assessment of climate change risks

May be useful for strategic planning as a first pass assessment to identify or prioritise need for further investigations, or where the time, data and information are limited

Detailed risk and adaptation needs assessment

More detailed risk assessment

Will help assess the vulnerability of park features, programs or objectives to climate change, and identify and prioritise risk mitigation and adaptation action

Requires more time, resources and data but provides more specific, detailed and potentially quantitative information to inform climate risk management action

Key actions explained in the guide

The guide includes the following important actions for climate change risk assessment and management:

- defining the scope of the assessment
- identifying who needs to be involved in the assessment
- identifying climate variables exposures and relevant climate change projection information
- assessing the risk with respect to likelihood and consequences
- identifying and prioritising risk mitigation and adaptation actions

Key features

Explains climate projections and refers to DEW climate projections for South Australia

Provides examples of recommended time scales and scenarios for projections for natural and built features in national parks

Provides examples of identifying park features and programs eg ecology, cultural heritage, trails and buildings

4.1.2 Roles and responsibilities for climate change risk management

Recommendation

Agencies should define who is responsible for overseeing and managing climate change risks while they build their maturity and capability and integrate climate change risk into their existing risk management processes. In doing this, they should:

- define the roles and responsibilities of various operational areas and governance groups for overseeing and managing climate change risks
- record details of these roles and responsibilities in relevant governance documents, such as their risk management frameworks and terms of reference for relevant oversight bodies
- assign responsibility for monitoring external developments (eg the release of new climate change data and projections) to identify and integrate relevant information into the climate change risk management process.

Audit observation

The agencies we reviewed have defined roles and responsibilities in their risk management frameworks for elements of their risk management processes. These apply to all risks but are not specific to climate change risk management.

We found that roles and responsibilities for climate change risk management processes have not yet been defined and assigned as agencies first need to decide their approaches to climate change risk management at strategic and operational levels.

Establishing specific responsibilities for climate change risk management is important because most agencies are at the early stages of developing their practices and there is a need for specific attention to evaluate and identify appropriate responses.

Defining responsibilities for managing climate change risks for specific people and groups provides clarity on what they are responsible for and when. This then enables them to be accountable for the specific tasks required to effectively manage climate change risks.

4.1.3 Using an adaptive planning approach to manage and respond to climate change risks

Recommendation

In developing their climate change risk management practices, agencies should assess whether applying adaptive planning concepts will help them better plan for and respond to their identified climate change risks. Key actions of adaptive planning include:

- providing for stakeholder engagement and input into the risk management process

- setting out both short and longer-term risk management actions in light of uncertainty, clearly articulating where knowledge gaps are impacting decision making
- identifying and mapping out various adaptation options to manage climate change risks under a range of possible future scenarios
- determining where trigger points exist at which further decisions or actions need to be undertaken or revisited
- allocating appropriate funding and resources to support the ongoing management of risk.

Audit observation

Planning under uncertainty is a challenge inherent in climate change risk management. There are many ways to plan for managing climate change risk. Adaptive planning is a useful approach because it explicitly addresses inherent uncertainty and the complex and long-term nature of managing climate change risks. It supports a transparent approach to addressing climate change risks over time. We observed that the existing planning approaches used by most of the agencies we reviewed do not yet incorporate adaptive planning concepts. We noted that some agencies have recognised the benefits of using adaptive planning concepts and one agency has established actions for using this approach in managing its climate change risks for a key area of its operations.

Adaptive planning processes in the context of climate change typically include these elements:

- defining the existing planning context and how it may change in response to climate change. This typically involves evaluating climate change projections over multiple time frames and emissions scenarios
- determining priorities, based on planning objectives and the identification and assessment of risks and (any) opportunities that arise from projected climate change
- identifying, evaluating, selecting and, in some cases, sequencing potential interventions that address key climate change risks and opportunities
- ongoing review and reflection to understand how climate change risks and the climate change risk context are changing, the effectiveness of interventions, the emergence of new climate technologies or capabilities for response and whether thresholds to trigger new interventions are approaching or have been reached
- planning for collaboration with key stakeholders.

Adaptive planning provides a strategic and flexible approach for responding to changing conditions. It is accepted as good practice¹⁰ in climate responses and can be used by agencies to address the challenges in planning for and managing uncertainty from climate change.

¹⁰ Department of Planning, Industry and Environment 2021, *Climate Risk Ready NSW Guide*, New South Wales Government, March and CSIRO 2019, *Resilience Adaptation Pathways and Transformation Approach* (version 2).

Using an adaptive planning approach can help agencies plan for how they will respond to climate change risks and respond to different future climate conditions. Benefits include:

- a flexible, yet structured decision-making process that recognises decisions to adapt to climate change do not all need to be made now
- investment in adaptation actions can be planned for, prioritised and staggered
- investment options can be changed, which manages the risk of over or under-adapting to climate change
- risk exposures may be managed without necessarily locking in actions.

4.1.4 Integrating climate change risk into existing risk management processes

Recommendation

After agencies determine their climate change risk management approaches and take steps to build their capability, they should integrate climate change risk into their overall risk management processes.

The integration of climate change risks into existing risk management processes should:

- be completed as an iterative process while building climate change risk capability
- start with ensuring there is a basic understanding of climate change concepts and potential impacts and then build a shared understanding
- identify existing risk management processes that may need adjusting to address the characteristics of climate change risks
- ensure that the risk management process supports the identification of risks that may arise in the long term as well as the short and medium term
- review existing risk categories and determine whether climate change risks will be treated as stand-alone risks, drivers of existing risks or a combination of both
- decide whether new risk management tools are needed to support identifying, assessing and managing climate change risks or whether existing tools can be adjusted
- assess the relativity of climate change risks to other agency risks, the extent of exposure to climate change risks and the implications for the agency's strategic objectives
- decide how climate change risk is incorporated into the overall risk appetite.

We suggest that agencies refer to the Guidance on Risk Management Integration and Disclosure that the Task Force on Climate-Related Financial Disclosures has developed in determining possible adjustments to existing risk management processes.

Audit observation

Climate change risk management is an emerging concept to many people and organisations and requires new ways of thinking to be integrated into existing risk management processes.¹¹

As agencies still need to determine fundamental elements, such as their approaches to undertaking climate change risk assessments, their existing practices for identifying and assessing risks may need to be adjusted to ensure they sufficiently address the unique characteristics of climate change risks.

Integrating climate change risk into existing risk management processes helps:

- ensure that practices for identifying and assessing risks sufficiently address the characteristics of climate change risks
- determine the priority of climate change risks against other strategic and operational risks, and highlight the interdependencies of climate change risks with other risks
- to increase the efficiency and effectiveness of the risk management process
- agencies establish and communicate their risk appetites for managing climate change risks
- to achieve consistency in climate change risk management processes.

¹¹ CSIRO 2018, *Climate Compass: A climate risk management framework for Commonwealth agencies*, August, Australia, p.3.

5 Climate change risk assessments

5.1 Types of climate change risk assessments

5.1.1 Strategic climate change risk assessments

A strategic climate change risk assessment is used to evaluate climate change risks across an organisation or for key areas such as asset portfolios.

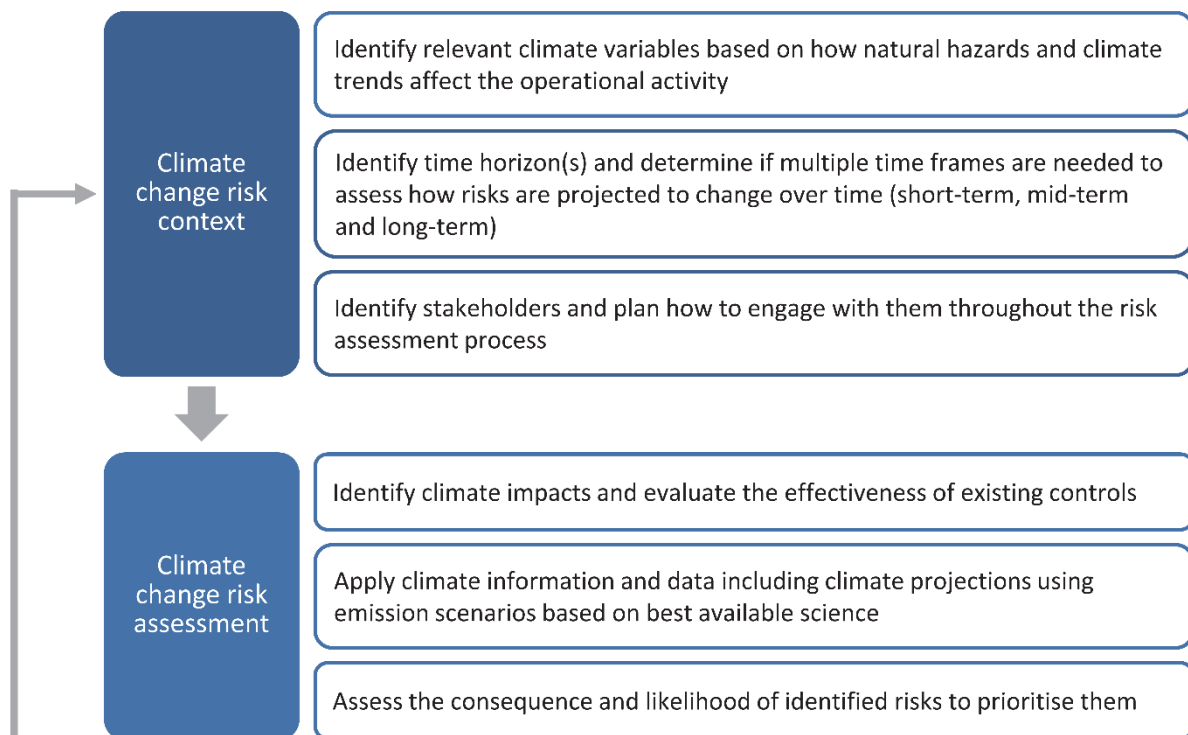
It is a higher-level assessment that mostly uses qualitative analysis to explore how an organisation’s functions, including key services and assets, were affected by climate change impacts in the past and how they might be affected in the future. Engaging relevant stakeholders across the organisation is a key feature of this assessment to build understanding of how climate change is being experienced by the organisation.

Once climate change risks are assessed at a strategic level, resources can then be prioritised to complete a more in-depth analysis for the functions and operational areas that are identified as facing greater climate change risks. This includes completing detailed climate change risk assessments, using quantitative data where it is available or some other actions.

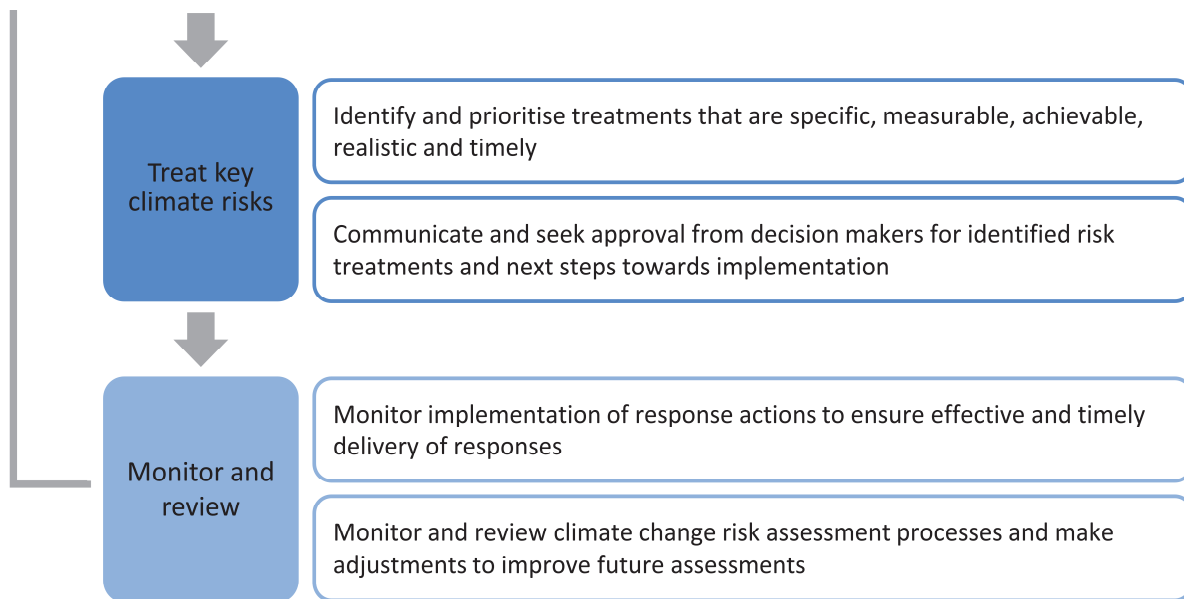
5.1.2 Operational detailed climate change risk assessments

The key elements for conducting detailed climate change risk assessments that are currently accepted as good practice¹² are summarised in figure 5.1.

Figure 5.1: Key elements for conducting detailed climate change risk assessments



¹² See Appendix 1 for details of how we identified elements that represent good practice for climate change risk management.



5.2 Audit recommendations and observations

5.2.1 Strategic climate change risk assessments

Recommendation

Agencies should undertake a strategic climate change risk assessment to identify which of their objectives, functions, assets or operational areas face greater climate change risks and warrant more detailed risk assessment or some other action. The areas requiring attention should be prioritised and time frames established.

The strategic climate change risk assessment including outcomes should be documented.

After the assessment, agencies should decide whether they need to adapt their strategic planning to manage any significant climate change risks to their objectives and functions.

Audit observation

The agencies we reviewed have not yet performed strategic-level climate change risk assessments.

A strategic climate change risk assessment would help to identify and assess which deliverables are more vulnerable to climate hazards, which can then help agencies plan to prioritise their resources on specific parts of their functions, programs or assets. It is a higher-level assessment of how climate change may impact their strategic objectives and key functions. It should also identify treatments and actions that are already underway to manage climate change risks.

We acknowledge that the agencies we reviewed have all included one or more climate change-related risks in their risk registers or recognised climate change as a key risk driver for certain enterprise risks. They could use this information as one of the various inputs into a strategic climate change risk assessment.

A strategic climate change risk assessment would enable agencies to identify and prioritise climate change risks to its strategic objectives and key functions. It also:

- provides a common understanding of climate change risks across the agency, including which risks are most significant and why
- facilitates an organised and coordinated climate change risk management strategy
- raises awareness and builds understanding of how climate change is being experienced
- develops the evidence needed to inform and build support for responding to climate change risks
- allows the agency to plan for the effective use of its limited resources and adapt its strategic planning to manage climate change risk at an operational level.

5.2.2 Operational detailed climate change risk assessments

Recommendation

Agencies should undertake detailed climate change risk assessments for their key functions and operational areas. The priority for these risk assessments may be driven by the strategic climate change risk assessment.

Agencies should use a methodology appropriate to the operational area to conduct the assessments.

Agencies should, where relevant, relate with the Commonwealth Government and other jurisdictions that have similar activities to understand their current climate change risk practices and how they are addressing any challenges such as data limitations.

Audit observation

SA Government agencies are responsible for key operations that are expected to be increasingly impacted by climate change over time. We found that most of the agencies we reviewed are yet to undertake detailed climate change risk assessments at the operational level. We did note that they were managing a broad range of climate change-related hazards as part of their planning and operations. For example, some agencies have prepared climate change hazard management plans, however these do not contain key elements regarded as good practice for managing climate change risks.

Detailed climate change risk assessments can help agencies:

- understand current pressures being experienced and how future climate change may impact their operational functions, activities and assets and the extent that they may be exposed to climate change risks under a range of scenarios

- define the costs and benefits of adaptation, prioritise their responses to climate change risks and highlight gaps and areas that warrant further investigation or investment
- adapt and build climate resilience by informing decisions about risk treatments to be implemented over time to manage or reduce the consequences of climate change.

Case Study 3 describes the key differences between hazard management plans and climate change risk assessments using the example of the Extreme Weather Hazard Risk Reduction Management Plan prepared by the South Australian State Emergency Service. While the plan does not explicitly assess projected climate change impacts, it does respond well to the challenges the emergency services sector faces from extreme weather hazards.

Case Study 3: Extreme Weather Hazard Risk Reduction Management Plan

Hazard Plan Overview

The Extreme Weather Hazard Risk Reduction Management Plan for South Australia aims to reduce risks associated with extreme weather hazards in South Australia. It includes a detailed description of the hazards and their impacts and identifies stakeholder roles and responsibilities for four phases of disaster risk reduction, preparation, prevention, response and recovery (PPRR). The Plan references climate change as an amplifier of extreme weather but it does not explicitly consider how it may affect the hazards or the effectiveness of PPRR disaster risk reduction activities.

Hazard risk reduction management plan and climate change risk assessment

While climate change risk assessment (CCRA) and hazard risk reduction management plans are potentially complementary, they have differing objectives and approaches, as highlighted in the table below.

	Objectives	Inputs	Method	Outputs
Hazard risk reduction management plan	Identifies priority risks from extreme weather hazards and the emergency management strategies and actions needed to address such risks	Emergency management, and extreme weather legislation, strategy and planning Extreme weather intelligence (current and historical) National Emergency Risk Assessment Guideline	Identifies and describes potential impacts, stakeholder roles and responsibilities, priority risks, governance, and gaps for managing extreme weather hazards Applies preparation, prevention, response, recovery (PPRR) framework	Strategies and actions for managing extreme weather hazards and priority risk areas, including defined roles and responsibilities Part of the State Emergency Management Plan

	Objectives	Inputs	Method	Outputs
Climate change risk assessment	Identifies, assesses and mitigates risks from climate hazards that are created or exacerbated by climate change	Risk assessment framework (eg ISO31000, AS5334) Climate change projections based on emissions scenarios (eg RCP8.5)	Systematically evaluates future climate conditions and scenarios, assess and evaluate risks and determine mitigation responses	Long-term insights to the amplifying and compounding effects of climate change on climate-related events Register of climate change risks and risk mitigations

6 Climate change risk assessments for assets and new investments

6.1 Audit recommendations and observations

6.1.1 Existing assets

Recommendation

Where detailed climate change risk assessments need to be undertaken for existing assets and infrastructure, agencies should complete them in line with established requirements and/or good practice. Useful information already collected in developing existing hazard management plans should be used where relevant.

Audit observation

We found that agencies had not yet undertaken detailed climate change risk assessments for their existing assets and infrastructure.

The assets and infrastructure that agencies manage varies significantly in size, number, complexity and location. Some agencies have extensive asset portfolios located across different regions of the State and are highly climate dependent, requiring a strategic approach to manage them.

We noted that asset managers are managing a broad range of climate change-related hazards as part of their planning and operations. These activities do not always have a longer-term outlook, or consider climate projections and emissions scenarios and/or other key elements of good practice for managing climate change risks.

Existing assets may be vulnerable to future climate impacts because they have been designed and maintained to operate under historic or current climate conditions.

Detailed climate change risk assessments for existing assets can help agencies:

- understand how levels of service and maintenance programs may be impacted by projected changes in climate
- identify where existing assets need retrofitting and upgrading to increase their resilience to future climate impacts and assess the capacity for this to occur
- assess the risk of existing assets becoming stranded¹³
- plan for when actions may need to be implemented to maintain levels of service.

¹³ Stranded assets are assets that have experienced unanticipated or early write-down or devaluation.

6.1.2 New assets and investments

Recommendation

Agencies should establish requirements and practices for when they expect to assess climate change risks for new assets and investments (such as capital projects).

This should include identifying the characteristics that trigger the need for climate change risks to be assessed. Some characteristics that an agency should establish in its practices include:

- how important and critical the new asset or investment is to the agency's functions and its ability to achieve its strategic objectives
- its financial and strategic value
- its expected life
- whether it is subject to higher exposure to climate hazards such as flooding, bushfire, storms or heat.

Climate change risk assessments should be undertaken early in the project lifecycle and reassessed as needed during design and construction.

Audit observation

Most of the agencies we reviewed have yet to undertake detailed climate change risk assessments for their new assets. We found that most of them had not established practices for determining when new assets or investments need to be assessed for climate change risk.

Establishing these practices would enable an agency to consistently assess climate change risks for new assets and investments in line with management's expectations and risk appetite. This also helps to embed climate change risk management as a routine part of agency planning and decisions.

Climate change means that new infrastructure, which is built now and will still be operational for many years, needs to be designed and constructed to be resilient to future climate conditions. This will help maintain service delivery and avoid community disruption.

There are several opportunities to assess climate change risk across a project's lifecycle. Completing assessments early increases the agency's ability to successfully implement responses to identified risks.

DIT has undertaken climate change risk assessments for most of its new transport infrastructure projects since 2019. Our review of a sample of these assessments found that they followed good practice principles, including:

- identifying relevant climate variables
- using climate projections based on emission scenarios
- using multiple time horizons that take into account asset design life
- engaging with stakeholders.

Case Study 4 is an example of a sound climate change risk assessment that DIT facilitated for the Truro Bypass project.

Case Study 4: Truro Bypass Climate Change Risk Assessment

The project

The Truro Bypass project aims to improve regional transportation through enhancing safety, diverting heavy vehicles and improving travel efficiency. Assessing the potential impacts of climate change is crucial for long-term resilience of this project.

Approach to the climate change risk assessment

The initial climate change risk assessment (CCRA) aimed to evaluate potential climate impacts on the project and identify suitable treatments. Risks were identified and assessed following guidance and processes from the DIT Climate Change Adaptation Guideline. The CCRA was undertaken based on early design documentation and climate change projections for the South Australian Murray-Darling Basin region reflecting the high emissions scenario (RCP 8.5).

Systematically identifying and managing climate change risks

The CCRA systematically identified and contextualised relevant risks for assessment. Key time horizons (2030, 2050, 2070 and 2090) were considered to capture climate change projections applicable to the expected design life of various project asset components, allowing identified risks to be assessed over short, medium and long-term time frames as climate change progresses. Treatments were identified for the assessed risks. Good practice was followed by engaging relevant stakeholders to assess the climate change risks.

Climate risk management early in the project lifecycle

The CCRA was conducted early in the project life. It provided valuable insights into the potential impacts of climate change on the infrastructure being developed. The CCRA identified the need for the initial assessment to be reviewed during the detailed design and construction phase. Climate projections were used to describe how climate hazards may change over the project’s design life, inform assessments of their potential impacts and risks and develop treatments that, if implemented, will improve the infrastructure’s climate resilience. An example is shown below of how one of the identified climate change risks was assessed and outcomes of conducting the CCRA for the project.

Risk assessment			Treatment	
Asset component	Risk statement	Initial risk rating	Treatments	Residual risk rating
Drainage basins	Expansion and cracking of drainage basin as a result of decreased annual rainfall	2030 – Low 2050 – Medium 2070 – Medium 2090 – High	Engineering design accounts for expansion/cracking Drainage basins tested for worst-case scenario (2090) Specification of high durability materials	Low

Outcomes

Efficient identification of relevant risks

Early identification of suitable treatments

Treatments clearly detailed for implementation by project teams

Risks mitigation based on consideration of appropriate time-scale and climate data

6.1.3 Integrating climate change into asset management planning

Recommendation

Agencies should include climate change risk in their asset management strategies, plans, practices and guidance. In doing this, they should assess:

- which asset management objectives and performance measures are most susceptible to and affected by climate change risks
- asset performance and condition, including the tolerance of assets to climate change hazards and how assets have been and are projected to be affected by climate change
- climate change impacts on customer and service outcomes
- how climate change impacts affect the lifecycle management of the assets
- how climate change risks are dealt with in maintenance planning and how maintenance programs can be adjusted to account for projected changes in climate
- monitoring and reporting processes for climate change risks
- how actions for responding to the potential impacts of climate change are incorporated in asset investment strategies.

Audit observation

We found that the agencies we reviewed have not yet fully integrated climate change into their asset management strategies, plans, practices and guidance.

Including climate change in asset management plans provides an opportunity to:

- address risks related to current and future extreme weather events and incremental climate change, and the associated impacts
- focus on building and improving climate resilience
- incorporate climate change risk mitigation strategies into short and long-term budgets and upgrade and maintenance programs
- help to establish an approach for monitoring and reporting on identified priority climate change risks.

We did find that one agency had started to take action to integrate climate change into its asset management planning arrangements. The South Australian Water Corporation (SA Water) updated its asset management plan template to give greater focus to climate change risks and impacts.

The template is being used to prepare asset management plans for SA Water’s 2024–2028 regulatory period.

Case Study 5 provides an example of how SA Water has addressed climate change risk in developing one of its asset management plans.

Case Study 5: SA Water asset management planning

Asset management plan template

SA Water has developed an asset management plan template that recognises that climate change and natural disasters are possible future impacts that will drive change to the existing level of service targets or existing performance. It prompts staff to describe in asset management plans the predicted impacts of climate change and natural disasters on the assets and their levels of service, and the timing of this impact.

Asset management plan for the Metro South Region Wastewater System for 2024–2028

SA Water staff have addressed climate change risks in drafting the asset management plan for the Metro South Region Wastewater System for 2024–2028. The draft plan represents a sound process for managing climate change risks.

Key features of the assessment management plan

<p>climate change impacts using information and data including coastal flood mapping to provide a high-level, qualitative discussion on the climate change risks for the assets and infrastructure</p>	<p>a plan for addressing climate change risk and building climate resilience. This includes:</p> <ul style="list-style-type: none"> conducting climate change risk assessments developing and implementing strategies to reduce the impacts of climate change risks monitoring the effectiveness of planned strategies and adjusting them as needed to ensure they are effective as climate conditions change securing the resources needed to implement the plan including funding for infrastructure upgrades, research and improving knowledge engaging with stakeholders including customers and local organisations
<p>incorporating climate change resilience into the level of service statements</p>	
<p>identifying the need for an integrated and adaptive planning approach for a range of future scenarios including climate change impacts</p>	

7 Climate change risk management capability

7.1 Audit recommendations and observations

7.1.1 Defining and assessing climate change risk management capability

Recommendation

Agencies should define their target level of climate change risk management capability (eg knowledge, skills and experience). In determining this they should address the context of their objectives, functions and size.

Agencies should assess their current level of climate change risk management capability. In completing this assessment, where relevant to their agency, they should evaluate:

- the extent that climate change risk assessments are undertaken across the agency
- the knowledge, skills and experience of their staff, including technical expertise
- staff knowledge about emissions scenarios and climate projections and how they are used
- the extent that climate change risk has been embedded into existing risk management practices, policies and procedures.

Where gaps are identified in current practices, skills and knowledge, agencies should identify:

- the actions needed to move from their current capability to their target capability
- time frames for implementing these actions
- responsible officers.

For identified gaps, the actions should include how staff will obtain the required technical knowledge and skills to assess and manage climate change risks. This may include accessing expertise from external organisations and/or government agencies if the required knowledge and skills do not exist within the agency.

In building their capability, agencies should take opportunities to learn from, collaborate and make use of activities and initiatives led by other SA Government agencies, such as DEW's plan to provide training to agencies on climate change risk management.

The capability assessment outcomes, and the progress of implementing planned actions, should be reported to key people and/or groups with governance responsibility.

Audit observation

Climate change risk management is a challenging and complex area that continually evolves. It is therefore reasonable to expect that SA Government agencies will have gaps in their current practices, skills and knowledge that need to be addressed.

We found that the agencies we reviewed have not yet defined their target levels of capability or assessed their current levels of climate change risk management capability.

A capability assessment is a practical and efficient activity that:

- establishes a baseline of current practices, skills and knowledge
- identifies where current practices, skills and knowledge are sound and in line with good practice, and where gaps exist
- can be used to understand how capability has changed over time.

The draft Climate Ready Agency Framework that DEW has provided to some agencies includes guidance on completing a stocktake of current climate change risk management practices. The purpose of the stocktake is to identify where further effort is needed to introduce or improve climate change risk practices. This could be used by agencies to identify the areas they should include in a capability assessment.

Not defining a target capability level or understanding and addressing gaps in current capability may lead to:

- methods used to assess climate change risks not being applied consistently or not being in line with good practice
- climate change risks not being effectively identified, assessed and managed.

8 Reporting, monitoring and review

8.1 Audit recommendations and observations

8.1.1 Reporting on climate change risks to oversight groups

Recommendation

In determining how they manage climate change risks, agencies should establish arrangements for reporting climate change risk management actions and results.

In doing this, they should:

- decide which people and groups should receive information on climate change risks, and the nature and frequency of information to be reported
- define arrangements for reporting the outcomes of climate change risk assessments
- include information on the agency's capacity to implement treatments to mitigate climate change risks and information to assess the progress and effectiveness of these treatments.

Audit observation

Agencies regularly report key agency risks (ie extreme and high risks) to their senior management and key governance groups. This reporting is designed to include key agency risks and is not specific to climate change risk management. In the agencies we reviewed there was limited reporting to senior management on climate change risks because most of these agencies have not yet undertaken climate change risk assessments.

Timely, accurate and useful reporting enables agencies to monitor their climate change risks and track the progress of implementing the actions to manage them.

Reporting on identified climate change risks to those with decision-making responsibility helps them to meet their responsibilities and increases their ability to make timely and well-informed decisions. This includes decisions on:

- the actions that should be implemented to manage identified climate change risks and when they should be implemented
- whether existing actions remain appropriate or need adjusting to respond to changing context or impacts.

8.1.2 Monitoring and reviewing climate change risk management processes

Recommendation

Agencies should take steps to establish and implement arrangements to monitor and review:

- their progress as they develop practices and processes for managing their climate change risks
- the effectiveness of their practices and processes after they are operating and settled
- new and emerging developments and information relevant to climate change risk management processes, including new knowledge about climate change impacts and climate projections
- whether actions are needed and, where relevant, implemented.

Agencies should document their monitoring and review processes, and report outcomes to those assigned responsibility for overseeing climate change risk management.

Audit observation

Monitoring and reviewing process design and implementation should be a planned part of the risk management process.

We found that the agencies we reviewed still need to progress aspects of their climate change risk management processes before they can start to monitor and review them. This includes establishing their approaches to climate change risk management, undertaking climate change risk assessments, and identifying and implementing risk treatments (adaptation responses).

Monitoring and review processes help to ensure that agencies implement effective climate change risk management. These processes will help them:

- drive improvements in their climate change risk management processes over time
- ensure that developing climate change risk management practices is given specific focus, which will support agencies in building their capability and embedding climate change risk into existing practices
- identify and integrate new knowledge about climate change impacts and projections into existing processes and adaptation responses
- implement a robust climate change risk management process and identify areas that require focus for developing their climate change risk management maturity.

Appendix 1 – Audit mandate, objective and scope

Our mandate

The Auditor-General has authority to conduct this audit under section 31(2) of the *Public Finance and Audit Act 1987*.

Our audit objective

We assessed whether SA Government agencies are effectively identifying and managing their climate change risks.

What we audited and how

Our performance audit covered two broad areas:

- coordination of climate change risk management across the SA Government
- climate change risk management practices in agencies.

We addressed the sub-objectives in figure A1.1 in performing our audit.

Figure A1.1: Performance audit sub-objectives

Audit area	Audit sub-objective
Coordination of climate change risk management across the SA Government	<p>Has the SA Government established appropriate direction, guidance, oversight and coordination functions to assist agencies with climate change risk management?</p> <p>Has the SA Government established central monitoring and review processes to ensure agencies have implemented sound climate change risk management processes and risks are assessed at a whole-of-state level?</p>
Agency climate change risk management practices	<p>Do SA Government agencies have effective governance, reporting and accountability arrangements for managing climate change risks?</p> <p>Are SA Government agencies effectively identifying, assessing, evaluating and prioritising climate change risks?</p> <p>Are SA Government agencies effectively identifying, selecting and implementing risk treatments to manage the impacts of identified climate change risks?</p> <p>Are SA Government agencies effectively monitoring and reviewing their climate change risk management processes?</p>

For the coordination of climate change risk management across the SA Government we looked at the Climate Risk Management Program being implemented by DEW to help all government agencies address climate change risk and opportunity. We also held discussions with DPC and DTF in our audit planning and when finalising our audit observations and recommendations.

We selected six government agencies and reviewed their climate change risk management practices. We focused on the management of physical climate change risks. The agencies we selected covered a range of key government operations and sectors, to ensure that we obtained sufficient audit evidence to conclude on our audit objective. The six agencies were:

- Department for Environment and Water
- Department for Infrastructure and Transport
- Department of Primary Industries and Regions
- South Australian Fire and Emergency Services Commission
- South Australian Housing Trust
- South Australian Water Corporation.

We engaged a subject matter expert to provide technical advice and assistance to us throughout the audit and to ensure that our observations and recommendations were consistent with sound industry and government practice. We also referred to international standards and guidance to identify elements that represent good practice for climate change risk management. These include:

- IFRS S2 *Climate-related Disclosures*
- ISO 31000:2018 *Risk management – Guidelines*
- ISO 14091:2021 *Adaptation to climate change – Guidelines on vulnerability, impacts and risk assessment*
- Recommendations of the Task Force on Climate-Related Financial Disclosures
- The UK National Audit Office's *Climate change risk: A good practice guide for Audit and Risk Assurance Committees*.

The subject matter expert also provided advice on principles considered good practice.

What we did not audit

The scope of this performance audit did not include assessing:

- the SA Government's overall progress on the implementation of the South Australian Government Climate Change Actions
- climate change risk management practices of agencies outside of our sample
- the management of transition risks, liability risks and climate-related opportunities
- climate change mitigation activities, such as emissions reduction
- the identification and management of non-climate change risks
- the support and guidance provided by the SA Government to industry and external bodies for their climate change risk activities.

Appendix 2 – Abbreviations and terms used in this report

Abbreviation/Term	Description
Adaptation	Actions undertaken to manage or reduce the adverse consequences of climate change or harness any opportunities
Adaptive planning	A longer-term planning approach that adopts strategic rather than reactive planning through considering multiple possible future outcomes and allowing for analysis and flexibility of various options across those multiple futures
AS 5334	Australian Standard 5334-2013 <i>Climate change adaptation for settlements and infrastructure – A risk based approach</i>
CCRA	Climate change risk assessment
Climate change	Long-term shifts in temperatures and weather patterns
Climate hazard	A weather event that could harm people, property and the environment, such as bushfires and floods
Climate projection	The response of the climate system over the coming decades to an emission scenario as simulated by a climate model to obtain a sense of the range of future climate conditions that may emerge
Climate resilience	The ability to anticipate, prepare for, respond to and adapt to climate change, to continue delivery of services and meet community expectations
Climate variables	Variables that define or describe the longer-term average weather or environmental metrics (eg rainfall and temperature)
DEW	Department for Environment and Water
DIT	Department for Infrastructure and Transport
DPC	Department of the Premier and Cabinet
DTF	Department of Treasury and Finance
Emissions scenario	Description of a possible future scenario of the change in rates of greenhouse gas emissions resulting from human activity
ISO 31000	ISO 31000:2018 <i>Risk management – Guidelines</i>
PPRR	Preparation, prevention, response and recovery
RCP	Representative Concentration Pathway
SA Water	South Australian Water Corporation
Time horizons	Future time frames used to assess climate change risks

Appendix 3 – Response from Acting Chief Executive, Department for Environment and Water under section 37(2) of the *Public Finance and Audit Act 1987*

Ref No: DEW-D0023936
Your Reference Number: A22/5500

Mr Andrew Richardson
Auditor-General
Auditor-General's Department

Via email: records@audit.sa.gov.au



Government of South Australia

Department for Environment
and Water

Office of the Chief Executive

81-95 Waymouth Street
Adelaide

GPO Box 1047
Adelaide SA 5001
Australia

Ph: +61 8 8204 9000

www.environment.sa.gov.au

Dear Mr Richardson

Thank you for your letter dated 10 October 2023 enclosing your proposed Report 9 of 2023: *Climate Change Risk Management*.

The Department for Environment and Water (DEW) has appreciated the opportunity to participate in this audit. DEW has previously provided feedback on your management letter and a draft version of the report. DEW does not have any additional feedback.

Yours sincerely

A handwritten signature in black ink, consisting of stylized initials 'BB' followed by a horizontal line.

Ben Bruce
ACTING CHIEF EXECUTIVE

17/10/2023

Appendix 4 – Response from Chief Executive, Department for Infrastructure and Transport under section 37(2) of the *Public Finance and Audit Act 1987*

OFFICIAL



Government of South Australia

Department for Infrastructure
and Transport

OFFICE OF THE CHIEF
EXECUTIVE

83 Pirie Street
Adelaide SA 5000

GPO Box 1533
Adelaide SA 5001

ABN 92 366 288 135

Your Ref: A23/177

Mr Andrew Richardson
Auditor-General
By email: records@audit.sa.gov.au

Dear Mr Richardson

REPORT OF THE AUDITOR-GENERAL: REPORT 9 OF 2023 CLIMATE CHANGE RISK MANAGEMENT

I refer to your letter dated 10 October 2023, regarding the *Auditor-General's proposed Report 9 of 2023 Climate Change Risk Management* requesting a reply in writing to the proposed report.

The Department for Infrastructure and Transport (the Department) acknowledges and supports the observations and recommendations made in the report. Your report will help guide our approach to strengthen our climate change risk management processes.

As captured in the report, the Department has previously responded to the observations and recommendations of the audit, outlining our commitment to formalise a strategic approach for the identification and management of climate risks and develop a detailed implementation plan to action the recommendations.

The strategy and implementation plan will consider the Department for Environment and Water's Government Climate Risk Management Program, and build on progress already underway, including:

- adopting procurement measures to ensure future climate conditions are considered in the procurement of goods and services;
- commencement of integrating climate risk into asset management planning;
- setting intention for Sustainable Government Building Requirements to require Climate Change Risk Assessments for all building projects; and

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- commencement of updating the *Program and Project Management Framework* and associated checklists to reduce the risk of climate risk assessments not being undertaken correctly for new transport infrastructure projects.

Finally, thank you for the words of appreciation for the support of our staff and assistance during the audit process. Equally, I would like to thank you and your team for their diligence and professional conduct throughout.

Yours sincerely



Jon Whelan
Chief Executive

16 October 2023

Appendix 5 – Response from Chief Executive, Department of Primary Industries and Regions under section 37(2) of the *Public Finance and Audit Act 1987*

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Government of South Australia
Department of Primary Industries
and Regions

Your Ref: A22/550
Our reference: A6029925

OFFICE OF THE CHIEF
EXECUTIVE

Level 12
25 Grenfell Street
ADELAIDE SA 5000
GPO Box 1671
Adelaide SA 5001
DX 667
Tel (08) 8429 0216

www.pir.sa.gov.au

Mr Andrew Richardson
Auditor-General
Auditor-General's Department
Level 9, State Administration Centre
200 Victoria Square
ADELAIDE SA 5000

By email: records@audit.sa.gov.au

Dear Mr Richardson

Report of the Auditor General: Report 9 of 2023 Climate Change Risk Management

Thank you for providing a copy of Report 9 of 2023 *Climate Change Risk Management* and inviting Department for Primary Industries and Regions (PIRSA) for the opportunity to respond to the findings and recommendations as outlined in your letter dated 10 October 2023.

I confirm that PIRSA has no further updates or additional comments to the report.

The report represents a fair assessment of PIRSA's climate change risk management practices and provides recommendations to improve in the assessment and management of climate related risks, as well as monitoring and evaluation processes.

I would like to thank the audit team from the Auditor-General's Department for their cooperation and assistance during the audit.

Please do not hesitate to contact Ms Michelle Griffiths [REDACTED] for any further queries.

Yours sincerely

Prof Mehdi Doroudi PSM
CHIEF EXECUTIVE

18/10/2023

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Appendix 6 – Response from Chief Executive, South Australian Fire and Emergency Services Commission under section 37(2) of the *Public Finance and Audit Act 1987*

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Government of South Australia

South Australian Fire and
Emergency Services Commission

If calling please ask for: [REDACTED]
Telephone: [REDACTED]

Our Reference: ESS-23-3093 / Your Reference: A22/550

Mr Andrew Richardson
Auditor-General
Auditor-General's Department

Level 2,
37 Richmond Road
Keswick SA 5035

GPO Box 2706
Adelaide SA 5001
DX 206

Tel 8115 3900
Fax 8115 3908

ABN 95 437 863 949

www.safecom.sa.gov.au

Dear Mr Richardson

Re: Report of the Auditor-General: Report 9 of 2023 *Climate Change Risk Management*

I write in response to your letter dated 10 October 2023 and the Report of the Auditor-General: Report 9 of 2023 *Climate Change Risk Management* and I thank you for the opportunity.

I support the observations and recommendations outlined in your report that considers the physical risks which result from the direct impacts of changes in climate. The emergency services sector has seen the impact of changes in climate firsthand in the frequency, severity and consequences of natural disasters and emergencies.

SAFECOM has a lead role to work with the sector in developing a consistent, mature and more sophisticated approach to managing climate risk. I am cognisant of the importance in working collaboratively with the Department of Environment and Water, which is leading this transition for the State, and with other government, non-government, community and business partners.

This organisation has commenced integrating climate risk management practices across strategic and operational areas, notwithstanding the sector's ongoing engagement in risk mitigation for natural disasters and emergencies. Our sector continues to be an active participant in state and national groups examining climate risk and adaptation strategies in emergencies. The Chief Officers and I equally recognise the need for improved integration of climate risk management practices into other elements of our operational and non-operational business activities.

Significant work is being undertaken to raise the profile of climate change risk management at all levels of SAFECOM and emergency services organisations. The SAFECOM Board has identified climate risk management as a priority area of business. SAFECOM has revised and continues to evaluate its Risk Management Framework and policy positions and has committed resources towards research, analysis, assessment, planning, reporting and monitoring for improved decision making.

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I remain committed to supporting the Government on this important priority.

Yours sincerely,



Julia Waddington-Powell
Chief Executive
SAFECOM

18 October 2023

Appendix 7 – Response from Chief Executive, South Australian Housing Trust under section 37(2) of the *Public Finance and Audit Act 1987*

OFFICIAL: Sensitive



Government of South Australia
SA Housing Authority

Ref: 23CHAF/2004

Mr Richardson
Auditor-General
Level 9, 200 Victoria Square Adelaide SA 5000

Email: records@audit.sa.gov.au

SA Housing Authority

GPO Box 1669
ADELAIDE SA 5001
DX 550

Tel: 131 299
ABN: 17 545 435 789

www.sa.gov.au/housing
housingcustomers@sa.gov.au

Dear Mr Richardson

I am writing to acknowledge the receipt of the Auditor-General's proposed Report 9 of 2023 on Climate Change Risk Management, as provided under section 37(2) of the Public Finance and Audit Act 1987 (PFAA). I would like to express our gratitude for your assistance during the audit process and the constructive approach.

Having reviewed the proposed report, we understand the importance of the matters discussed, particularly in the context of climate change risk management. The SA Housing Authority are committed to working with the whole of the SA Government including other agencies to implement the recommendations and have no further feedback to provide.

We value the opportunity to engage in this important matter and appreciate your consideration of our response.

Yours sincerely,

A handwritten signature in blue ink, appearing to read 'Michael Buchan'.

Michael Buchan
CHIEF EXECUTIVE
SA HOUSING AUTHORITY

18 October 2023

OFFICIAL: Sensitive

Appendix 8 – Response from Chief Executive, South Australian Water Corporation under section 37(2) of the *Public Finance and Audit Act 1987*



OFFICIAL

13 October 2023

Your ref: A22/550

Mr A Richardson
Auditor-General
Auditor-General's Department
Level 9, State Administration Centre
200 Victoria Square
ADELAIDE SA 5000

Dear Mr Richardson

Report of the Auditor-General: Report 9 of 2023 - Climate Change Risk Management

Thank you for your letter dated 10 October 2023 regarding your proposed Report 9 of 2023 - Climate Change Risk Management.

SA Water is committed to cost effective management of climate change risk and, equally importantly, combatting the drivers of climate change. We are well advanced in this work and are already working to respond to your recommendations to implement initiatives which will further improve our processes.

If you require any further information regarding this matter, please contact our General Manager Science and Strategy, Nicola Murphy, via email [REDACTED] or on [REDACTED].

Yours sincerely,

A handwritten signature in blue ink, appearing to read "Chris Young".

Chris Young
Acting Chief Executive

