ACT Environmental Policy Review

FINAL REPORT

August 2022

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Alluvium recognises and acknowledges the unique relationship and deep connection to Country shared by Aboriginal and Torres Strait Islander people, as First Peoples and Traditional Owners of Australia. We pay our respects to their Cultures, Country and Elders past and present.

Artwork by Vicki Golding. This piece was commissioned by Alluvium and has told our story of water across Country, from catchment to coast, with people from all cultures learning, understanding, sharing stories, walking to and talking at the meeting places as one nation.

This report has been prepared by Alluvium Consulting Australia Pty Ltd for ACT Office of the Commissioner for Sustainability and the Environment under the contract titled '*Comprehensive review of all ACT Government environment and sustainability policies for 2023 State of the Environment Report*'.

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Executive Summary

The ACT population is growing toward half a million people with forecasts of ongoing growth and diversification over the next twenty years. Forecasts of ongoing growth and increasing awareness of its impact on environmental values have emphasised the need for sustainable development. The situation has become more urgent as the effects of climate change become manifest affecting many of the ecosystem services on which our communities depend (drought, flood, fire, heatwaves). The ACT has been a national leader in the development of environmental policy being the first jurisdiction to set a goal to achieve no waste going to landfill and to achieve an entirely sustainable electricity supply. The efforts of the ACT have recently been acknowledged through a nomination for a Banksia award for efforts to reduce emissions.

Despite the ACT government's commitment to sustainability, evidence to support progress toward environmental objectives is limited and there are areas where declines continue. There is also increasing public interest in how governments are seeking to become more sustainable which makes transparency critical to informed public debate. It has become increasingly apparent that the development of numerous strategies and plans was compromising transparency and potentially impeding managers' capacity to identify short-comings and address them.

In response, the Office of the Commissioner for Sustainability and the Environment (OCSE), commissioned this review of the ACT's environmental policies to provide an overview of the ACT's environmental policies, including an assessment of the efficacy of the overall policy suite in order to identify strengths, redundancy or gaps and to identify areas of potential improvement. A multi-disciplinary review panel identified a small suite of criteria by which to assess individual policies and complementary criteria for the overall portfolio of policies. In addition, a brief review of the publishes literature identified several additional principles that were considered as panel members reviewed each policy. The review focussed on the key policy in each of 10 areas, with additional review of subsidiary policies where this was necessary to identify specific commitments. Each commitment was classified according to the type of actions proposed. This enabled an assessment of the balance of actions across the entire policy portfolio.

The review found that all policies clearly describe their goals and describe an objective hierarchy from a goal or vision down through objectives to proposed actions. The context for each policy is well described as are relevant pieces of legislation and policies that have overlapping interests. Each policy is divided into components that help describe the scope of the policy.

The review did identify several policy characteristics that risk undermining their effectiveness. Environmental management is beset by uncertainty which needs to be considered in the development and subsequent implementation of the policy. The most effective way of managing uncertainty is adaptive management which includes assessments of condition and setting measurable outcomes. Very few policies included adaptive management, condition assessments or measurable outcomes. These gaps mean managers will continue to operate with high levels of uncertainty and associated risks of failure.

Across the program of policies, the review found that while policies clearly described the legislative and policy context, there was little consideration of the interdependencies among polices, nor the opportunities or risks associated with complementary actions. This poses a risk to each policy area because if one area does not perform as expected then this will influence the ACT's capacity to achieve objectives in other areas. The issue of change is another risk for many policy areas. The review found that changes in circumstances could render large portions of a policy ineffective. Rather than commit to an endless process of adaptation, the review recommends that policies include processes that enable policies to adapt through time. The Nature Conservation Strategy (NCS) has sought to remain flexible through development of Implementation Plans.

The review also confirmed the complexity of the ACT's policy portfolio and recommends that the government provide improved guidance on the policy areas and hierarchy and on the key relationships among policy areas that should be considered as strategies are adapted or renewed

Overall, the review found that the ACT's environmental policy portfolio represents a strong foundation that can be adapted to manage uncertainty and, over time, improve effectiveness. The improvements will come through the implementation of robust and transparent processes that will ensure a constructive contest of ideas to direct investment at areas that will derive the greatest benefit.

Glossary of terms

Asset Protection Zone	Includes inner and outer zones; an area in or beside urban development that is designed and managed to reduce the risk of adverse impacts from bushfires on assets (public or privately owned).
Biodiversity	Biodiversity: The variety of life on earth, comprising countless species living in different but interdependent ecosystems. Variability among living organisms in terrestrial, marine and other aquatic environments (and the ecological systems of which they are part) includes diversity within species and between species and diversity of ecosystems.
Climate change	The Intergovernmental Panel on Climate Change defines climate change as "a change in the state of the climate that can be identified (e.g., using statistical tests) by changes in the mean and/or the variability of its properties and that persists for an extended period, typically decades or longer. It refers to any change in climate over time, whether due to natural variability or as a result of human activity."
Climate Change Adaptation	Actions by individuals or systems to avoid, withstand or benefit from current and projected climate changes and their impacts. Adaptation reduces a system's vulnerability or increases its resilience to the effects of climate change. Various types of adaptation can be distinguished, including anticipatory (proactive), autonomous (spontaneous) and planned (deliberate) adaptation (IPCC).
Environmental Flows	An environmental flow is any managed change in a river's flow pattern (water released from a dam or a weir) intended to maintain or improve the integrity of riverine ecosystems.
Evaporation	The process of liquid water turning to a gas. Liquid water requires energy to become a gas and it often takes this energy from the atmosphere resulting in a reduction in air temperature. Water in an irrigated landscape evaporates reducing the air temperature, though raises the humidity. When people sweat, the water evaporates by taking energy from their skin, cooling them down.
Evaporative cooling	When water evaporates it uses energy from the air to change from liquid to gas, the air loses this energy and cools. This also occurs when water in plants evaporates.
Evapotranspiration	The sum of evaporation and plant transpiration. The evaporation refers to water coming from sources like soil or surface water on leaves, while transpiration is the movement and loss of water as vapour from within a plant such as through their stomata. Like evaporation, evapotranspiration reduces the air temperature when energy from the air is used.
Heat stress	Heat stress occurs when our body is unable to cool itself enough (e.g., through sweating) to maintain a healthy temperature.
Heatwave	Three or more days of high maximum and minimum temperatures which are unusual for that location.
Microclimate	A local set of meteorological conditions.
Natural landscapes	Areas that have had limited human impact or intervention.
Plan	A detailed proposal for doing or achieving a goal.
Policy	Policy is the guiding principle or rules, that guide governments and/or organizations in their decisions.

Potable Water	Water suitable on the basis of both health and aesthetic considerations for drinking and culinary purposes.
Program logic	A program logic is a schematic representation of a program's intent. By linking activities with outputs, intermediate impacts and longer term outcomes a program logic aims to show the intended causal links for a program.
Strategy	Strategy is a comprehensive plan designed to achieve a long-term or overall aim.
Thermal comfort	The subjective feeling of temperature in the environment. The term often includes factors such as air temperature, solar radiation, wind and humidity.
Urban Open Space	Unleased Territory Land within the urban area set aside for public and recreational use.
Urban heat island (UHI) effect	Localised warming in urban areas due to energy created by people, transport, buildings and activities, and by the storage and emission of heat from large amounts of paved and darker coloured surfaces.
Water sensitive urban design (WSUD)	An approach to urban planning and design that aims to integrate the management of the urban water cycle into the urban development process.

Abbreviations

ACT RFS:	ACT Rural Fire Service
AILA:	Australian Institute of Landscape Architects
APR:	Accessible Pedestrian Route
ATN:	Active Travel Network
ATRA:	Active Travel Route Alignments
ATIPT:	Active Travel Infrastructure Practitioner Tool
CMTEDD:	Chief Ministers, Treasury and Economic Development Directorate, ACT Government and its successors.
CPTED:	Crime Prevention Though Environmental Design
CRP:	Community Recreation Park
DPSIR:	Drivers, Pressures, State, Impact and Response.
EPBC Act:	Environment Protection and Biodiversity Conservation Act
ESA:	ACT Emergency Services Agency, ACT Government and its successors.
EPA:	Environment Protection Authority, ACT Government and its successors.
EPSDD:	Environment, Planning and Sustainable Development Directorate, ACT Government and its successors.
Ha:	Hectares
IAPZ:	Inner Asset Protection Zone
LATM:	Local Area Traffic Management
MERI:	Monitoring, Evaluation, Reporting and Improvement
NCC:	National Construction Code
OAPZ:	Outer Asset Protection Zone
OCSE:	Office of the Commissioner for Sustainability and the Environment
PCS:	Parks and Conservation Services, ACT Government and its successors
SBMP:	Strategic Bushfire Management Plan for the ACT
TCCS:	Transport Canberra and City Services, ACT Government and its successors
WSUD:	Water Sensitive Urban Design
UHI:	Urban Heat Island

1 Introduction

The ACT is committed to working together to deliver well informed decisions and innovative programs that make Canberra a liveable, competitive and inclusive city. Environmental sustainability is a key management objective that has seen the Territory develop several environmental policies and plans to guide decisions that will contribute to the ACT's goals.

Sustainability is a complex challenge with multiple drivers having the capacity to affect progress. An indication of this complexity is that there are at least 24 legislative acts that all have some relevance to sustainability and implementation of each Act is associated with a suite of policies. The result is that in seeking to address the diversity of issues, the policy landscape is complex and with many interdependent parts. This brings with it the risk that transparency suffers, and those individual policies may not all be complementary. This review seeks to assess these risks and find ways of managing them.

1.1 Purpose of the Review

This review seeks to collate all relevant policies across 10 topic areas to establish their intent and inter-relationships in a way that is transparent to the public. The review seeks to analyse each of the key environmental policy instruments in the ACT that fall under each of the 10 topic areas. The intent of the analysis is to identify the effectiveness, strengths and weaknesses of individual policies, where policy synergies and gaps occur within and between topic areas, and where improvements can be made.

The review draws on both best practice in the development, implementation, and evaluation of policy but also national and international examples of effective policies.

This review of ACT Environmental Policies has three broad objectives:

- To improve transparency and communication about the ACT's environmental policies and the ways that they contribute to achieving key sustainability objectives.
- An assessment of the efficacy of the overall policy suite to identify strengths, redundancies or gaps.
- To identify areas of potential improvement

1.2 Scope of the Review

The scope of the investigation was to understand the effectiveness of key ACT Government management actions and strategies to sustain the ACT's environmental values and enhance Canberran's quality of life. The review included major policies in 10 topic areas:

1. Planning
2. Climate change
3. Transport
4. Energy
5. Waste management
6. Fire management and preparation
7. Air quality
8. Nature conservation (including threatened species and communities, conservation reserves, invasive species)
9. Water management – water resources and consumption
10. Water management – environmental

Within each topic area, there are multiple policies in operation that contribute to a management objective hierarchy. Within the hierarchy, high level objectives encompass finer scale objectives or targets that, in turn give rise to fine scale actions. The review included key strategies and ACT wide plans, but did not review in detail action plans, plans of management, investment plans or operational plans.

The investigation included:

- identifying the program logic for each policy
- assessing policy effectiveness.

- evaluating relationships among policies both with an area and across all 10 topic areas.

This report documents the strengths and weaknesses of individual environmental policies and the overall policy portfolio to support the Office of the Commissioner for Sustainability and the Environment (OCSE) to achieve sustainability objectives in the ACT. Recommendations for improvement have been provided where possible and appropriate.

Relevant policies were reviewed at two scales: the individual policy scale and environmental policy program scale. The policy scale analysis involved review of individual instruments (Act, strategy, plan) in each of the 10 environmental policy areas. The policy program scale review examined the relationships among individual instruments including, where appropriate, multiple policies within a theme and individual policies in different themes.

The policy program review identified the extent to which policies share elements with other policies. There are generally few policies that are very highly interconnected while most policies will have a small number of interconnections. In some instances, the ACT government had recognised the interdependence of separate policies, for example the links between Planning and Transport or Fire and Air Quality. While these explicit relationships are clear, more indirect and un-anticipated interactions that emerge from the broad scope and complexity of managing sustainably were identified.

1.3 Characteristics of effective environmental policy

1.3.1 Initial criteria for review

The following criteria was used in the initial review of environmental policy documents:

- Objectives clearly stated
- Program logic clear and aligned with conceptual model
- Outcomes are stated in measurable terms
- Observed changes in outcomes (where appropriate)
- Implemented within an adaptive management framework.

1.3.2 Additional principles for effective and equitable environmental policy

In reviewing the policies, several other considerations were considered where appropriate. As a guide, we have synthesised key principles from across three complementary perspectives: business, nature conservation, and future justice below (drawing on Cabrera et al 2011; NWF 2021; WBCSD No date). The World Business Council for Sustainable Development (WBCSD) identifies key principles for successful environmental policy. They also highlight that capacity and resources for more effective implementation and enforcement is required in many cases, and that collaboration between business and policy makers on policy design and implementation could greatly improve policy success (WBCSD, No date). The US National Wildlife Federation (NWF) identify a national policy agenda for the US to improve their future for both people and wildlife (NWF 2021). The World Future Council (WFC) provides guidance on designing policy that supports a just and sustainable world and protects future generations (Cabrera et al 2011). They offer a checklist for decision-makers, built around their analysis of key examples of successful law/policy, and the International Law Association (ILA) 2002 principles which are considered a benchmark of international law on sustainable development.

Principles for effective and equitable environmental policy:

1. Enable, integrate and reward sustainable use of natural resources and biodiversity
2. Recognise the connection between human wellbeing and biodiversity
3. Invest in natural infrastructure
4. Precautionary approach to human health, natural resources and ecosystems
5. Integration and interrelationship
6. Comprehensiveness and a long-term view

7. Translate vision into action (effective action planning and target setting)
8. Clearly assign roles and responsibilities across society
9. Establish and adequately resource implementation, monitoring and compliance
10. Informed, adaptive policy
11. Climate-ready
12. Integrate landscape and system understanding into policy
13. Work with the private sector to develop and implement innovative solutions
14. Good governance with participatory, transparent and accountable decision-making for equity and justice

Each of the principles is listed below with additional detail primarily drawn from the three reports: Cabrera et al (2011), NWF (2021) and WBCSD (No date). Some of the titles of the principles are directly from these documents, while other headings have been created to capture themes across relevant linked principles and characteristics.

Enable, integrate and reward sustainable use of natural resources: Enable, integrate and reward sustainable use of biodiversity and natural resources (e.g., payments for ecosystem services schemes); Deliver stated objectives with lowest economic/social cost or greatest social/economic benefit.

Invest in natural infrastructure: recognise and enhance the value of ecosystem services to human society.

Precautionary approach to human health, natural resources and ecosystems; Prevent negative effects on biodiversity by limiting damaging activities and threats such as invasive species; Establish safeguards protecting biodiversity from GMOs.

Integration and interrelationship; Integrating biodiversity into all policies and actions and linkages to other policies (e.g., climate change, land use, forestry); Seek to achieve consistency between nations to assist in the management of transboundary issues; Implement related obligations (e.g., Ramsar and other treaties) in a synergistic manner; taking into consideration existing legal framework governing biodiversity;

Comprehensiveness and a long-term view; does the policy neglect any crucial issues or drivers? Provide clear policy signals into the future (at least 5-10 years) to influence long-term decision-making; Assess pressures on ecosystems based on cumulative impacts now and in the future.

Translate vision into action (effective action planning and target setting): Set realistic but challenging and SMART targets (Specific, Measurable, Attainable, Relevant and Time-bound); Develop and implement targets in line with relevant higher-level plans and goals; ensure actions directly link to achieving higher levels strategies/goals through actions in the short and medium term.

Clearly assign roles and responsibilities across society: Roles and responsibilities of all relevant stakeholders in halting and reversing biodiversity loss in the interest of future generations; Common but differentiated responsibilities appropriate to context; government, corporate and private responsibilities are defined.

Adequately resource implementation, monitoring and compliance: and establish and enforce accountability; Instruments to monitor compliance with the law (e.g., addressing invasive species and biodiversity loss); Strong legal measures and an appropriate institutional structure with the power to oversee implementation, including enforcement for non-compliance.

Informed, adaptive policy: Review or update process and collect information on the progress in implementation and status of biodiversity; Provide timely and up-to-date information on the state and trends of biodiversity to decision-makers and the public in coordination with other levels of governance (e.g., international, regional) in order to enable adjustment to new challenges.

Climate-ready: Ambitious and equitable climate policy targets; Build a clean and resilient grid and set economy-wide climate goals; Amplify environmental and climate justice and foster accountability; Support climate-smart infrastructure and account for climate risk in planning and investment.

Integrate landscape and system understanding into policy: and ensure sustainable practices on both public and private land: Safeguard clean water and resilient waters, coasts and communities; Work with land managers so "working lands" can be part of a solution for climate change mitigation and adaptation; Provide incentives as directly as possible to resource managers to enhance provision of valuable natural resources; Transparency and good government practices on public lands, restoration and conservation.

Work with the private sector to develop and implement innovative solutions: including accounting for natural values: Establish a level playing field for companies competing in the same markets/accessing same resources; Respect, protect or assign property rights; Be cognizant and commensurate with relative ecosystem value wherever possible

Recognise the connection between human wellbeing and biodiversity: explicitly recognise intrinsic links between human wellbeing and environmental protection. An example of this includes Bhutan's linking of happiness and wellbeing to the environment (see next section).

Good governance with participatory, transparent, and accountable decision-making ensuring equity and justice:

- Participation of a broad set of stakeholders in implementation, monitoring, and review of policy (government, indigenous, academic, civil, and private sectors)
- Empower the key role of Indigenous peoples and local communities in decision-making: Tribal partnerships; Establish both ex-situ and in-situ biodiversity conservation measures giving due consideration to Indigenous and local community rights; Protect, promote and ensure fair and equitable benefit sharing from use of traditional knowledge, innovations and practices relating to biodiversity; Mechanisms for public participation and access to justice (e.g. instruments providing legal standing for environmental harm).
- Public participation, access to information and justice: Equity and poverty eradication; Support equitable environmental education; Safeguard bedrock environmental and community protections (improve implementation of core environmental legislation); Mechanisms for awareness raising, education, incentives and technology transfer to increase capacity to address biodiversity challenges.

2 Environmental Policy Assessment

2.1 Assessment Introduction

The policy assessment aims to both clarify the objectives and role of environmental policies and to inform improvements in ACT environment policy by providing an assessment of policies across 10 themes in terms of their program logic and effectiveness. We have drawn on current ACT Policies and Plans, State of the Environment Reports, and investigations by OCSE, Auditor General and other research organisations.

Most of the information included in the review is publicly available. Where confidential reports or information are used, this will be indicated in the text. The project team also provided useful reports and scientific papers that represent best available science on the relationship between Human activities, Impacts and where appropriate, Responses. These are listed in the References section.

The project team reviewed each policy and developed a summary of the causal links that link Human activities to Responses (program logic). The summary was then used to identify where in the causal chain (program logic) policies were seeking to respond and whether there were any gaps, based on what is known of the system. For each policy the results were summarised as a conceptual model.

The assessment of each policy considered both the program logic and evidence of effectiveness. The first step assessed the program logic to identify strengths, weaknesses, risks and opportunities. The second step reviewed available evidence to determine policy effectiveness. The first source of evidence was the 2019 State of the Environment report, but where additional evidence was available this was also considered.

With the completion of the review, each policy was assessed against the following criteria:

- clearly articulated goals
- program logic – clear and aligned with conceptual model
- outcomes are stated in measurable terms
- includes an assessment of risk and feasibility
- implemented within an adaptive management framework

Each policy within an area was assessed against the same criteria, although there were some policies that could not be assessed against all criteria.

The assessments of individual policies were then compared across areas to ensure that assessments were consistent and to identify:

- strengths and gaps in the information reviewed
- common strengths in policies
- common risks
- potential remedies to manage risks
- common externalities found to affect multiple policies.

The outcomes of the assessment were then reported based on aggregated outcomes for the portfolio and for each individual policy. Individual, detailed policy assessments for each theme are found in the Appendices, with a summary of assessments across the policy portfolio here in Sections 3.2 to 3.5.

Act	Climate Change	Energy	Planning	Transport	Waste	Air	Fire	Bio-diversity	Water resources	Environ. water
Australian Capital Territory (Planning and Land Management) Act 1988										
Planning and Development Act 2007										
Waste Minimisation Act 2001										
The Plastic Shopping Bag Ban Act 2010										
Dangerous Substances Act 2004										
Litter Act 2004										
City Renewal Authority and Suburban Land Agency Act 2017										
Heritage Act 2004										
Fisheries Act 2000										
Animal Welfare Act 1992										
Environmental Protection Act 1997										
Water Resources Act 2007										
Pest Plants and Animals Act 2005										
Nature Conservation Act 1980										
Waste Management Act 2016										
Climate Change and Greenhouse Gas Reduction Act 2010										
Commissioner for Sustainability and Environment Act 1993										
Lakes Act 1976										
Emergencies Act 2004										
Human Rights Act 2004										
Tree Protection Act 2005										
Building Act 2004										
Public Health Act										
Commonwealth EPBC Act 1999										
Commonwealth Product Stewardship Act										

Table 1. Overview of Legislative Acts and their relevance to the nine environmental areas. The Planning Strategy strategies number refers to the five strategies included in the Planning Strategy, 1: Compact and Efficient City, 2: Diverse Canberra, 3: Sustainable and resilient Canberra, 4: Liveable Canberra, 5: Accessible Canberra. Dark green cells denote the primary Act for the theme, while pale green indicate matters are within scope of the Act.

2.2 Assessment

2.2.1 Clearly articulated goals

All the policies reviewed had clearly stated goals that provided context for a suite of objectives or priorities. For example, the Transport strategy seeks to create a "*world class system that supports a compact, sustainable and vibrant city*." However, translation of intent and broad goals to specific targets and actions is often lacking in the individual policies. As an example, there are several tiers of strategy between the Nature Conservation Strategy (NCS) and the species action plan for Murray crayfish, however, there is no measurable outcome in terms of the number of crayfish, habitat quality or the extent to which threats need to be reduced.

2.2.2 Program logic

The development of a conceptual model and subsequently a program logic are critical to policy development because they require articulation of tacit knowledge and facilitate a contest of ideas. The process of developing a model and a program logic ensures that there can be shared agreement about the way a system works and that there is a robust causal chain between proposed actions and policy objectives. It is particularly important when seeking to engage people as it helps underpin the why of what is proposed. Of course, it doesn't take much convincing to encourage people to weed or plant, but there are many more contested areas where a clear articulation of why and in some cases why not will be important.

2.2.2.1 Conceptual models

Conceptual models are abstractions of reality expressing a general understanding of a more complex process or system. They tell the story of how a system works. Conceptual model building consists of choosing the system parts and the relationships that link these parts, specifying how the parts interact and identifying missing information (Department of Environment and Heritage Protection 2012).

It is recognised that generating an agreed model of how a system functions is essential. While it is not a guarantee that robust science will be applied, models can clearly communicate the science underpinning management.

Four policy areas included some form of illustration of some aspect of the policy challenge, however they did not provide an overview of the system parts and linking relationships. Waste included a diagram illustrating sources of waste and their linkages to potential markets. Inclusion of a diagram showing the major influences on waste production, its collection and treatment would be useful, particularly as this was used as a benchmark to compare to the circular economy model. The transport policy included a series of maps that illustrated planned improvements. Maps are powerful communication tools, but the reader is left with the question of the extent to which investments in improved transport influence people's behaviour when compared to the location of their home, work, schools, or recreation. The conceptual model has clear links here with the planning area, but in terms of effective communication, it is unreasonable to expect the audience to read several policies to get an overview of what is happening. The Nature Conservation strategy had an illustration of different types of landscapes with notes about the role they play in conserving biodiversity (Error! Reference source not found.). While useful for communicating the point that there are different management objectives for different landscapes, it is a very high-level representation (5 types) of the ACT and there are no relationships about the linkages between landscape types which might be important for achieving objectives. Finally, the water policy includes a generic model of Integrated Catchment Management which is only part of the overall water strategy and should be adapted so that it links with all the key elements of the strategy.

2.2.2.2 Program Logic

In general, there was alignment between the stated goals, subsidiary objectives, and proposed actions. For example, the Nature Conservation Strategy has a vision, 3 outcomes, 5 strategies and up to 8 Actions within each strategy. Within the Protect Species and Ecological Communities strategy are actions on managing the protected estate, identifying refugia and propagating and transplanting threatened plants. Despite this general alignment, there are two observations.

The first is that the program logic is not always clear across the policies. For example, the Planning Strategy seeks to achieve a compact and efficient city as part of a sustainable and resilient territory. Within these objectives they seek a liveable, diverse, and accessible city. The directions do raise some questions in terms of

both the focus and relationships among directions. For example, the focus for compact and efficient appears to be the areas of new growth, while commercial areas are protected, and the city centre is enhanced to improve diversity. The question is why the city centre and commercial areas aren't the focus of attempts to become more compact and efficient. It is understandable that planning can have the biggest impact on new developments, however, other regions will undergo cycles of renewal and there are risks in failing to plan for this process. The Planning Strategy also seeks to protect biodiversity while promoting continued development. If this is taken to mean only threatened species and communities, then the current approach of planning for corridors and a development assessment process may ensure no loss of this part of biodiversity, but it is a high-risk strategy based on the assumption that species are resident in patches of habitat and are amendable to using corridors through urban developments. This is clearly not the case for many species of birds who respond to habitat at a landscape or continental scale and for a range of mammals that follow resources and have limited road sense. While conflicting objectives and directions are inevitable, the role of the strategy should be to identify these conflicts and outline the process for resolving them.

The second is that while the Actions may appear reasonable, there is a question about whether they are the most important or effective ways of contributing to reaching the goal. For example, in the Climate Change Strategy there are actions such as:

- Investigate options for dedicating a greater proportion of road space and public realm space to sustainable transport modes
- Consider options for reforming car registration fees to incentivise efficient road use

While these actions may have some effect on emissions, questions arise about how much change would be expected from a full, or pragmatically realistic implementation of these actions on emissions. The Climate Change strategy includes 83 actions, the implementation of each action will be associated with a blend of fixed and scalable costs. Within this context it would seem more effective and efficient if a greater focus were placed on the actions that have either the greatest potential or expected impact on emissions rather than spreading limited resources across a fragmented and under resourced program. Addressing climate change will require multiple actions across areas, however, some consideration needs to be given to the expected outcomes, their contribution to objectives and the ways in which outcomes complement each other. From a change management perspective, focussing on low hanging fruit makes sense at the start because it gives people confidence that change is possible and can help build trust. But the low hanging fruit is a small part of an effective long-term strategy that risks early gains if subsequent activities founder through limited resources.

This is one of the areas where a conceptual model can help assure the audience that a range of issues have been considered and then prioritised. One consistent deficiency in many policies was either a rationale for why the focus was being placed in some areas and not others or a prioritisation of the proposed subsidiary objectives. This is important as sustaining environmental values will never have all the resources it requires, and difficult decisions need to be made about where resources are allocated to achieve the greatest impact. While it may be difficult to achieve consensus in prioritising actions, it is a valuable process because it will identify areas of uncertainty and inform a risk assessment that will be important in avoiding further degradation and evaluating the outcomes.

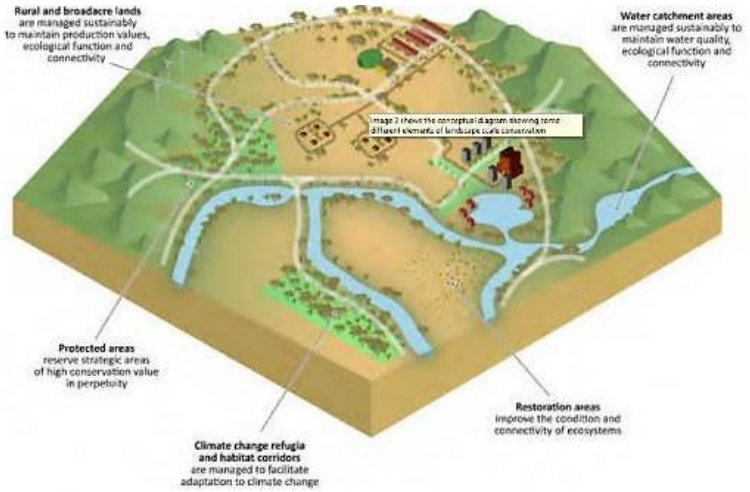

Figure 1. *Conceptual diagram showing some different elements of landscape scale conservation, from ACT Nature Conservation Strategy 2013-23*

2.2.3 Measurable Outcomes

It is critical that all proposed actions are associated with an outcome that is measurable. Within the objective hierarchy (Act – Strategy – Plan) the measurable outcomes are usually described in the lower tiers where specific actions are associated with their expected outcomes and the outcomes' contribution to higher level objectives. A well-known example of this is the Murray-Darling Basin Plan. The Water Act is at the apex, followed by the Basin Plan, which is more detailed, but still has generic objectives and then the Basin-wide Watering Strategy which sets specific targets that align with Long-Term Watering Plan targets in each Water Sharing Area and Annual Watering Priorities.

The assessment found that very few policies described measurable outcomes and subsidiary strategies and plans often failed to describe measurable expected outcomes from successful implementation. As noted earlier, in most cases, the generic outcomes align with higher-level objectives, however, because they are unquantifiable their value is reduced.

The Waste strategy has a mix of targets, some of which are clearly measurable:

- The growth in ACT waste generation is less than the rate of population growth, and
- The rate of resource recovery increases to:
    - — over 80% by 2015
    - — over 85% by 2020
    - — over 90% by 2025.

Other targets are less useful, including:

- ACT leads Australia in low litter levels and incidents of illegal dumping, and
- ACT's natural resources are protected and, where feasible, enhanced through waste management.

The illegal dumping target is not informative because differences between the ACT and other regions could be due to differences in monitoring, or different approaches to waste management. In addition, environmental policy is not a competition it is a means to an end and there is no way of knowing whether ACT's relative performance would achieve ACT objectives. Protecting natural resources is an objective, but it is not clear what would be measured to determine whether declines in waste were being influenced by changes in waste management. There are some natural resources that benefit from waste (Ibis, seagulls, methanogenic bacteria) but changes would provide equivocal evidence of policy effectiveness?

The Nature Conservation Strategy 2013-23 includes several measurable targets, including maintaining the extent of lowland native vegetation, and an increase in connectivity between patches of native vegetation. While these targets are measurable, it is not clear that they are meaningful. While these have a direct line of sight to the NCS's Strategy 1: Enhance habitat connectivity and ecosystem function. The assumption is that either maintenance or any increase will contribute to "biodiversity rich, resilient landscapes". The audience needs to

trust that this is the case, however, there is no evidence presented to support this important link in the program logic.

There are other targets for which the problem of measurement is far more challenging. For example, A reduction in the abundance and distribution of significant pest animals. While broadly it may seem straightforward, detecting a reduction and being confident that management is responsible is fraught for several reasons:

- Australian ecosystems are notoriously variable, meaning it can take a long time to detect a change within the noise created by other sources of variation (e.g., climate, habitat, or connectivity changes). In other instances, including highly mobile or migratory species, changes can be due to drivers occurring in other locations or at different scales from the management scale.
- The resources required to develop a reliable estimate can be prohibitive, particularly for rare and cryptic species.
- Finally, the target is to reduce threats with the assumption that a reduction in a threat will lead to an improvement in the threatened. This can also be difficult to determine as ecosystems and species are subject to multiple threats that interact in different, often unknown, ways. In addition, the pathway to recovery may not be the same path the system followed as it degraded and while the threat may have been reduced, there may remain constraints on recovery that would also need to be addressed.

Once again, the way the information is presented in the Strategy means the reader needs to trust that appropriate resources have been allocated, collaborative arrangements are in place and that a robust monitoring program will be implemented. From a transparency perspective, the audience should not be asked to take something on trust, they should be assured that a rigorous planning process has been undertaken and that a robust monitoring program is included as a core element of the program. Regrettably, monitoring programs are often cut or compromised so that data required to evaluate outcomes is not available. Finally, limitations in our capacity to monitor outcomes ought not be used as justification for not monitoring, but rather should be used to inform the way that actions are implemented, aligning with our monitoring capabilities, and then inferring outcomes if actions are undertaken over broader and longer scales. For example, undertake monitoring of environmental responses to weed control at a small number of sites and then infer similar outcomes at other sites where weed control is undertaken.

2.2.4 Risk and feasibility assessment

Almost none of the policies included an assessment of risks and feasibility. This is understandable given that these documents appear intended for a community audience. Too much technical detail or discussion of the things that may go wrong can be difficult to communicate without causing the community to catastrophise. Regardless of this, in the development of a policy it is critical that there is a robust assessment of feasibility and risk, given the limited resources and large uncertainties associated with environmental management.

Perhaps the clearest example of this is that the Nature Conservation and ARC strategies note that 54% of the ACT is within reserves. The 2003 bushfires severely damaged 70% of the ACT's pastures, pine plantations, and reserves and since then Australia has experienced larger more intense bushfires, increasing the risk that most of the ACT reserves may be reduced to a memory. In some ways this is too bleak to contemplate, but there may be actions that could be taken to reduce the consequences (acknowledging that the Fire Strategy acknowledges its limited capacity to deal with catastrophic fires), even if only marginally, and so consideration of the apocalyptic as well as the unfortunate will be critical to sustainability in the long term.

The importance of feasibility is perhaps best illustrated in the ACT Weed Strategy which includes a prioritisation process and then a hierarchy of control tactics to weed control (Controlling introductions, Prevent Spread, Eradication, Suppression and Containment) which acknowledge limited resources, the varying impacts of different weeds and the risks associated with trying to achieve objectives with limited resources. The Weed Strategy is a subsidiary strategy to the Nature Conservation strategy, however, its example of describing processes to focus efforts is not replicated in other higher level polices including NC, ARC, Planning, Climate Change or Sustainability, despite facing very similar issues.

2.2.5 Effectiveness

The OCSE in reviewing Plastic Waste found an "*endemic lack of data in the waste industry and the failure to provide evidence-based information to policy makers and the community alike*". Sadly, this situation is common across the portfolio with limited data available to assess effectiveness. For example, of the 104 priorities in the NCS Implementation Plan No. 1, progress was only reported on 10 in Implementation Plan No. 2 and of these only 5 related to activities that would directly influence environmental condition. Assessing effectiveness is not the only area that robust information add value to natural resource management, it is also critical to identifying and prioritising areas of greatest risk, need or value. There appear to be several reasons for the lack of data.

1. A strategies' age. Some strategies are relatively recent (e.g., bushfire (2019), Planning (2018), Sustainability (2020)) which means that there has been insufficient time for them to achieve detectable impact or implement an appropriate monitoring program. The second is not actually a justification as the values and threats facing the ACT have not materially changed in fifty years, although their condition and severity have declined and increased respectively. There has been time to implement routine condition assessments as they should be used to inform development of strategies, not emerge from the strategy's implementation.

2. Focus on outputs rather than outcomes. Some of the available data reports on outputs. This appears to be a widespread issue and the following are three examples from very different areas>

    a. The Bushfire Smoke and Air Quality strategy acknowledges the need for greater air quality monitoring to support risk management and inform policy. What is less clear is how the ACT will know when it has provided adequate and effective support to vulnerable populations and workers during severe air pollution events or economic supports to businesses, communities and individuals affected by severe bushfire smoke.

    b. The 'onerous' responsibility for urban forest management is 9 outcomes ranging from wellbeing, climate mitigation, support for biodiversity through to property values. There is some evidence provided to affirm these benefits, but it is often generic and doesn't inform assessments of effectiveness in the ACT context or provide insights on how effectiveness could be improved in either existing areas or new developments.

    c. The Aquatic and Riparian Conservation Strategy reports on the number of artificial cod habitats that have been installed and the number of fish stocked rather than fish abundance, population structure of recruitment.

    d. .

    It is noteworthy that Climate Change shows almost the opposite pattern where there is good information on the outcomes such as emissions and climate, but varying levels of information about activities. Some activities like transport have good data while the effectiveness of community-driven solutions and measures designed to build resilience are limited.

To finish this point with a positive message, the study of plastic bag usage revealed the single use plastic shopping bag ban (*Plastic Reduction Act 2021*) identified that the use of other types of bags had gone up, limiting the effectiveness of the ban. These types of unexpected responses should be expected and effective monitoring is the only way to manage the associated uncertainty.

3. Mistaking opinion for data. The Waste and Energy reporting both include reference to surveys and community feedback. While engagement may be critical to policy effectiveness, it is a tool; none of the policies commit to making people happy except within the broader context of liveability. If there is engagement it needs to be for a purpose and the effectiveness of engagement evaluated (rates of adoption, changes in behaviour etc) while the objective of the policy (reducing waste or emissions) needs to be monitored. The former informs the adaptive management of implementation while the latter informs adaptation of what is implemented.

4. **Strategies that lead to business as usual**. In reviewing the NCS Implementation Plan No.1 the content of the State of the Environment report was a lot easier to understand. Of the 83 priorities (this includes some duplications) less than half (24 of 59 for strategies 1-4) referred to anything that would make a difference to the environment. The situation worsened for Implementation Plan No.2. There were numerous references to plans, planning and monitoring which may make a difference in the long-term, but given the plethora of strategies and plans within the conservation realm, difficult questions need to be asked about the value of adding to the archive. Among the activities that could be expected to directly improve environmental conditions were revegetation, fish stocking, fish habitat installation, pest and weed management. Clearly there may have been some strategic planning in the detailed design of these activities, but they are also activities that have been core business for government agencies for decades. The ongoing declines in condition of ecosystems and the occurrence of, what appears to be, an ongoing series of unprecedented events raises the question of whether business as usual is forgivable.

There is an aphorism that "you can't manage what you can't measure". While probably not a universal truth, it certainly has stark implications in managing natural resources in the ACT. The lack of information to inform strategy development and then to support evaluation raises risks about the effectiveness of each of the strategies and the overall portfolio. While it is easy to catastrophise about the lack of information, there is no doubt that some progress will be made. However, given the magnitude of the challenge, the limited resources available, and what could be lost, this situation needs to change, not just from an accountability and transparency perspective, but also for the sake of innovation. Failure is one of the most potent stimuli for innovation and if we don't know that we are failing until the damage is irreparable, then we lose the chance to innovate and become effective.

There is, therefore, a challenge in assessing the effectiveness of policies in the ACT due to the limited information available. Clearly there has been progress in some areas including energy (renewable energy, energy saving through upgrades) waste (increases in recycling and reductions in waste) and air (replacement of wood heaters). There have also been improvements in nature conservation including revegetation, weed control and captive breeding or seed protection. This progress in no way reduces the need for evaluation of outcomes, given the hundreds of proposed actions across all policy areas.

Finally, we note that the age of a strategy may influence the extent to which its effectiveness can be assessed as monitoring appears to be developed as part of strategy implementation. Given the importance of information to inform the development of strategies, it is important that a condition monitoring program be established that is adapted with the release of a new strategy, but not to the extent that it undermines managers' capacity to identify long-term trends. The development of the CEMP is welcome development, similar data needs to be sourced for all policy areas. The CEMP undertook an admirable indicator identification process, however, given the challenges of identifying signals amongst the noise, it is likely that the CEMP may take some time to detect anything except major changes – fire, flood, drought effects. One remedy to this would be to explore sources of information that can be used to examine historical data. Remote sensing now has a 30-year history of images that could provide a useful resource.

2.2.6 Adaptive management

"Strategy formation walks on two feet, one deliberate, the other emergent."

Lawrence Freedman, Strategy: A History

Adaptive management not only represents best practice in environmental management, but to date, it's the only practical way to manage the environment given the levels of uncertainty; particularly when this uncertainty increases as development creates novel ecosystems and climate change produces unexpected effects.

Adaptive management is also important because it enables strategies to emerge as our understanding improves or the challenges change. In many ways the ACT policies represent the deliberate part of a strategy, but several policies are either old (e.g., Waste) or expected to last for a long time (e.g., Water Strategy 2044). Given the rate and extent of change, these policies may start as innovative but are likely to age quickly.

Commitments to monitoring varied widely across policies with Planning, Waste and Transport having minimal commitments beyond existing data sources, while Air, Fire, Water and Water – Environment were the most

committed to monitoring and the generation of new knowledge through citizen and institutional research. The Water Strategy (2014-44) includes commitments to Improve water monitoring and analysis across the ACT and region. Fire plans to use a range of existing data sets and performance indicators to measure the effectiveness of the Plan and commits to monitoring ecological monitoring of the effects of fuel management and potential impacts of climate change upon the bushfire risk facing the Territory (Figure 2).

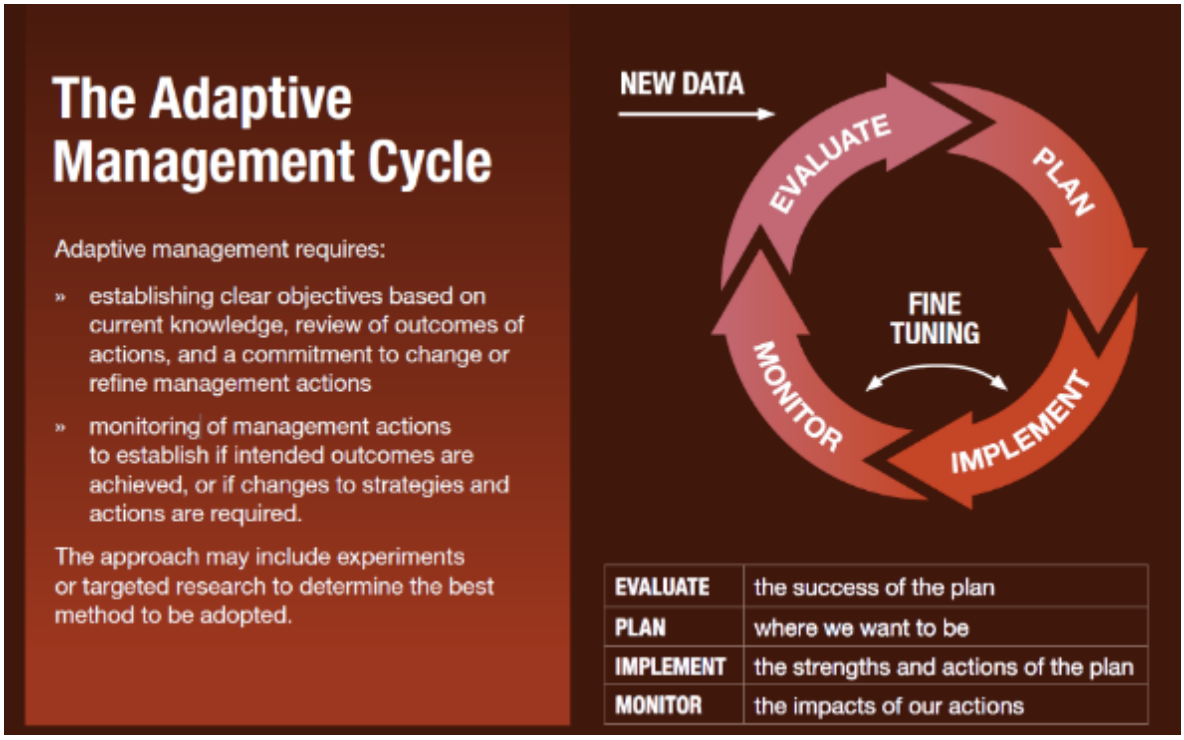

Figure 2. *Adaptive management cycle from the ACT Strategic Bushfire Management Plan 2019-2024.*

While monitoring is included in ACT policies, reference to adaptive management is less common, with strategies including Waste, Transport and Planning failing to mention the approach. This may be attributable to the fact that these policy areas are perceived to be more certain. While the Strategies may focus on areas of relative certainty, as discussed in Section 2.3 it is important for Strategies to address areas of uncertainty if they are to achieve their objectives.

For those policy areas where adaptive management is included, it is important that each step in the process is undertaken effectively. This raises the question; what are the key steps in the process? The answer is that it varies, depending on which policy is being considered. Four steps is toward the lower end of the number of steps included in available descriptions (Figure 3). The policies consistently provide key steps in the adaptive management process, including setting objectives and varying levels of detail on the design and implementation of interventions. A more detailed assessment of each step is contained in Text Box 3.

Several of the policies are due to be updated (Waste), while some include Targets that are already dated (Air) and others are planned to be in place for another 20 years (Water). The static nature of ACT policies is that they may start out cutting-edge, but quickly become dated as the world, management techniques and our knowledge change. The other issue that arises is that if one policy changes or becomes ineffective, its relationship to other policies will change and there is no process designed to address this risk. To address this, policies need to have a planned and an emergent component. The planned components are the long-term large-scale goals and objectives while the emergent elements are how you achieve them. Adaptive management provides an ideal framework for describing the process that will be implemented to facilitate a cycle of continuous improvement.

Text Box 3: Steps in Adaptive Management

1. **Assessment.** Once objectives have been identified, it is important to assess the condition of the system to quantify the gap between current condition and the management objectives. Both the CEMP and the Aquatic Ecosystem Toolkit are good examples of condition assessments as they include key threats within the system based on the conceptual model. The development of the Conservation Effectiveness Monitoring Program (CEMP) is designed to create a coordinated, systematic, and robust biodiversity monitoring program that will allow detection of changes in ecosystem condition within reserves, evaluate the effectiveness of management actions in achieving conservation outcomes and provide evidence to support land management decisions.
2. **Design.** The policies include a wide range of activities, some of which have been designed (e.g., Transport plan for 2045) while others are yet to be identified (e.g., identify threats to aquatic and riparian ecosystems and provide guidelines for their management) or developed (e.g., Develop a program to coordinate and prioritise bushfire operations).
3. **Implementation**. An obvious step in adaptive management and one that must be reported to understand an Action's contribution to the policy objectives. However, reporting highly variable, for example, within the SoE report, it was reported that "It was not possible to determine changes in the area of urban and rural lands" (p. 190 SoE 2019). Under biodiversity, it is reported that 1,500 Ha of revegetation was undertaken on private land and that there was some rabbit control. It is possible to gain additional information on activities through media reports, for example, cat confinement and registration but this is also patchy.
4. **Monitoring (intervention).** The relationship between management actions and changes in condition varies considerably. In some rare instances, there can be a direct relationship (Figure 4), but more often there is a causal chain with several links between the management action and changes in condition (Figure 4). The Water-Environment policy area is the only one to mention intervention monitoring. This absence undermines the ACT's capacity to manage adaptively, or in the long-term effectively. It is particularly pronounced in Transport and Planning that there is no attempt to monitor the effectiveness of their planned actions, reducing their management to a matter of faith that what they are doing is effective. On this note, it is worth observing that the assessment of Travel mode forecasts commitments to bike paths and additional light rail, the future considerations represent only modest growth in bike journeys, ongoing growth in car journeys and a large growth in bus and light rail. The Figure on p.14 reports a 180% outcome in 2020 and subsequent increases that increase the percentage when the numbers should add up to 100%.
5. **Evaluation** in any arena needs to be planned and is dependent on both condition and intervention monitoring. While several policies refer to evaluation in terms of identifying options (Planning, Waste), several do not refer to evaluation at all (Transport, Diversity) and so there is no clear pathway to ongoing improvement.
6. **Adaptation**. This is often treated as a trivial afterthought, labelled as fine tuning, or adjusting; ignoring the possibility that major renovations may be necessary. An example of this is the Murray-Darling Basin Plan. The Basin Plan 2020 evaluation that found that environmental water on its own was necessary but not sufficient to achieve Basin Plan objectives and that complementary measures were needed. Regardless of the amount of adaptation required, the capacity to change must be entrenched into management processes. The Basin Plan stipulates periodic evaluation and review to ensure adaptation is given an opportunity. The gaps in reporting on implementation and in monitoring and evaluation will critically undermine efforts to ensure policy goals are achieved.

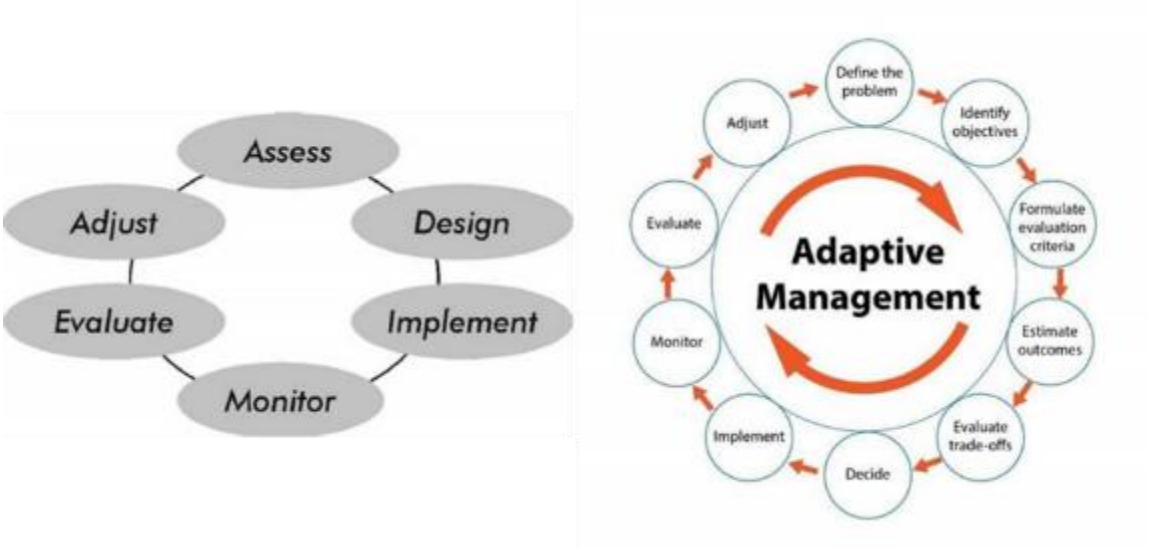

Figure 3 *Two alternative models of adaptive management. Left from Murray and Marmorek (2003), Right from Clark et al (2017)*

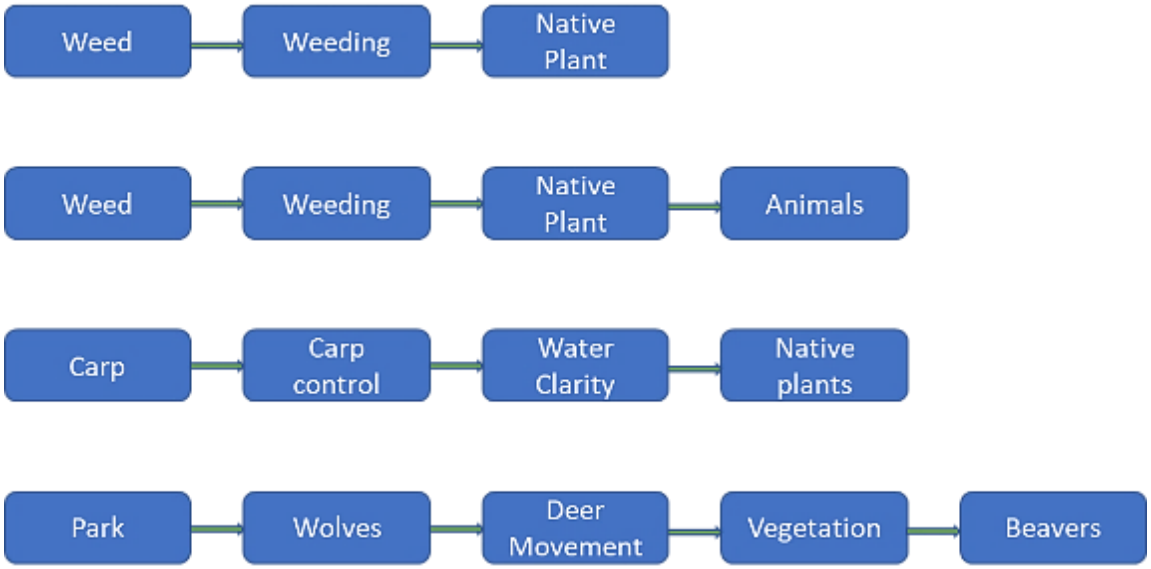

Figure 4 *Illustrations of causal chains, noting that every link in the causal chain is a risk. Weeding provides no guarantee that weeds will be controlled. The last example is from Yellowstone and describes an unexpected benefit of introducing a top predator.*

2.2.7 Engagement

Aichi strategic objective E states that implementation should be enhanced through three key processes: participatory planning, knowledge management and capacity building. The OCSE report on ACT environmental volunteers identified seven values (6 outcomes, 1 process) associated with engagement.

1. The in-kind value of the work
2. Citizen Science
3. Health and wellbeing for participants
4. Relationship benefits
5. Specialist skills
6. Financial benefits (grants etc)
7. Education and Management

Table 2. List of the Aichi Vision and Goals

Vision	By 2050, biodiversity is valued, conserved, restored and wisely used, maintaining ecosystem services, sustaining a healthy planet and delivering benefits essential for all people
Goals	**Specific Text**
A	Address the underlying causes of biodiversity loss by mainstreaming biodiversity across government and society
B	Reduce the direct pressures on biodiversity and promote sustainable use
C	Improve the status of biodiversity by safeguarding ecosystems, species and genetic diversity
D	Enhance the benefits to all from biodiversity and ecosystem services.
E	Enhance implementation through participatory planning, knowledge management and capacity building

Engagement also forms a cornerstone of Australia's Strategy for Nature and is included in all ACT Environmental Policies. The Aichi strategic objective acknowledges that management actions need to be tailored to local conditions and the best way to do this is through processes that engage local stakeholders. Across the portfolio, there seem to be very few examples of this being put into practice. The most prominent example is the climate change strategy that seeks to promote community leadership in development of community-driven solutions. Included within the CC Strategy actions are:

- providing tools and resources,
- recruiting a dedicated climate change community liaison,
- enable community members to share ideas for ongoing improvements, and
- grants to support community projects.

A second example comes from NCS where a long-term revegetation program has been using its monitoring data to inform future plantings. Adding the 3 Aichi processes to the seven OSCE values means that that there is a choice among 10 objectives. If one adds the strategy objectives to which the engagement contributes, there are going to be at least a dozen. It is always a challenge to deal with multiple objectives, as anyone who has had multiple jobs, or worked while raising a family will confirm.

In dealing with multiple objectives, it is important to prioritise the objectives so that informed decisions can be made about prioritisation and allocation of limited resources. As engagement is included in all strategies, the primary and overarching objective should be the strategy's objective whether it be "*a sustainable, competitive and equitable city*" or "*Healthy waterways supporting diverse aquatic and riparian flora and fauna and providing high quality ecosystem services*". This is entirely compatible with the Aichi Target as the target describes processes that will facilitate implementation of effective management actions.

The risk here is that values that emerge from engagement become mistaken for objectives and in so doing they divert attention away from the strategy's vision. Consequently, there is a focus on engaging more people, the health benefits to those engaged and grants won. There is a risk that engagement activities deliver value, but do not contribute to strategy objectives or the vision.

The Aichi strategic goal rightly focusses on processes to underpin effective conservation. There is another framework that also needs to be considered when planning engagement and that is the need to develop robust collaborations. Here the key ingredients are trust, governance, and clearly articulated roles and responsibilities which people undertake with some level of autonomy. The model of promoting and empowering local action with some level of autonomy has been found to be an effective engagement technique that will both facilitate adaptation of generic solutions to local conditions and foster innovation. It is to be hoped that the ACT government is prepared to take some risks in the allocation of resources to promote ambitious projects.

2.3 Findings

- The assessment found that all strategies had clearly articulated goals and high-level objectives.

- All strategies have an implicit program logic that moved from a goal through strategies or priorities to actions. While links between actions and strategies and goals could be inferred, the missing element in most cases was why certain items were prioritised ahead of other possible, but omitted, choices.
- Ambitious policies need to achieve a balance between ambition which increases the risk or failure and pragmatism that will often be associated with a risk of not achieving objectives. Across all policies, regardless of ambition, risks were not considered. Several policies (e.g., fire, water) refer to risk management but within the context of managing risks associated with fire or climate change, not the risks associated with the proposed actions.
- Key to development of both a program logic and risk assessment is the development of (a) conceptual model(s). Across the key policies, there was little attempt to provide a conceptual model, depriving the audience of an easily accessible source of information on context and rationale for priorities and actions.
- One of the hallmarks of environmental policy is uncertainty, even in areas where communities have a great deal of control (e.g., planning, transport, waste) there is uncertainty around technological developments, human or institutional responses, environmental risks and the relationships between policy areas. Despite ubiquitous uncertainty, very few policy areas were developed around an adaptive management framework. This means that at best, areas of uncertainty will remain, at worst that policies will fail without anyone being held accountable.
- Across all policy areas, a key weakness was defining outcomes that could be measured. In the Water: environment area, there were four tiers of strategies and plans but even in the most fine-scaled plans (species recovery plans) there were still not numerical targets identified. The lack of measurable targets severely undermines managers' capacity to manage adaptively and corrupts the planning process as there is no way of determining how far a subject is from where it needs to be. It is likely that the lack of numerical targets is a response to the uncertainty raised earlier. While this is understandable, from a management perspective it is not appropriate and will contribute to increasing policy failure rates.
- The State of the Environment report has limited information on the condition of the ACT natural resources but does have information on policy development. This reflects one of the most significant findings across all policies and that is that there is a paucity of information available on current conditions or major threats. As noted in the SoE (2019) Data availability, quality and comprehensiveness is a key limitation for indicator assessments.
- Engagement is included in most policy areas, ranging from seeking input from residents (Planning), education on roles and risk management (fire) to community science (Nature conservation). The overarching objective of engagement within each Strategy is contributing to the strategy's objectives. In contrast, engagement appears to disperse resources across achieving a variety of objectives.

2.4 Recommendations

- Policy architects develop a robust program logic with associated conceptual model and rationale before the next reporting period and have this independently reviewed.
- Policy architects undertake a risk assessment for their key policies, using the program logic and conceptual model as a foundation with input from stakeholders responsible for implementation.
- All new policies need to be framed around an adaptive management framework that includes an evaluation plan and a schedule for key steps. These elements need to be mandated, otherwise there will always be compelling reasons for delaying or avoiding challenging tasks, particularly those that let the light in.
- Every opportunity should be taken by both policy architects and those responsible for implementation to develop measurable outcomes for proposed actions. This can be a challenging to undertake due to the uncertainty and fears that the outputs will influence resourcing decisions to the detriment of collaborators.
- The Chief Minister's office should request the OCSE convene and facilitate cross policy working group to develop a broad approach to environmental policy evaluation in the ACT. Once the approach is drafted, a list of the information required to evaluate each policy area could be compiled. The Working Group could then oversee an exploration of options and prioritisation.
- When policies are reviewed or renewed, that engagement is included as an activity incorporated into the program logic the same as any other proposed activity, that is with a clear program logic linking engagement to achievement of the Strategy objectives.

- The ACT should adopt Aichi strategic goal E by implementation through participatory planning, knowledge management and capacity building and through processes to develop enduring and effective collaboration.

2.4.1 Additional information on Recommendations

2.4.1.1 Collaborative development of conceptual models and program logic

Collaborative relationships are easier to develop if everyone agrees on the way a system works and can see how each role contributes to achieving common objectives. Conceptual models can be difficult to develop without ending up with an unintelligible mess. This is, however, an important part of the process as everything is connected to everything but deciding which are the meaningful connections is one of the major challenges.

A conceptual model then informs the development of a program logic by identifying the key causal relationships but also factors that may undermine the effectiveness of proposed actions. In many of the strategies, the program logic was implicit within the hierarchy of goals, objectives, and actions, however, there were often weak links to other options that were not considered for reasons that remain unclear.

2.4.1.2 Adaptive Management

In reality, there are very few textbook examples of adaptive management being applied. This does not mean that implementing management within an adaptive management framework won't improve effectiveness. Policy makers and managers need to deal with uncertainty, in many cases uncertainty that will not be reduced through investments in research due to unfortunate comparisons between research and the real world. Adaptive Management provides a way of dealing with uncertainty, but also ensuring that there is evidence to support key decisions at each step, thereby improving transparency and accountability. There can be reluctance to undertake adaptive management because there is a risk of exposing failure and subsequent reputational risk. This is part of the larger risk around undertaking activities with high levels of uncertainty. There are, however, implementation strategies that can minimise the failure risk, including pilots, implementation of components, staged implementation etc.

2.4.1.3 Engagement is a tool

Many of the strategies include engagement as a high-level objective (e.g., NCS). The risk with this approach is that engagement becomes an end in itself, and its contribution to management becomes lost in the challenges of managing engagement processes. There are arguments that engagement will help build political support and advocacy for environmental management. There is no evidence to support this position and while it may be the case in some instances, this is no guarantee that it will apply in all circumstances. From first principles, people who invest limited free time on conservation implementation probably have less time to tell anyone about what they are doing.

We would recommend that engagement be included as an action within each strategy or objective, however, the value to be delivered by the engagement program should be articulated and the causal link between engagement and contribution to the objective documented.

2.4.1.4 Condition Monitoring

Environmental policy is uncertain and one of the most effective ways, if not the only immediately available tool, to address uncertainty is by measuring current conditions. There are unquantified, but potentially significant, risks to developing policies when uncertain about current condition and possible threats. There are ongoing risks in implementing policy without determining whether the policy is effective. The consequences of these risks are policy failure, waste or limited resources and loss of confidence in government. It could be argued that on-ground managers will identify adverse trends and lobby for policy change. This may be the case, but the time frames over which the policy cycle progresses mean that natural resource management will be reactive more than strategic and this will be associated with increased costs.

Condition information underpins strategy development and evaluation. The ACT needs to develop a program that supports assessments of condition, whether that be the area and distribution of ecosystems through to the diversity of people living in Canberra. There are numerous sources of information available, some of which are currently used, to inform an assessment that range from:

- Bespoke surveys of environmental indicators

- Remote sensing of vegetation condition, land use and water quality
- Australian census data
- Public transport usage
- Energy consumption and from this information, emissions
- Waste processes, recycling undertaken.
- Lightning strikes, fire ignitions, controlled burning, fires controlled, and effort invested, areas burnt

In some instances, there will be no feasible direct indicator of performance, however, the development of a conceptual model may provide insights into ways that effectiveness of change may be assessed. For examples of approaches refer to Superforecasting (Tetlock and Gardner, 2015), Freakonomics (Levitt and Dubner, 2005) or How to Measure Anything (Hubbard, 2011).

3 Environmental Portfolio Assessment

The ACT Government has made a significant investment in the development of a portfolio of environmental policies. The portfolio addresses the major threats to sustainable development through a mix of actions that seek to address drivers, pressures, current condition and impacts. The portfolio achieves a balance between aligning with policies implemented by other Australian jurisdictions and ambition to improve sustainability. For example, the Waste Strategy (2011) was the first in Australia to establish a zero-waste target.

Across the portfolio different policies have their individual strengths. The Planning strategy is the output of a thorough and comprehensive process that has produced a clear hierarchy of Vision, Themes and strategic directions. The Bush Fire Management Plan provides a complementary suite of objectives, but also achieves broad ownership by distributing responsibility for risk management to landholders. There is further detail on the strengths and weaknesses of each policy area in the relevant Appendices.

The goals of the environmental policies range from reducing emissions to conserving Murrumbidgee Bossiaea. These relate to economic, social and environmental values and need to be managed at a variety of scales ranging from individual habitat patches up to the entire ACT. To achieve the ACT's goals with the limited resources available, it will be important that:

- Actions undertaken are effective
- Actions are complementary
- Policies are complementary if not synergistic

One of the challenges for each policy is achieving a balance between providing objectives, principles or a framework to inform implementation decisions and identifying specific actions to achieve objectives. Less certainty requires greater emphasis on providing principles and frameworks. To ensure that actions and then policies are effective, robust processes need to be implemented to inform the design, prioritisation, implementation and, through time, the improvement or refinement of management interventions.

This challenge is compounded as most strategies and plans seek to cater to multiple audiences, ranging from stakeholders engaged in environmental management (managers, regulators and collaborators) to mildly interested stakeholders (general community, students). The Strategies and Plans reviewed for this assessment appear to be primarily aimed at community stakeholders and provide good information on history, context and objectives. Descriptions of Targets and Actions vary among the policy areas, however, increasing uncertainty seems to be associated with a move toward listing options rather than specifying outcomes. For example, the Transport Strategy focusses on pedestrians, cycle paths and light rail which are all discrete tangible outcomes. In contrast, the Nature Conservation Strategy included commitments to improving habitat and connectivity, managing threats, protecting species and communities, improving urban biodiversity, with several options within each, for hundreds of species providing a broad, diverse range of often intangible outcomes. This is not a criticism, rather it is an observation that policy makers have noted the challenges associated with uncertainty and responded by providing options that ensure managers retain some autonomy to use their experience and judgement to identify effective actions. The options approach also helps ensure that Strategy will stay current for its planned lifespan which should be efficient if the high-level objectives and principles remain constant.

In an ideal world, the outcomes of an effective Environmental Policy Program (suite of policies in this instance – the word 'program' will be used for the remainder of this report) would exceed the outcomes of all the individual Policies. This review has found that the ACT has sought to take a lead in sustainability and develop policies that are more ambitious, but similar in content and structure to other Australian jurisdictions. This foundation means that ACT is well placed to start an adaptation and innovation process required to improve policy effectiveness. The following sections outline recommendations that will, if implemented, significantly improve policy effectiveness. Noting that not all policies are equal in rigour and effectiveness, the following section seeks to highlight the policies that particularly effective and those that may be lacking in areas.

For the purposes of the Program Assessment, the following conceptual model has been developed. The model includes three policy categories. The three categories are:

1. Development policies that cover areas directly related to supporting human development.

2. Risk policies that seek to address areas that pose risks to values e.g., Fire.
3. Environmental policies that seek to sustain environmental values, including the provision of ecosystem services to support development.

The three areas all influence liveability which we have used as an overarching term for human wellbeing in the model (Figure 5).

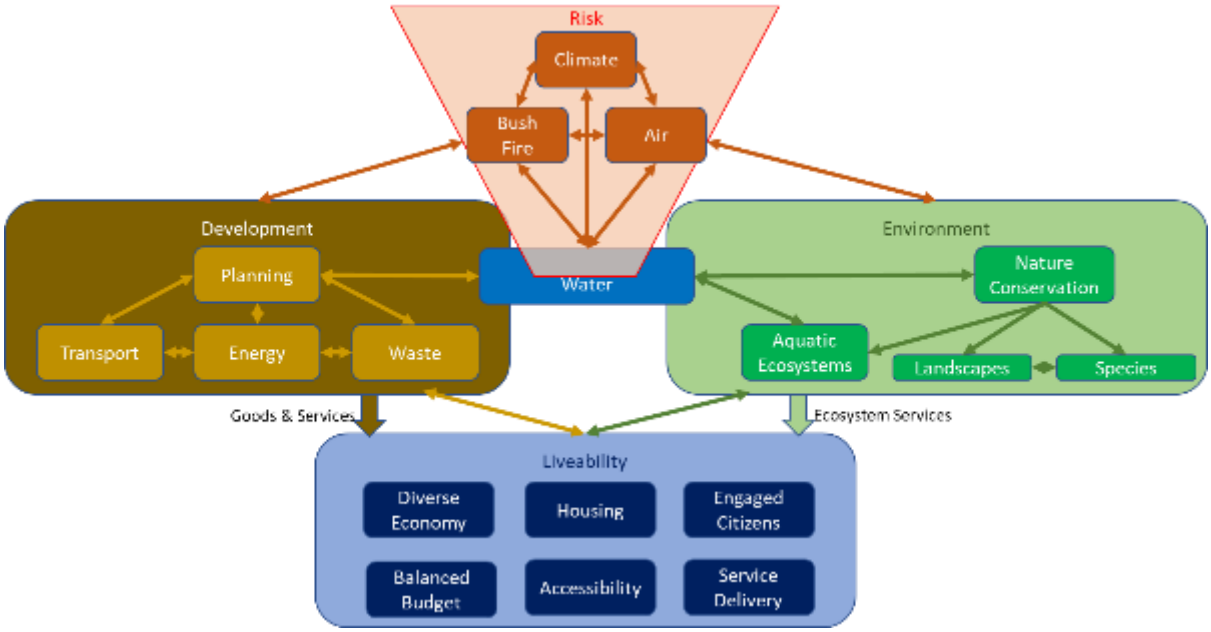

Figure 5. *Conceptual model of the Environmental Policy Program including three broad policy types (Development, Risk and Environment) influencing liveability.*

3.1 Portfolio Characteristics

3.1.1 Scope

Overall, the scope of the program appears appropriate with one major gap being a soil strategy, noting that this is a commitment within the Nature Conservation Strategy. Soil is an important foundation for ecosystems and anthropogenic systems (farms). Soil represents a risk to water supplies for both communities and ecosystems. Soils are also a potential repository for contaminants (Waste) and carbon sequestration (Climate Change).

An additional area that could be considered is ways of reducing people's demand for goods and services. This is antithetical to supporting an endlessly growing economy, however, there are some elements that already overlap with an updated Waste strategy that includes the circular economy. An Energy policy could also consider the design of a distributed power network which includes greater incentives for people to reduce power consumption. Other examples may include ride sharing in cars, or potentially on smaller electric or hybrid vehicles. Finally shared use of other appliances such as washing machines and power tools could all reduce demand, or increase demand for enduring, rather than disposable, products.

For the program, most of the major gaps occur within individual policy areas rather than at the program level. A list of gaps are provided in Table and there is further discussion of these in the individual assessments.

Table 3. List of gaps in ACT Environmental Policies

Area	Gap
Planning	Rejuvenation, renewal and renovation of established areas
Transport	Traffic impacts on air quality or health
Energy	There is currently no Energy policy

Area	Gap
Waste	Circular economy
Climate	Carbon sequestration, Agricultural systems
Fire	Environmental resilience
Air	Monitoring is currently not sufficient
Water	Integrated Catchment Management, particularly urban catchments
Nature	Agricultural systems, Coordination with NSW and Vic
Aquatic Ecosystems	Ecosystem approach integrated with NCS.

3.1.2 Complexity

Within the policy areas, complexity increases as one moves from Development policies through to Environmental policies. There are likely several explanations for this, including:

- The ACT government's sphere of influence aligns well with the development policies while environmental management requires consideration of scales that are larger, similar to, or smaller than the ACT. Even for smaller scale systems, there are connections among systems that need to be considered.
- Development policies apply to people whose values, broadly, align with the objectives and will implement or respect the policy. In contrast, environmental policies seek to influence the outcomes of complex systems where motivations vary and, in some instances, will constrain or undermine implementation. In both cases, people or institutions implement the policy, but, in general, we have less control or influence over environmental agents (individuals and species).
- Environmental policies cover a broader range of values, some of which affect a range of stakeholders and may not align with everyone's interests and so require specific legislative or policy responses.

In some ways, this complexity is inevitable, however, the way it is dealt with will influence the effectiveness of the program, collaboration among areas and the community's capacity to understand what is being done and why. The first three recommendations are expected to help improve these issues.

3.1.3 Addressing underlying causes.

The Aichi Targets prioritise addressing underlying causes of biodiversity loss and reducing direct Pressures. The project team undertook an assessment using the Driver, Pressure, State, Impact and Response (DPSIR) framework in which the responses are the policy or strategy. As each policy was assessed, the reviewer categorized each action or priority according to whether it sought to address:

- Drivers – human activities that create Pressures on the environment e.g., urban expansion, energy consumption
- Pressures – changes that affect environmental state e.g., pollution, clearing
- State – the condition of the ecosystem, including the type, health, function, and resilience
- Impact – the direct effects on the ecosystem e.g., population declines, poor water quality

The assessment revealed that the Development areas (Planning, Transport, Energy and Waste) put greater emphasis on reducing drivers and pressures (**Error! Reference source not found.**). For environmental areas, m ost priorities were pressures but there was a greater emphasis on condition and impact. The area with the greatest focus on impact was Fire The assessment noted that environmental areas are subject to a range of pressures, some of which (e.g., Climate Change) are beyond direct control, while others (e.g., invasive species) are pressures that can be influenced directly and in real time. Given its role influencing climate, the area with the greatest proportional commitment to reducing drivers was Energy. Initially, Planning was expected to have a higher commitment to drivers, however, many of the pressures arising from Planning are now historical. The gaps in Planning around both city renewal and agriculture may mean that opportunities to address, at least partially, the legacy of unfortunate planning decisions may have been missed.

The Climate Change strategy focusses on pressure and impact in part is due to its cross-cutting nature and emphasis on leadership, transport and waste. From a risk perspective, climate change represents one of the greatest threats to the environment which is addressed through four commitments none of which are direct action. In this way, the Climate Change strategy links to the NCS, but not in a meaningful way, by which we would expect a measurable change in environmental condition. This reflects the challenge of linking policies so that the actions in one area complements or reinforces commitments in other areas. Resolving this is currently difficult given the lack of clarity around the policy hierarchy, scope, and function of each policy. Developing an overarching environmental policy and defining the function of the Climate Change policy within the overall framework would enable clearer identification of where and how the key climate risks to environmental values are addressed.

Overall, by seeking to address pressures (Figure 6), the program aligns well with the Aichi targets focus. The situation could be improved if development areas focused more attention on addressing drivers. Similarly, given the perilous situation for many ecosystems, it may be prudent to undertake risk assessments and prioritise condition improvements or impact mitigation if pressures and threats are not going to be addressed. It is noted that this may already be undertaken, however, evidence was not uncovered during this assessment.

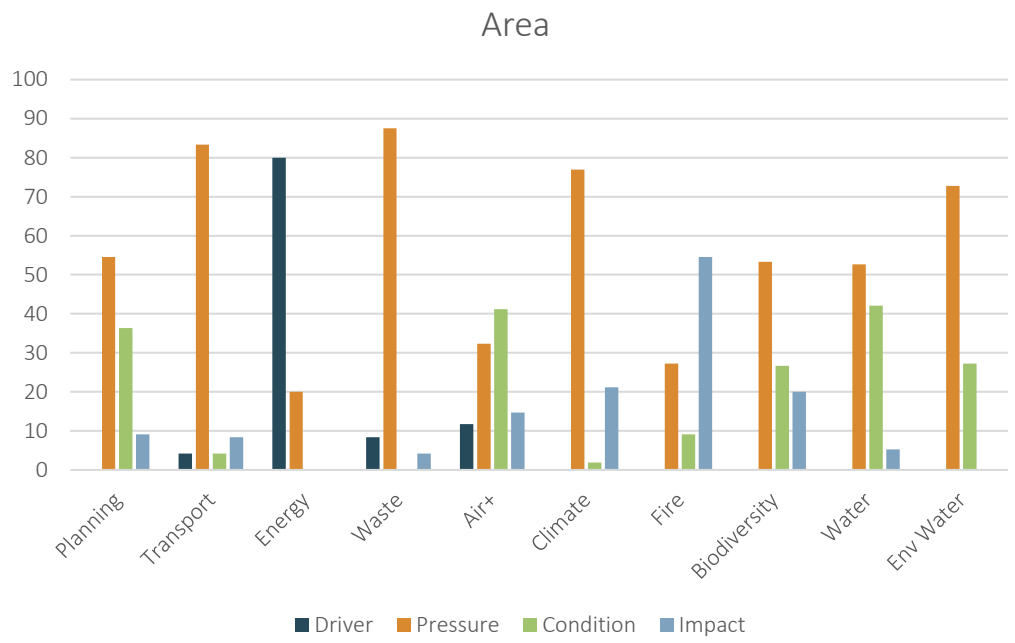

Figure 6. *Bar graph of the proportion of each area's priorities in the driver, pressure, condition or impact categories. Numbers are based on categorisation of each priority or commitment into one of the four types during the assessment of each policy.*

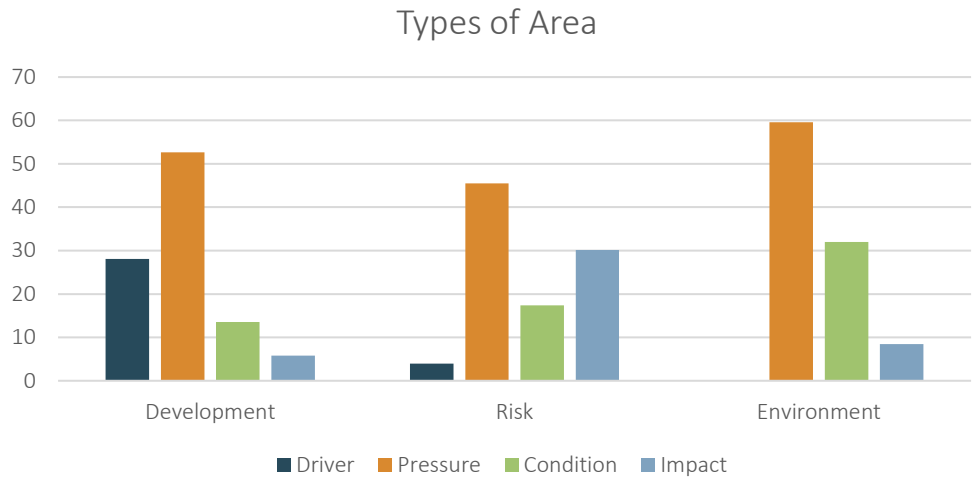

Figure 7. *Bar graph of the proportion of each type (development, risk, environment) area's priorities in the driver, pressure, condition or impact categories. The numbers are derived from the same categorisation that have been aggregated according to the type of risk. Water priorities have been included in the environment group.*

3.2 Findings

- The scope of the environmental policy portfolio covers 11 areas of which two, climate change and sustainability are cross-cutting.
- The focus of key policies were broadly appropriate for their goals with opportunities to increase efforts to address drivers among development policies.
- Each policy acknowledges the existence of other policies that have common interests or areas of influence. The policies do not take the next important step of describing the relationship between policy areas that will influence opportunities or risks.
- Policy areas vary in their complexity with some areas having only a few strategies or plans (e.g. Fire, Planning) while others have many strategies and plans (e.g. nature conservation) with the relationships between them poorly articulated.
- Policies focus on a mix of priorities that vary in terms of how confident we can be about their outcomes. Across the policies there is very little consideration of uncertainty in terms of capacity to implement or contribute to objectives.
- The ACT has sought to implement long-term policies in recognition of the timeframes over which change will occur. One of the main risks with this approach is that short-term, significant changes can render large portions of a policy redundant. Declines in relevance in one policy area have the potential to decrease the effectiveness of other policy areas. The clearest example of this is the Waste policy that was affected by China's position on recycling materials that has the potential to affect climate change and water. The other key example is that our knowledge changes with implications for the prioritisation and design on management interventions.

3.3 Recommendations

- The Chief Minister's office should develop an over-arching environmental sustainability strategy that would include a suite of overarching principles for achieving sustainability and define the role of each policy area in achieving the ACT goal. This role would then provide a foundation for subsequent policy revisions.
- For each policy area, the hierarchy of strategies and plans should be planned. The planning needs to identify the tiers in the hierarchy and the content of each tier, starting with frameworks and principles in the top tier progressing down to specific actions with measurable outcomes in the lowest tier.
- To ensure that policies remain current, relevant and effective, policy architects need to include:
    - An overarching framework or suite of principles
    - Processes to support application of principles and adaptation
    - A suite of actions that will be implemented

- The ACT should adopt Sustainable Development Principle No. 6 that specifies that environmental costs should be internalised into decision-making. Adoption should be undertaken as a gradual and carefully managed change process. Development has left a legacy of environmental damage with no resources allocated to deal with development's unexpected consequences. Now that the consequences are clear, Principle No. 6 seeks to ensure that resources are available so that we do not pass a legacy of degradation on to the next generation.

3.3.1 Additional information on Recommendations

3.3.1.1 An overarching policy

To ensure that the policy program achieves its full potential, it is important to have an overarching document that provides:

- the overarching vision
- The principles that will be applied in every subsidiary policy or plan. This does not mean that each policy will have the same principles, but the principles they do describe will ensure the ACT achieves its over-arching principles
- The scope and role of each subsidiary policy including key interactions across policy areas.

The natural assumption is that the Planning Strategy would be best placed to take on this role, however, the scope of the Planning Strategy is social, economic and environmental values of the City of Canberra, not the ACT as an interdependent system.

The other candidate is the Sustainability Strategy that is currently a cross-cutting policy that includes elements of the core focus-areas of the Planning, Climate Change, Waste, Transport, Water and Nature Conservation Strategies. Rather than providing an overview, the Sustainability Strategy dives into specific projects and commits to an annual action plan. It is not clear how this process is integrated with processes under other strategies.

We believe it would be appropriate to focus the Sustainability Strategy on the overarching vision and this would allow the other policy areas to focus on their core issues. From a community stakeholder perspective, this would simplify their attempts to understand what is being done in each policy area and how interactions are being managed.

For the principles, there are a variety of sources that could be used as a foundation. These include the Sustainable Development Principles developed by UNESCO. Another option from an environmental perspective, would be the AICHI targets that were developed as part of the Convention on Biological Diversity.

3.3.1.2 Standardised Structure or Content.

If an overarching document is produced, then subsidiary strategies and plans should be:

- placed in a clear hierarchy
- required to include a minimum suite of information.

For some policy areas, the hierarchy is relatively straight forward, starting with an Act and including a couple of tiers or layers. For example, the Planning Strategy is subsidiary to the Planning and Development Act, the Territory Plan and National Capital Plan. The Planning Strategy also has implications for the Transport, Housing and Climate Change Strategies. In contrast, the Aquatic and Riparian Conservation Strategy (ARCS) is subsidiary to several Acts, the Basin Plan and the Nature Conservation Strategy. There is then some uncertainty about the status of focal landscape strategies (e.g., Lowland Woodland), Catchment Plans (e.g., Lower Cotter), Action Plans (e.g., Lake Burley Griffin) and species recovery plans (e.g., Trout cod). At a generic level, there do not appear to be any major conflicts among all these documents, however, it is difficult to identify gaps or potential synergies among the various strategies/plans, particularly as actions are only described in general terms. This complexity acts as an impediment to managing effectiveness and a barrier to communicate what is being done.

Once there is a portfolio plan, the content can be planned. The content will vary among different strategies depending on the topic, its role in delivering objectives and its location within the hierarchy. Text Box 1 provides some headings that should be considered mandatory for all strategies.

Text Box 1: Core Strategy Components

- **Why** – As noted, some strategies do this well, providing a well-articulated rationale for why the policy and proposed actions are needed. For example, Climate Change Strategy provides a brief rationale about the importance of continuing to address and adapt to climate change. The Climate Change Strategy rationale then falters as it transitions to the 6 Priorities. The reader is left wondering why such an emphasis is being placed on leadership and why species conservation is the last of 26 dot points. There is likely a robust rationale for these choices, but it is not communicated.
- **Objectives and benefits** – Once again, this is generally done well across ACT policies, particularly Fire.
- **Substance** (link back to Principles). This could be either:
    - Subsidiary Strategies, Actions and/or Plans. This will ensure that the function of each policy in achieving overall policy objectives is clear. This would include the principles or frameworks that would guide development of subsidiary documents. The Fire Strategy includes a helpful flow diagram (P. 19)
    - Actions that the ACT is confident will contribute to objectives and align with Principles
    - Processes that are required to inform decisions on actions that have the greatest likelihood of being effective
- **How it impacts/enhances other areas**. Ensuring that policies are complementary is influenced by clear demarcation of the scope of each strategy. It is also important that policies are not treated as silos, that there will be important interactions among policies. To ensure that relationships among policy areas complement each other, it is important that there be some consideration of the way the actions of processes may impact or benefit the other policy area.
- **Roles and Responsibilities**. All policies are collaborative somewhere in their development and implementation. Effective collaboration requires clear definition of institution's or individual roles and responsibilities. Fire makes it clear that individual property holders are responsible for managing risks. The Nature Conservation Strategy includes reference to the lead agency in the implementation plans which are toward the bottom of the policy hierarchy. In contrast, the New Zealand Biodiversity Strategy (2000) identifies key players for each Action within their Action Plans. Defining roles will help inform the development of engagement processes to underpin both actions and key processes.
- **Adaptive Management**. Strategies are a tool to enable the most effective use of resources to achieve a given objective. Adaptive management uses the experience to improve. The Basin Plan includes Adaptive Management as one of its goals, not as an add on once actions have been agreed. This was because the architects recognised the uncertainties around using environmental flows to protect and restore the Basin's water-dependent ecosystems. Every policy area has some areas of uncertainty and strategies should address these areas as this is one of their strengths. The uncertainty means, however, that none of the actions and many of the processes will be perfect and so there will always be scope for improvement. One of the ways in which the ACT could provide leadership is through effective implementation of adaptive management that would underpin innovation and reveal novel ways to achieve objectives.

3.3.1.3 Strengthen relationships among Policies (replace silos with a network)

The development of policies for specific areas poses a risk that the areas will turn into silos when they are actually highly connected and interdependent. The ACT has ensured that relationships among policies are described in policies. For example, the Aquatic and Riparian Conservation Strategy identifies links to The Territory Plan, The Planning Strategy, ACT Water Strategy, Nature Conservation Strategy and Climate Change Adaptation Strategy. While these links are identified, it is not clear what influence the linkages between these polices mean in terms of the principles, frameworks or priority actions proposed. This makes it difficult to assess the extent to which the policies are complementary.

This would not be such a problem if all policy areas were similar in terms of their priority, system condition and resilience and their capacity to adapt or acquire additional resources. This is clearly not the case when

comparing among development, risk, and environmental policies. Evidence for this can be seen in the number of Acts that seek to protect environmental values compared to those for development values (). As an example, risks affect both anthropogenic and environmental values, but not equally. The Black summer bush fires saw the death or displacement of 3 billion animals while 26 people died. The fires caused $1.88 billion damage, but humans have systems and processes to deal with this and while it may take time to rebuild, no one will be waiting 200 years for trees to develop hollows. This disparity is exacerbated when the Fire strategy concedes that during these types of incidents, the focus will be on human values. A second example comes from planning where 70% of new housing will be built within our existing urban footprint. This is admirable, but the flip side of this is that the remaining 30% will be expanding Canberra's footprint.

In planning a policy portfolio or hierarchy, the power distance between policy areas should be considered. The more powerful policies should explicitly consider the impacts and opportunities they present to facilitate or undermine the achievement of environmental policies.

3.3.1.4 Implement Sustainable Development Principle No. 6

There appears to be an assumption that the Environmental policies will be able to deal with any risks that manifest from ongoing or increasing threats. The declining condition and increasing risks facing ecosystems suggests that this assumption is invalid.

To illustrate this point, Figure 8 describes three potential scenarios for policy responses. Overall, the scenarios are based on the concept that ecosystems in better condition are less vulnerable to threats, have greater resilience and are more likely to retain their integrity. In scenario A, a Pressure would be expected to decrease the condition of the system and policy implementation would either mitigate the threat or support recovery. While all the degradation is not remedied by the policy, overall, the system remains in good condition and has a robust prognosis. In scenario B, there is a legacy of degradation, and while the policy is again partially effective in addressing current threats, the system is left in a highly degraded condition with significantly poorer chance of sustaining itself. In scenario C, the system is well understood, and a Limit of Acceptable Change has been identified above which experts believe the system has a good chance of being sustained or recovering. In this instance, the policy succeeds in improving condition above the LAC and thereby meeting sustainability objectives. From a policy perspective, these three scenarios emphasise the importance of both understanding the condition of the system and the relationship between condition and vulnerability, resilience, and sustainability.

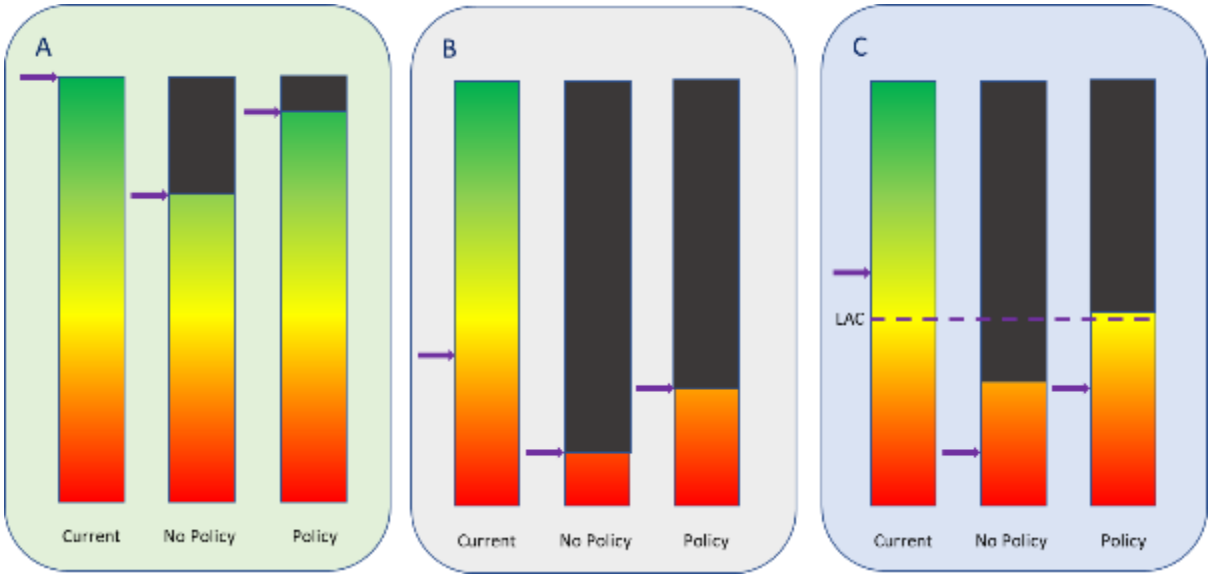

Figure 8. *An illustration of three possible ecosystem responses to the same policy. A) the system is in good condition (green) when a Pressure (grey) is exerted and there is a policy response that keeps the system healthy, in part because it was healthy and resilient to start with. B) the system is degraded (orange) when a policy is implemented and there is a response of about the same magnitude as A, but due to the larger pressure (grey) and the System's already degraded state condition remains poor. C) A situation where the system is degraded*

(orange) when a policy response is implemented to ensure the system remains above the Limit of Acceptable Change (LAC). The policy reduces the Pressure (grey) to a level that should enable the system to recover, however, its degraded condition has reduced resilience, so condition remains below the LAC. Each column represents the condition of the ecosystem ranging from green=healthy to red=collapsed. The purple arrows identify ecosystem condition at a point in time and grey bars represent the magnitude of all Pressures.

The question is whether there is an appropriate framework to address this type of situation. One potential framework is the Sustainable Development Principles, among which (No. 6) is a specification that there should be internalisation of environmental costs into decision-making for any economic and other development plan, program or project. Applying this principle would suggest that the area that threatens sustainability should pay for the associated costs. Applying this principle would create three categories of situation where managers inherit a degraded system (Figure 9).

1. Those where there is no further pressure on the system. The SDP do not provide a ready solution for addressing the legacy even when lags between the Pressure and environmental condition mean that system will likely continue to degrade. In this situation the community needs to resource recovery to an appropriate target.
2. Situations in which current policy settings will continue to allow Pressure to increase. In this instance, the SDL principle would suggest that remediation of the additional pressure should be borne by the parties benefiting from the Pressure.
3. Those in which, over the long-term, policy settings will return Pressures to those experienced today or to a level agreed to be sustainable. In these situations, remediation for the Pressures exerted over the interim period and the risk that the costs will be greater due to additional degradation will be borne by beneficiaries of the Pressure and the implementation schedule.

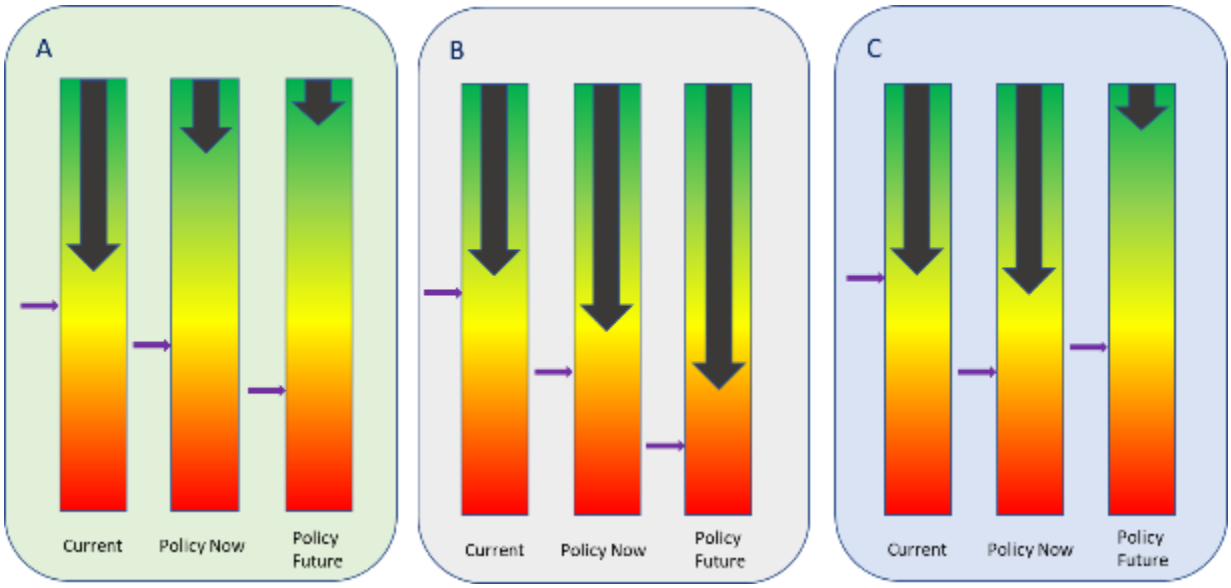

Figure 9. *An illustration of three possible responses. A) is a situation where a policy reduces Pressure (grey arrow) on a degraded system but has limited effectiveness due to already damaged condition of system. B) is a situation where policy enables the Pressure to keep increasing. C) The policy takes time to reduce the Pressure which leads to further declines in condition. Each column represents the condition of the ecosystem ranging from green=healthy to red=collapsed. The purple arrows identify ecosystem condition at a point in time and grey arrows represent the magnitude of all Pressures.*

Consideration of internalisation of costs will be a lot easier and transparent where there is a direct line of sight between the Pressure and changes in condition (e.g., vegetation clearing). Dealing with dispersed pressures (e.g., air pollution) and risks (e.g., floods) will be more challenging, however, this is the benefit of starting with principles as they provide a foundation from which an appropriate resolution can be developed.

As suggested in Section 2.2 each policy should consider its effects on other policy areas. In particular, the policy should consider its effect on Pressures on environmental systems that already under Pressure or highly degraded. If there is a high risk that implementation of the policy will have an adverse effect on environmental values, then we recommend that, in line with SDP No. 6, the policy take on responsibility for this. We do not envisage that the Planning strategy would include activities such as tree planting or cat control, rather that they include actions that will ensure environmental costs are directed to actions identified in the environmental policies.

It is likely that there will be resistance to application of SDP No. 6 due to premonitions of increased costs for consumers, eroding competitiveness for businesses and budget deficits. There are at least two responses to these forecasts. The first is that innovative funding or business models are developed to secure resources. The second is that there is movement in Europe to ensure that their manufacturers are not put at a disadvantage by importers who externalise their environmental footprint. The ACT should follow developments in these areas to ensure that their environmental policies remain innovative and improve in effectiveness over time. It is likely that there will be no silver bullet but given that nothing about sustainability is simple or easy, this is not an excuse for ducking the commitment. What will be important is the way that the commitment is implemented. It will represent a significant change, and this will require a deliberative change management strategy that recognises the value of small wins and the use of pilots to both manage adaptively and overcome people's inherent reluctance to change.

3.3.1.5 Strategies need to address areas of uncertainty

Strategies seek to provide direction under conditions of uncertainty. The value they deliver varies depending on the stated objectives. Among the ways that a strategy provide value is clearly articulating the objectives, describing the actions that are certain and providing advice on how to address issues that are uncertain but critical to achieving objectives. Examples of certain outcomes include light rail and bike paths (Transport), Fire Fighting equipment (Fire), Monitoring Stations (Water, Air). Examples of uncertain outcomes include the number of people using bike paths, the most effective ways of using firefighting equipment and improving air or water quality.

Currently ACT strategies do not discriminate between the certain and uncertain, despite the need to address them in very different ways. For example, the Climate Change strategy includes a range of priorities from Government Leadership (entirely within their control, certain) through to Waste where external influences (e.g., China changes importing) create uncertainty to land use and biodiversity which may be the area of greatest uncertainty due to climate change, and advances in agricultural technology and shifting markets. All these issues are treated broadly in the same way. A second example is the Nature Conservation strategy, where all five strategies are uncertain and to some extent the five strategies reflect different approaches to achieve the same objectives due to the risks associated with pursuing one strategy in isolation. When outcomes are certain there a range of standard processes to ensure that the project will achieve objectives and manage risks, including business cases, environmental impact assessments and regulatory approvals. For uncertain areas, there are significant risks including that implemented actions are not appropriate or effective, that they contribute to only some objectives or fail to complement actions implemented under other strategies.

As already noted, strategies are an effective way of dealing with uncertainty, but the authors need to consider the program logic that links an action's outputs to a tangible contribution to objectives. The strategy should focus on, or at least explicitly address, those links that are both uncertain and critical. The Fire strategy includes commitments to adaptive management and research, while the Weeds strategy describes a prioritisation process based on risk and feasibility. These are, however, exceptions. If this characteristic is driven by consideration of the proposed audience, then consideration needs to be given to alternate ways of communicating these processes to an appropriate level of detail.

3.3.1.6 Key Processes

The need to deal with uncertainty requires robust processes to ensure that implemented actions contribute to objectives. Clearly defined processes also contribute to transparency and accountability. There are a range of processes that may be important in adapting strategies or plans, including:

- Forecasting
- Intervention Design

- Prioritisation
- Resourcing
- Trade-offs
- Risk assessment

Addition information on each of these processes is provided in Text Box 2.

Text Box 2: Processes

1. Forecasting

Planning and design of interventions requires articulation of the expected outcomes. This review cannot provide a comprehensive summary of the many ways that an estimate of what is expected can be developed. Regardless of the tools that are used, expected outcomes support the design, prioritisation, and evaluation of actions. Given the limited resources available to the ACT Government, the most effective way of developing expected outcomes will be to learn from other's experience.

In the environment area, the ACT already collaborates with NSW and Victoria. Queensland are involved in similar efforts to protect and restore species and ecosystems, manage threats, and adapt ecosystems to climate change. This experience will, to varying degrees, be useful in identifying expected outcomes. For example, Joint Governments have invested heavily in fish passage and fish habitat restoration that could be used to inform management of aquatic habitats in the ACT. In Transport, one of the areas of uncertainty is the number of people that will change their transport utilisation habits. The Transport strategy provides graphs of usage through Covid and forecast changes in Government spending. Neither of these inform an assessment of whether investments in bike paths with lead to reductions in emissions. Cities all around the world have been seeking similar objectives, and their experience could inform both likely changes and opportunities. There will be people who will claim that it is not possible, however, there has been considerable work by intelligence agencies to improve their forecasting capability that could be informative (Tetlock and Gardner 2016).

2. Design

All ACT Policies include multiple objectives that need to be met with limited resources. These two challenges, performing an intervention that delivers multiple objectives and limited resources require a rigorous design process. If this process represents new territory for a policy team, then it is worth running a pilot to identify the steps and tools that could aid in each step. The process needs to include definition of the problem, confirmation of objectives, develop possible alternatives, forecast their outcomes, and then prioritize the option believed to provide the greatest contribution to objectives (Hemming et al 2022). In many instances, this will require comparison of options that will appear to be apples and oranges or present morally challenging choices. In general, there will be tools that will facilitate a considered weighing of options and development of a robust and transparent decision.

3. Prioritisation

Prioritisation is one of the key steps in the planning or design phase. There are numerous tools and, in some systems, models to support prioritisation decisions. In general terms the prioritisation can be based on value, feasibility, risk, cost or all of the above. One of the common approaches to prioritisation is multi-criteria analysis which allows comparison among differing criteria that can then be weighted according to the importance attributed to them by stakeholders. Multi-Criteria analyses are not perfect, but they support engagement and provide a transparent outcome, both of which may be important

Text Box 2: Processes

4. Resourcing

Strategies guide the approach to achieving objectives with the available resources. Failure to consider the available resources when developing a strategy or applying its principles will compromise efforts to achieve objectives. In any area of environmental management, resources will be limited. This is particularly true for distributive and redistributive policies, but also applies to regulatory and constituent policies. If the proposed actions consume resources, but do not, or are unlikely to contribute to objectives, then managers need to consider alternate actions that are more appropriate or effective. This may also be the case if the action does not lead to an enduring benefit but becomes an ongoing operational cost. In this case there is a risk that ongoing action will become a sunk cost that managers are reluctant to abandon or an opportunity cost that diverts resources away from more effective actions.

In many instances, there will be uncertainty around the resources available, whether they are funding, managerial resources, infrastructure, or volunteers. Given the influence resourcing will have on effectiveness, it is critical that strategy development include either:

- contingencies that will be adopted if desired resources do not become available.
- Estimates of the resources likely to be available. These could be based on current funding levels, or from examples of similar actions undertaken in other jurisdictions.

These considerations need to be included in the design process. This is the bleeding obvious when considering engineering projects, and the idea of reducing resources until the construction no longer met performance and safety standards would be considered unacceptable. Despite this, environmental projects are at risk of being implemented without sufficient resources to ensure they are effective. This can be a vexed issue in environmental areas where actions may take the form of an ongoing program, or in some cases an ongoing but variable action that responds to changes due to factors like climate, flood, and fire.

As an example, control of a hypothetical pest species is an ongoing program that seeks to manage a threat that varies through time. While funds could be allocated to controlling the pest, if inadequate resources are allocated, then control may not be sufficient to provide the anticipated environmental benefits or provide them only in some circumstances. If this is the case, it raises questions about how best to achieve the environmental objectives which could include investing in another action, finding additional resources, finding ways of being more efficient or effective, or focusing investment based on risk or vulnerability.

5. Risks

Risk management is an accepted part of a broad range of activities; however, it is not a common feature in ACT environmental policies. Clearly, one of the risks is uncertainty, but there are a range of risks that should be identified, and management responses developed to protect both environmental values and the investment invested in sustaining them. Some potential risks include:

- Can't achieve enough effect to progress toward objective
- Other threats suppress, undermine, or mitigate management outputs or outcomes
- Force majeure reduces or eliminates management outputs or outcomes
- Scale of action poorly aligned with scale of problem
- Attempts to improve resilience through general threat reduction found to be ineffective

From a strategic point of view, the development of solutions to these risks is not as important as identifying the risks which would help inform prioritisation of actions. The development of a robust program logic is one activity that will help policy architects identify risks because the process requires identification of the dependencies between proposed management actions and the policy objective(s).

Text Box 2: Processes: continued

6. Trade-offs

Trade-offs occur in two areas: among different policies and among objectives within a policy. For example, Planning seeks to support ongoing growth while Nature Conservation seeks to sustain biodiversity in lowland ecosystems and ARCS seeks protection and enhancement of aquatic and riparian areas. Within the Nature Conservation Strategy, there are three tiers of objectives:

1. 3 Outcomes and nested within these are
2. 5 Strategies and within these are
3. Up to 8 Actions which include items such as "Manage urban edge" which within this context can be considered an objective.

Trade-offs between policies are more likely to be antagonistic as they are often developed by different teams. Trade-offs within a policy will come back to issues around which objective should be given priority. For example, should you restore vegetation in a way that improves waterways or in ways that connects remnant habitat patches. Trade-offs may also arise when considering allocation of resources or in the way that actions are implemented (runoff versus corridors). Clearly, doing everything would be ideal, but given limited resources and that there are often multiple Pressures being placed on multiple ecosystems there is no guarantee that reducing a specific Pressure will lead to improved outcomes. It is important, therefore, that the trade-offs are examined and resolved as part of adaptive management. For example, if habitat is degraded, but the primary threat is invasive species, then it is possible that improving habitat will have no effect on condition. The same issue may arise when considering individual management actions where there is no obvious best choice (Craig et al 2017; Reid et al 2019).

One of the clearest examples of a trade-off within ACT environmental policies is the allocation of resources to protect human values when combatting major fires. The Minister's forward states that the SBMP "*seeks to achieve the best results for the environment and the community*" a commitment reflected in the development of Bushfire operational plans that seek to identify and protect reserves from bushfire risks. It is, however, "*acknowledged that ACT firefighting services' ability to respond may be constrained on days of elevated fire danger conditions due to multiple competing demands*." While this is an entirely rational approach, it represents a major risk to the Nature Conservation and Aquatic and Riparian Conservation Strategies. Given the seriousness of this risk, consideration needs to be given to how this trade-off will be managed.

There are a range of approaches to resolving trade-offs (Zheng et al 2019) including:

- Ecosystem methods: looks at options for ecosystem modification that support species at risk or ensure provision of ecosystem services
- Landscape methods that identify parts of the landscape that can support values that would otherwise be mutually exclusive.
- Optimization methods that seek to identify the composition or configuration of a landscape that will optimize the outcomes.
- Policy interventions that can offset trade-offs.

This is not a well-developed area in natural resource management, but it is clearly important to recognise trade-offs and anticipate how they will be managed.

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5 Policy Area Recommendations

5.1 Planning

The current planning policies provide a clear foundation of environmental and sustainability principles and directions to guide planning and development in the ACT. The major pressures of climate change and urban development and expansion is evident in the policy documents; however, more could be done to articulate how the policies will achieve longer-term impacts. Through the review the following observations have been made:

- The Act, Strategy and Plan could be better connected and more integration evident with other plans and strategies across transport, climate, nature, water, waste and housing.
- The planning policies could be improved through clearer monitoring and improvement processes.
- The Strategy could be improved with the inclusion of timing and delivery mechanisms in the implementation plan for delivery of actions.
- As the Strategy is reliant on the Territory Plan for implementation, greater integration and connection to the Plan would be beneficial along with specific implementation.
- Development codes are predominately focused on avoiding poor design or negative impacts from development and therefore misses an opportunity to encourage great, sustainable, and environmentally focused development.
- The approvals process and planning policy is relevant at the stage prior to development and rarely has effect or influence post development.

- Statutory planning policy is structured to focus on new development and new neighbourhoods which misses an opportunity to influence existing areas through retrofit, renovation and renewal.

5.2 Climate Change

- Policy ambition and alignment: While the Strategy overall has ambition, and good alignment with transport and housing policies, sectors related to waste and biodiversity are not as strong. The actions on waste are not in line with the ambition shown in the Waste Strategy. Biodiversity alignment with action plans is not evident.
- Targets: While there are overall targets, the targets are not broken down for other sectors. There are goals and actions but including targets will send stronger signals to stakeholders.
- Just transitions: This is mentioned as a key priority but the actions to achieve this objective are not defined beyond re-training. The links to energy security and justice and resilience can be made clearer through more defined actions and objectives.
- Adaptation: the previous adaptation policy had a stronger emphasis on resilience but was superseded by the current policy. It has a strong mitigation focus, but the adaptation is diluted and should be revisited in the next version. Reporting on resilience measures is not as strong as on the mitigation initiatives.

5.3 Transport

The principles outlined in the Strategy are consistent with the outcomes it seeks to achieve and describe an approach that is likely to succeed. But the Strategy is lacking in the detail to substantiate this and relies on action plans that are yet to be developed. A few areas for improvement have been identified:

- Policy ambition and alignment: While the Strategy overall has ambition, and some alignment with planning and climate change policies, tangible actions are not mentioned in the Strategy.
- The Transport Strategy recognises the city shaping potential of transport systems and the need to focus on better coordinating land use and transport planning. As they are integral to each other, a stronger relationship is needed with Planning Policy to commit to consideration of the impacts of actions under one on the outcomes of the other. Ideally, they would be produced in tandem so there is complete coordination.
- Whilst admirable as an ambition, the commitment to developing a Movement and Place framework has no time frame, nor any indication of how it will interface with land use planning or the wider Planning Policy.
- Targets: There are no overall targets or commitments. The priorities are expressed in a conceptual manner with little practical direction. There is a vision of where the Strategy wants Canberra to be but including targets will send stronger signals to stakeholders. It also lacks an evaluation plan and schedule. Alternatively, the implementation or action plans should be clearly listed and follow soon after release of the main strategy document.
- Air quality and Health: While health is mentioned from a perspective of promoting active transport, the Strategy does not link this to traffic and air quality impacts directly. The only mention of reducing pollution is promoting zero emission travel. However, the link to health and air quality could be made clearer through more defined actions and objectives.
- Transport use influences energy system: - With the emergence of zero emissions travel options, the Transport Strategy needs to acknowledge the interlinks with the electricity grid and the impact of large-scale uptake on the grid and electricity supply to Canberra.
- Co-ordination: The Strategy references the need to invest in enhancing regional transport connectivity through projects like the high-speed rail to Sydney or freight routes. It acknowledges the need for cooperation and coordination with NSW Government and Councils to support the region's transport future needs. However, the Strategy is not clear on the actions to facilitate this coordination.

5.4 Energy

The ACT's Sustainable Energy Policy has implemented some innovative and leading energy programs, notably:

- The ACT was the first jurisdiction to achieve 100 per cent renewable electricity – which has delivered most of the greenhouse gas emission reductions towards the 2020 target;
- Innovative energy efficiency programs, including the mandatory rating scheme for homes and the Sustainable Household Scheme (which received an Energy Efficiency Council award in 2022);
- Local industry development leveraged from its investment in renewable electricity;
- A strong focus on equity and low-income households to ensure benefits are more evenly spread

5.5 Waste

As the ACT might be preparing to develop a new waste strategy and to remain a policy leader in Australia, it is recommended that the new waste strategy:

- Adjusts strategic planning and actions that account for the changes that occurred in the waste sector over the last decade;
- Takes the opportunity to connect with the net zero targets;
- Includes the circular economy principles; and,
- Integrates with the strategic plans from energy, water, planning and transport to guarantee both net zero and circular economy visions are fulfilled.

5.6 Fire

Some limitations in the current bushfire management policy:

- The policy does provide a basis for prioritising actions and assess return on effort in investment in measures for bushfire protection and maintenance of ecosystem services. It would be beneficial for the policy to provide some measure of priority attached to actions and recommendation for research.
- The policy does not explicitly address issues associated and trade-offs between bushfire protection and maintenance of ecosystem services. There is strong emphasis on monitoring and evaluation and specific recommendation for areas of future research. However, these are not framed in the context of optimising fire regimes and fuel management to provide protection for communities whilst supporting biodiversity values and maintaining ecosystem values.
- The issue of increasing population size and increasing exposure to risk in bushfire prone land at the rural-urban interface. Maintaining liveability and ecosystem function in these settings whilst protecting communities from fire is a major challenge. The strategy 'supports government tree canopy targets through the development of urban vegetation guidelines to limit the risk of fire spread and other measures to increase infrastructure resilience.' However, there is no specific reference to how this outcome will be achieved.

5.7 Air

The review identified three key aspects that warrant change, and thus we make the following recommendations.

- Environment Protection Regulation 2005 - update the reference to the revoked 1985 "National guidelines for the control of emission of air pollutants from new stationary sources" (Division 2.2 Chimney emissions) to other stack criteria appropriate for new plant.

- Air Environment Protection Policy - specify criteria for impacts at a receptor due to a regulated source, consistent with NEPM and, for cross-border consistency, the NSW EPA Approved Methods guidelines.

- Further develop or strengthen policies and integrate actions to minimise emissions from wood heaters.

5.8 Nature Conservation

- Clearly define the scope of the Strategy and stratify assessments and actions with specified landscape or ecosystem types.
- A framework needs to be developed for prioritisation and objective development that can be applied consistently across different landscapes
- Application of this framework should be used to produce a small number of high priority activities
- The implications of threats such as climate change, waste and fire should be documented and communicated to the custodians of relevant strategy areas.
- A plan for ACT nature conservation strategies needs to be developed to ensure all values are addressed and, importantly, that interdependencies among daughter strategies are identified and managed appropriately as either opportunities or risks.

5.9 Water

- IWCM cannot be delivered by the water sector alone. Implementing IWCM will require significant, ongoing collaboration between land use planning and local government sectors and the water sector, in both policy and planning development at a range of different scales.
- Policies and practices that the ACT should explore ways to continue to improve water use efficiency.
- It is also recommended that with respect to properties constructed prior to the implementation of the ACT Waterways WSUD General Code, the ACT water savings calculator be used as a means of applying for a rebate to retrofit homes in order to be compliant with the ACT Waterways WSUD General Code
- Establish an entity or agency that is responsible and accountable for integrated catchment management at an urban scale and for making strategic decisions for the urban lakes, ponds and waterways, including stormwater management in the ACT, is needed, or these responsibilities and accountabilities need to be explicitly assigned to an existing group or agency.

5.10 Water for the Environment

- Develop a structure of all subsidiary strategies and the relationships among them. Refine the scope of each strategy or plan in line with the structure as each is due for updating.

- The current condition assessment needs to be adapted to meet the needs of the NCS, ARCS and daughter strategies.

- Convert the ARCS into a document that provides a framework and processes for achieving objectives. These can then be used to inform Area and Species plan development

- Ensure that area and species plans include specific actions with numerical outputs and outcomes within an adaptive management framework

- Include specific details about ecosystem services in the ARCS framework. This will provide a better focus for engaging stakeholders in prioritisation of actions and measurable outcomes

Attachment 1. Policy Synthesis (Planning)

Planning policy overview

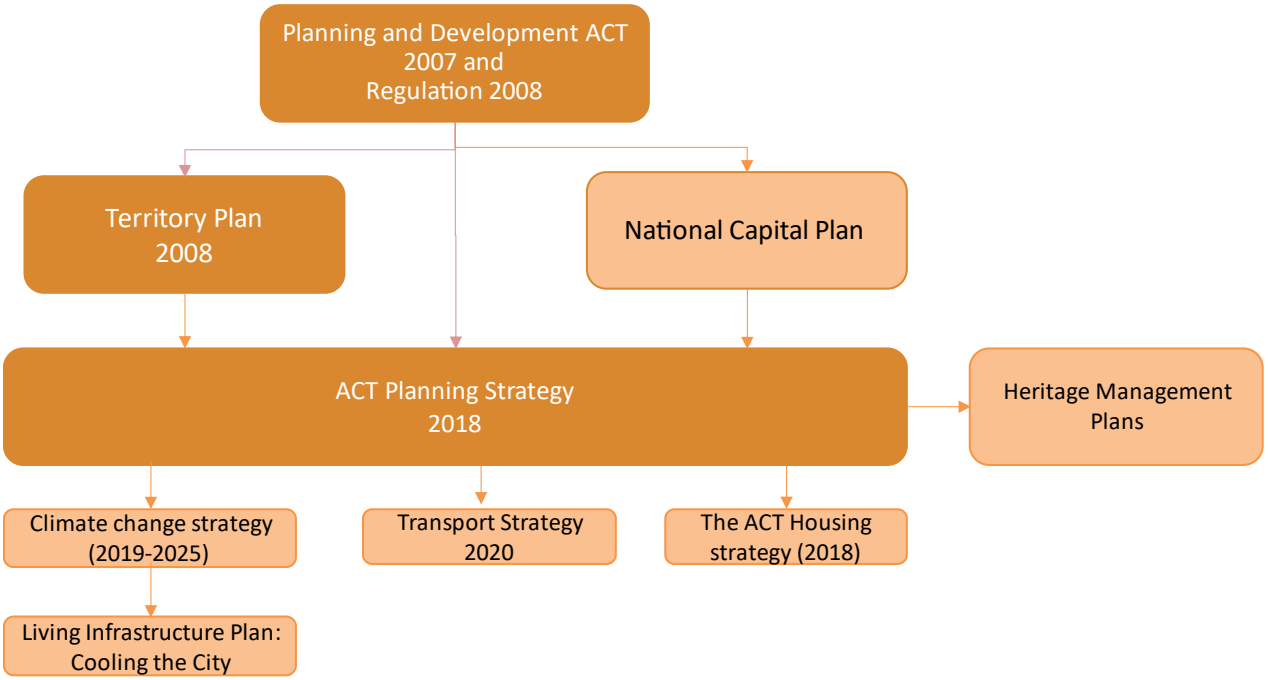


Figure 10. *Policies, strategies and plans related to planning in the ACT*

Progress snapshot

The ACT's suite of planning policies is currently undergoing a major review and update. A new Planning Bill has been drafted for public consultation and is intended to set the foundation for a reformed, outcomes-focussed planning system. The Planning Bill aims to ensure a clearer process with increased certainty, flexibility, and transparency. District Strategies and a new Territory Plan will also form part of the review and reform. This major reform demonstrates adaptive management in the planning space and the ACT governments commitment to improve and modernise policy to achieve better outcomes for the Canberra community.
One of the main changes from the reform will be to expand the scope of the planning system to give effect to other government policies such as climate change, wellbeing, and environmental policies. Other changes are expected to:

- simplify the current system so it is easier to understand
- put the focus more on outcomes than rules, with a new object of the Bill that supports and enhances liveability, prosperity and wellbeing
- introduce new 'principles of good planning' and 'principles of good consultation'
- expand strategic planning provisions, including the introduction of district planning through district strategies
- expand the functions of the Territory Planning Authority (formerly known as the ACT Planning and Land Authority)
- establish a new, outcomes-focussed Territory Plan
- introduce a more efficient Territory Plan amendment process
- streamline the development assessment system
- introduce pre-decision advice on development applications (DAs)
- broaden decision-making considerations for DAs
- simplify the Environmental Impact Statement (EIS) process and remove EIS exemptions
- introduce processes for 'Territory Priority Projects'
- split the existing regulation into a standalone exempt development regulation and a general regulation
- provide improved transparency and access to information on planning processes and decisions.

Planning policy context

Planning and development in the ACT are controlled by a number of key Acts, plans and strategies and administered by several authorities (Figure 10). The legal framework for planning is established by the *ACT Planning and Land Use Management Act 1988* (PALM Act) at the Commonwealth level. The PALM Act establishes the National Capital Authority to prepare and administer a National Capital Plan, oversee Designated Areas and to manage National Land on behalf of the Commonwealth. The PALM Act also requires the establishment of a Territory planning authority with responsibility for preparation of a Territory Plan.

The National Capital Plan is the strategic plan for Canberra and the Territory and ensure that 'Canberra and the Territory are planned and developed in accordance with their national significance'. The National Capital Plan establishes a broad framework of planning principles and policies for land use and development and sets out

detailed conditions of planning, design and development for the 'Designated Areas' because of their particular importance to the special character of the national capital.

Within Designated Areas, all proposed development and works required approval by the National Capital Authority. Designated Areas comprise Canberra's system of Inner Hills and Ridges, the Main Avenues and Approach Routes to the city, and the Central National Area, including the Parliamentary Zones and environs, the diplomatic areas, Lake Burley Griffin and its foreshores, and the main national institutions and symbols of Commonwealth governance.

Description of planning policy in the ACT

Planning and Development Act 2007 and Regulation 2008

The requirement of PALM Act to establish an ACT planning authority, legal planning framework for the Territory, and Territory Plan is met by the *Planning and Development Act 2007*. The object of this Act is *'to provide a planning and land system that contributes to the orderly and sustainable development of the ACT—(a) consistent with the social, environmental and economic aspirations of the people of the ACT; and (b) in accordance with sound financial principles'.*

The Planning and Development Act includes the requirements for the Territory Plan and the requirement for a planning strategy for the ACT (the ACT Planning Strategy 2018) that sets out long term planning policy and goals to promote the orderly and sustainable development of the ACT. The Act also provides the formal processes for assessment of development proposals and the arrangements for leases and licences.

Territory Plan

The ACT Government Directorate of Environment, Planning and Sustainable Development (EPSDD) is responsible for the Territory Plan, the Land Release program, development applications, leases and licenses, regulating development and the building industry, land use, surveying and mapping, community consultation and public education on issues relating to planning and land in the ACT.

Within EPSDD portfolio, two statutory authorities have been developed, responsible for different functions. The *City Renewal Authority and Suburban Land Agency Act 2017* has established:

- City Renewal Authority: statutory authority charged with revitalising the city centre of Canberra covering the designated City Renewal Precinct that spans Dickson, Northbourne Avenue, Haig Park, Civic and Acton

- Suburban Land Agency: build people-focused residential estates and urban renewal projects for the people of Canberra. The ACT Government agency that delivers suburban and urban land for future development

The Territory Plan is the key statutory planning document in the ACT, which includes the policy framework for the administration of planning in the ACT. The purpose of the Territory Plan is to manage the development of land in a manner consistent with strategic directions set by the ACT Government, Legislative Assembly and the community, and it must not be inconsistent with the National Capital Plan.

The Planning and Development Act requires that the Territory Plan must include a statement of strategic directions; objectives for each zone; development tables; codes; and a map (the Territory Plan map). The Territory Plan also includes a series of general development codes, precinct codes, structure plans and concept plans for the development of future urban areas.

The policy vision of the Territory Plan is that *'the planning and development of the ACT provides the people of ACT with an attractive, safe and efficient environment in which to live, work and have their recreation'*.

Table 4. Summary of Territory Plan Statement of Strategic Directions – Environmental Sustainability Principles

Principle No.	Environmental Sustainability Principles
1	Planning policies will seek to ensure the efficient use of all resources and to reduce consumption of non-renewable resources. Waste minimisation, reuse and recycling will be encouraged, whilst energy-rating and conservation measures will be applied wherever appropriate, particularly in transport, subdivision planning, and building design and construction.
2	The pattern of development is to reflect land capability constraints resulting from topography, soils, geotechnical factors, drainage, natural hazards, microclimate and the sensitivity of ecosystems. Particular attention will be given to the need to conserve soil, water, and vegetation; maintain biological diversity; safeguard important ecosystems and ecological processes; and provide and protect wildlife corridors.
3	Land and water resources will be planned in accordance with the principles of integrated catchment management and water sensitive urban design. Policies will seek to protect identified environmental values, whilst focusing on opportunities for multi-purpose use of resources. Special attention is to be given to protecting sources of the Territory's water supply and to maintaining environmental flows in rivers and streams.
4	Planning policies will provide for the sustainable management of rural areas, ensuring that rural lands nominated for future urban development or other purposes can be retained in productive use and properly managed for the time being. Appropriate activities to reduce net greenhouse gas emissions will be encouraged.
5	Urban expansion will be contained in order to minimise impacts on valuable natural and rural areas.
6	Integrated land use and transport planning will seek to maximise accessibility and transport efficiency, prioritise active travel, reduce energy consumption, increase physical activity, support the preferred pattern of development, promote safety, safeguard environmental quality, and minimise greenhouse gas emissions.
7	Policies for environmental planning and management will ensure amenity, minimise pollution, and protect public health and safety.

ACT Planning Strategy 2018

The ACT Planning Strategy sets out the long-term planning policy and goals to promote the orderly and sustainable development of the ACT, consistent with the social, environmental, and economic aspirations of the community. It informs the future development of Canberra and is the strategic document for managing growth and change in the Territory and for coordinating growth with infrastructure, transport, and community facilities.

The Strategy vision is to be a sustainable, competitive and equitable city that respects Canberra as a city in the landscape and the National Capital, while being responsive to the future and resilient to change. Strategy directions include:

- **Compact and Efficient:** Urban spread will be limited, and growth catered for through increased density in appropriate places such as around town and group centres and along major transport routes. While up to 70% of new housing will be built within our existing urban footprint, new urban areas will be explored for future needs. Care will be taken to retain the features of the city that people value, including the bush capital setting and access to green space.

- **Diverse:** Continued cooperation with neighbouring councils and regional partners will further strengthen Canberra's role as the region's hub and help to promote the liveability, economy and attractiveness of the whole ACT region, including leveraging off Canberra Airport's international flights and 24-hour operations.
- **Sustainable and Resilient:** Careful urban planning will improve our sustainability and resilience to climate change; protecting and expanding living infrastructure, managing our waterways, reducing emissions, protecting our parks and reserves for both for our community and our biodiversity, and reducing our ecological footprint. This can make our city a more sustainable and liveable place for current and future Canberrans.
- **Liveable:** Making Canberra a great place to live and work is essential. Planning can deliver a liveable Canberra through the development of social infrastructure, open space and public places, strong activity hubs and housing choice.
- **Accessible:** An accessible Canberra will have better integrated land use and transport, well-designed and safe public spaces, a wide range of housing choice, and be easily accessible by people of all ages and abilities.

The Planning Strategy may be used to develop or guide the amendment of the Statement of Strategic Directions in the Territory Plan; however, it is not part of the Territory Plan and has no application to decisions on development proposals or compliance actions.

Additional ACT supporting Acts, plans and strategies

Table 5. Additional ACT supporting Acts, plans and strategies

Instrument (Act, strategy, plan)	Objective / Vision
Statement of Planning Intent 2015	Sets out the key planning priorities for the ACT Government for the next three to five years. The statement built on the strategic framework set out in the 2012 ACT Planning Strategy, Transport for Canberra and the ACT Government's climate change strategy and action plan. The Statement establishes four key planning priorities, and associated actions, that reflect the key messages heard from community and stakeholders: • Creating sustainable, compact and liveable neighbourhoods with better transport choices • Delivering high quality public spaces and streets through placemaking • Delivering an outcome-focused planning system to reward design excellence and innovation • Engaging with the community, business and research sectors to optimise planning outcomes.
The City Plan	The City Plan sets a vision for future development in the city centre. The City Plan will help determine development and growth, and ensure projects and infrastructure are delivered efficiently and effectively. It aims to unlock the potential of Canberra's CBD and better integrate it with public transport, residential buildings, surrounding parklands and educational institutions. The Plan has been jointly funded by the ACT and Australian governments under the Liveable Cities Program. The Liveable Cities Program supports state, territory and local governments to meet the challenges of improving the quality of life in our state and territory capitals and major regional cities. It supports strategic planning in line with the Council of Australian

Instrument (Act, strategy, plan)	Objective / Vision
	Governments (COAG) principles for facilitating urban renewal and strategic urban development.
City Renewal Authority and Suburban Land Agency Act 2017	The objectives of the Act are to: • Establish the City Renewal Authority and the Suburban Land Agency. • promote and facilitate the orderly and efficient delivery of residential, commercial and industrial development in the public interest, including urban renewal. • Promote development that is environmentally sustainably and applies innovative environmental building and public domain design. • Support, encourage and facilitate public and private investment and participation in the development of the Territory.
SLA Sustainability Strategy 2021-25	The strategy responds to the latest ACT Government policies and priorities, while setting ambitious objectives around the built and natural environment. The Strategy is designed to help Canberra become a sustainable city, while at the same time meeting our growing housing needs. It provides a strategic framework for planning, decision-making and actions that will improve the environmental sustainability of our projects and help us deal with the environmental challenges we all face. The vision is to create great places where communities thrive. The Strategy centres on four key themes which incorporate elements of social and environmental sustainability: resilient communities, zero emissions suburbs, responsible consumption and production, health, prosperous and inclusive places.
City and Gateway UD Framework 2018	The National Capital Authority (NCA) and ACT Government have together prepared the City and Gateway Urban Design Framework to set the principles for development and growth in the city centre and along the gateway corridor of Northbourne Avenue and the Federal Highway. The Framework sets out the overarching principles for urban renewal and growth in the city centre and along the corridor to achieve well-designed and sustainable buildings, urban infrastructure, public places and streets that are appropriate for the gateway to the National Capital. • City shape and urban built form • Access and movement • Better places and streets • Sustainable communities and urban culture
Place Plans	Developed by the City Renewal Authority to define an area's existing character and identify actions to make it even better. The place plans guide improvements to public spaces to help the area grow in a way that meets the community's needs and expectations. City Renewal Authority established under the *City Renewal Authority and Suburban Land Agency Act 2017*, is charged with shaping the growth of central parts of Canberra. Through City Renewal Precinct Place Plans.
Master Plans	The master planning programme was initiated under the 2012 Planning Strategy and is now complete. Master plans were a key element in the implementation of the 2012 strategy, to manage and delivery responsible, integrated growth in appropriate locations. The master plan sets out how a particular area can develop and redevelop into the future. It is a high

Instrument (Act, strategy, plan)	Objective / Vision
	level plan intended to set out objectives and strategies to manage development and change over time. Elements of master plans incorporated into relevant codes in the Territory Plan.

Planning policy analysis

Table 6. Assessment of Effectiveness of key planning policy instruments in the ACT

Instrument (Act, strategy, plan)	Objective / Vision	Assessment of effectiveness
Planning and Development Act 2007 (and Regulation 2008)	The objective of the Planning and Development Act is to provide a planning and land system that contributes to the orderly and sustainable development of the ACT consistent with the social, environmental and economic aspirations of the people of the ACT, and in accordance with sound financial principles. Set out the requirements of the Territory Plan and the requirement for a planning strategy. The Act provides the formal processes for assessment of development proposals and the arrangements for leases and licences.	The Act performs its objective to provide the planning and land system through establishing the planning and land authority, and setting the requirements for a planning strategy, the Territory Plan, the ACT Environmental Offsets Policy, and development requiring an Environmental Impact Statement. It is a document that focuses on rules and policy rather than outcomes. The Act defines sustainable development as *the effective integration of social, economic and environmental considerations in decision-making processes, achievable through implementation of the following principles:* *a) The precautionary principle;* *b) The inter-generational equity principle;* *c) Conservation of biological diversity and ecological integrity;* *d) Appropriate valuation and pricing of environmental resources.* *The inter-generational equity principle means that the present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations.* *The precautionary principle means that, if there is a threat of serious or irreversible environmental damage, a lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.* In terms of sustainable development, the Act requires the review of the Territory Plan, at least every five years, to consider whether the

Instrument (Act, strategy, plan)	Objective / Vision	Assessment of effectiveness
		Territory Plan gives effect to sustainability principles and promotes the planning strategy. The Territory Plan is also required to set out planning principles and policies, including policies that contribute to achieving a healthy environment in the ACT. While the definition of sustainable development and the requirements of the Territory Plan is positive, it is unclear how this will be measured. The Act and Regulation are being reviewed and updated as part of the Planning System Review and Reform Project.
Territory Plan	Key statutory planning document in the ACT, providing the policy framework for the administration of planning in the ACT. The purpose of the Plan is to manage land use change and development in a manner consistent with strategic directions set by the ACT Government, Legislative Assembly and the community, and it must not be inconsistent with the National Capital Plan. The Territory Plan is used to: • Manage development in the ACT, particularly how land us used and what can be built • Assess development applications • Guide the development of new estates and the management of public land. Includes a statement of strategic directions, zones and overlays, objectives and development tables for each zone, codes.	The Statement of Strategic Directions sets out the principles for the Territory Plan and includes principles for sustainable development (see Table). While positive in intent, the principles are quite general and not very prescriptive. The 'Governance' section of the Plan indicates the relationship with the Planning Strategy which may be used to develop or guide the amendment of the Statement of Strategic Directions, however it is not part of the Plan and has no application to decisions on development proposals or compliance actions. The Territory Plan doesn't list any other specific plans or strategies that are interconnected. As a standalone document, the Territory Plan is not recognising the clear interconnections between planning and all other areas of transport, climate, nature, water, waste and housing. The Territory Plan is a policy framework with a clear focus on future urban areas: structure plans, concept plans, and estate development. The codes for estate planning are focused on basic provision and design and do not go very far to promote sustainable development. The Structure Plans and Concept Plans do have a better environment and sustainability focus including principles encouraging ecological sustainability, retention of landscape values, design to encourage non-car based trips, walkable and well connected neighbourhoods, connected open space network, sustainable urban water management, heritage protection, and sustainable development and climate change

Instrument (Act, strategy, plan)	Objective / Vision	Assessment of effectiveness
		adaptation is to be taken into consideration with the application of no regrets and inter-generational equity principles. However, these Plans are focused on new suburbs, and little is provided in the way of sustainable development for existing areas where the ACT proposes 70 per cent of new housing to be located through infill development. A new Territory Plan is being developed as part of the Planning System Review and Reform Project and will sit under the new Planning Bill. The new draft Planning Bill has been released for public consultation in 2022. The Territory Plan has undergone 22 variations since July 2019. Variations are intended to better reflect the needs of the ACT community; maintain a contemporary planning system; and achieve goals and objectives of contemporary strategic planning policy.
ACT Planning Strategy 2018	Sets out the long term planning policy and goals to promote the orderly and sustainable development of the ACT, consistent with the social, environmental and economic aspirations of the people. Informs the future development of Canberra and is the strategic document for managing growth and change in the Territory and for coordinating growth with infrastructure, transport and community facilities. Sets a development target of 70 per cent within the existing urban footprint. Five themes: liveable, diverse, accessible, compact and efficient, sustainable and resilient. The Strategy supports the further delivery of the key planning priorities set out in the Minister's Statement of Planning Intent.	The Strategy has clear goals around the five themes focused on the sustainable economic, social, and environmental development of Canberra. Under the themes, there are 25 strategic directions and 65 actions to focus implementation and achieve the outcomes. However, as it is at the strategic level it is reliant on the Territory Plan as the statutory planning document to implement the goals and actions. A strength of the Strategy is that it identifies partner agencies for implementation as well as interconnections across other plans and strategies including links with the following key documents: • Territory Plan • ACT Transport strategy • ACT Sustainable Energy Policy • ACT Climate Change Strategy • ACT Climate Change Adaptation Strategy • ACT Living Infrastructure Plan • ACT Water Strategy 2014-44 • ACT Nature Conservation Strategy 2013-23

Instrument (Act, strategy, plan)	Objective / Vision	Assessment of effectiveness
		• ACT Waste Strategy • ACT State of the Environment Report • ACT Housing Strategy • City Plan • City Renewal Authority and Suburban Land Agency Act 2017 • City and Gateway Urban Design Framework • Minister for Planning's Statement of Planning Intent 2015 The Strategy includes annual reporting to identify progress on actions and every five years consideration is given as to whether a review of the Strategy is required. This enables government to review progress on the Strategy implementation and to consider whether the Strategy requires updating to take account of legislative, social, economic or environmental changes. The focus of the 'Sustainable and Resilient' theme is '*careful urban planning will improve our sustainability and resilience to climate change; protecting and expanding living infrastructure, managing our waterways, reducing emissions, protecting our parks and reserves for both our community and our biodiversity, and reducing our ecological footprint*'. A strength of the actions included under this theme is that it includes both mitigation (net zero) and adaptation (greening and cooling) actions. The Strategy could be improved with the inclusion of timing and delivery mechanisms for actions, along with greater connection to the Territory Plan and specific implementation.

Effectiveness of Policy Portfolio

The current suite of policies has set clear goals but has limited articulation of how the policies will achieve longer-term impacts. Whilst outcomes of the policies are largely stated in measurable terms there is little assessment of risk and feasibility. Processes for monitoring and improvement are not clearly articulated, however the 22 variations since July 2022 demonstrate a clear need for a flexible adaptive management process to be embedded within the new policy that is less cumbersome than the current process.

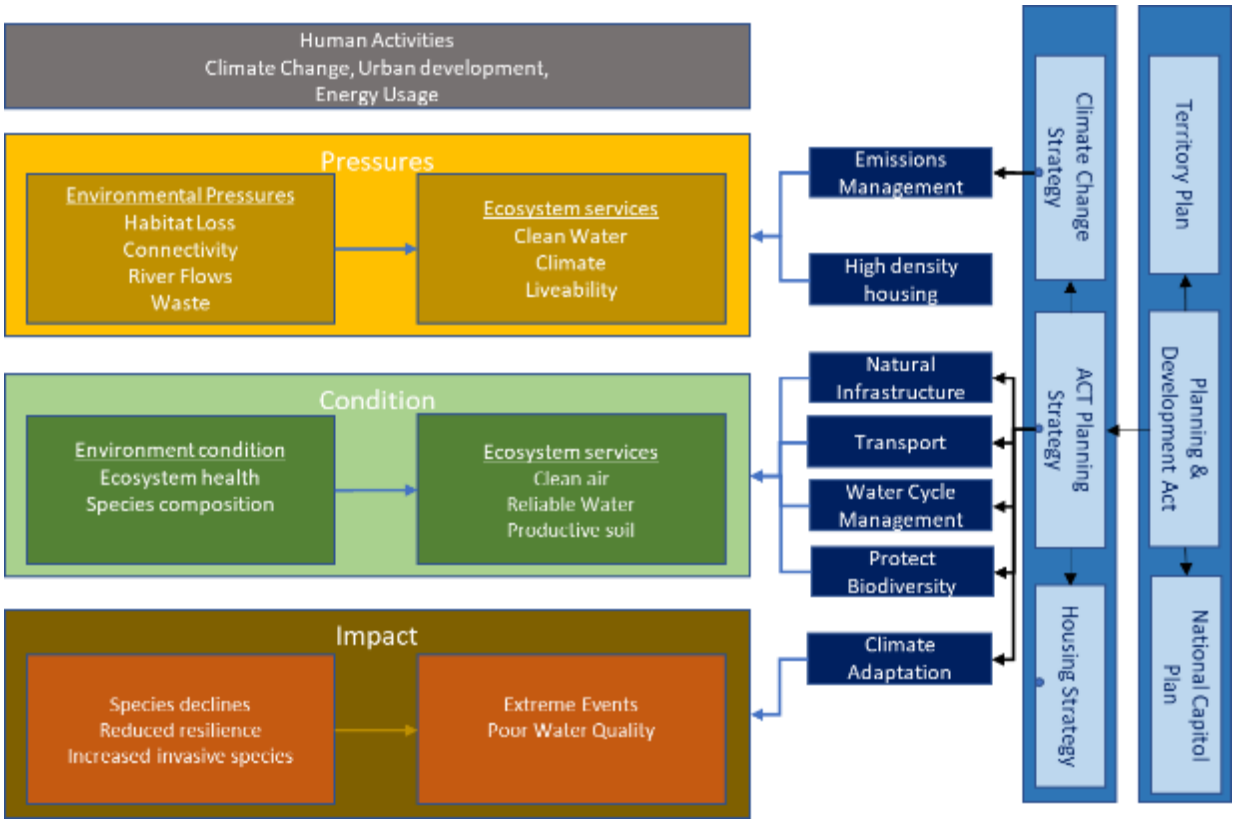


Figure 11. *Illustration of the areas of focus for Planning policy in the ACT*

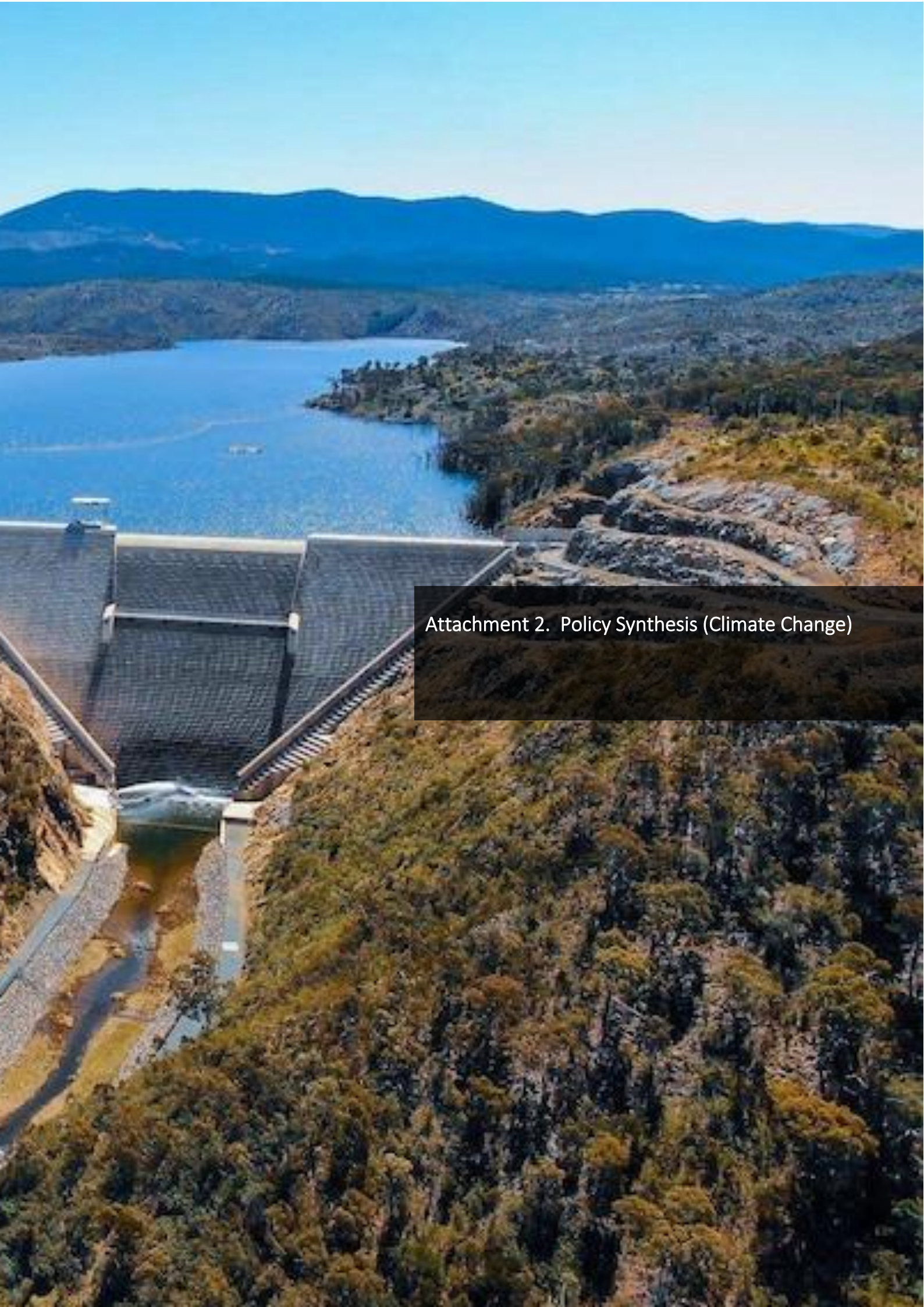
Conclusions and recommendations

The current planning policies provide a clear foundation of environmental and sustainability principles and directions to guide planning and development in the ACT. The major pressures of climate change and urban development and expansion is evident in the policy documents; however, more could be done to articulate how the policies will achieve longer-term impacts. Through the review the following observations have been made:

- General:
    - The Act, Strategy and Plan could be better connected and more integration evident with other plans and strategies across transport, climate, nature, water, waste and housing.
    - The planning policies could be improved through clearer monitoring and improvement processes.
- Planning Strategy:
    - The Strategy could be improved with the inclusion of timing and delivery mechanisms in the implementation plan for delivery of actions.

    - As the Strategy is reliant on the Territory Plan for implementation, greater integration and connection to the Plan would be beneficial along with specific implementation.
- Territory Plan:
    - Development codes are predominately focused on avoiding poor design or negative impacts from development and therefore misses an opportunity to encourage great, sustainable, and environmentally focused development.
    - The approvals process and planning policy is relevant at the stage prior to development and rarely has effect or influence post development.
    - Statutory planning policy is structured to focus on new development and new neighbourhoods which misses an opportunity to influence existing areas through retrofit, renovation and renewal.

The review and reform of the planning system, presents an opportunity to move towards outcomes focused policies and to give effect to other government policies such as climate change, wellbeing and environmental policies. The reform also presents an opportunity to better connect the strategic directions and actions in the Planning Strategy with the statutory implementation mechanism of the Territory Plan and create a more integrated and clear planning system.



Attachment 2. Policy Synthesis (Climate Change)

Climate Change Policy Synthesis

Climate change policy overview

ACT has taken a leading position in the fight against climate change and set up the most ambitious net zero target in Australia. ACT also showed leadership in declaring a state of climate emergency in 2019, acknowledging the need for urgent actions across the Government. In addition to the net zero commitment, ACT also committed to and achieved a target of 100% renewable energy by 2020. The climate change strategy and the legislation on reducing greenhouse gas emissions are the key policy instruments that guide ACT's path to achieving this target. The Urban Forest Strategy and the Living Infrastructure Plan further lay out action plans for improving resilience in urban areas while managing the impacts of climate change.

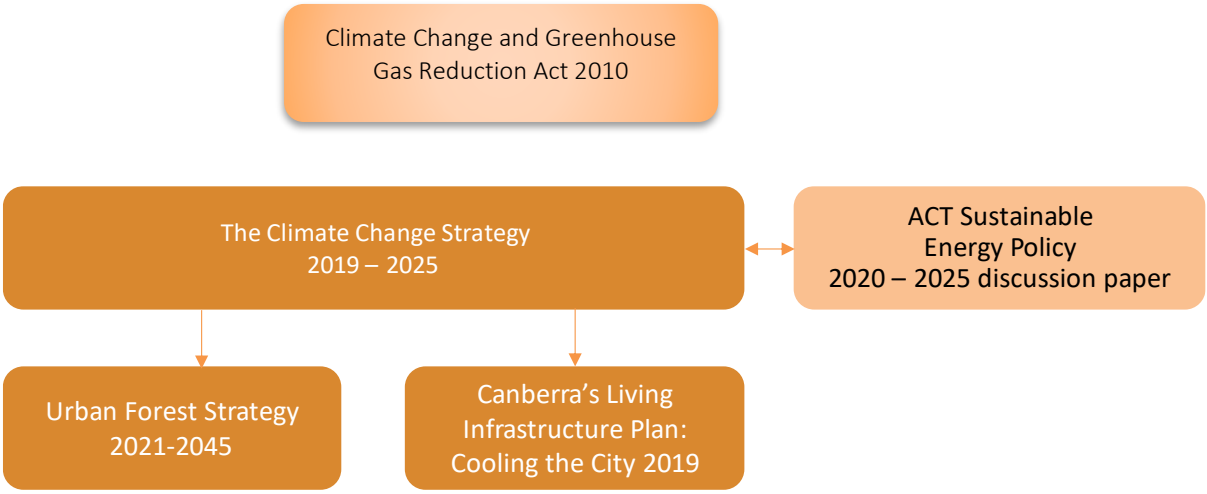


Figure 12. *Policies, strategies and plans related to Climate Change in the ACT.*

Progress snapshot

The 2020 targets set in the ACT Climate Change Strategy have been achieved by reducing direct emissions from transport and gas and eradicating any indirect emissions from electricity. The 2025 target of achieving 100% renewable energy was achieved 5 years ahead of schedule in 2020. As of 2020-21, total emissions were down 45% since 1990, in line with the 2025 interim target of cutting emissions by 50 to 60%.

Climate change policy context

At a federal level, Australia is party to the Paris Agreement. The Paris Agreement requires countries to describe their post-2020 climate actions, known as Nationally Determined Contributions (NDCs). Together these actions will determine if globally we can achieve the long-term goals of the Paris Agreement. The NDCs include details on national targets, policies and measures for emissions reduction and climate change adaptation.

Australia's 2021 NDC or emission reduction commitments are to get to net zero emission by 2050. This federal target is not currently legislated. The previous federal government (the Morrison Government) had taken a technology led approach to emission reduction, and developed an economy plan, Australia's Long-Term

Emissions Reduction Plan to achieve this target. The approach to climate change and emissions reduction by the new federal government (the Albanese Government) is yet to be fully realised.

The ACT itself has set a much more ambitious target. The Climate Change and Greenhouse Gas Reduction Act 2010 formalised the ACT targets of zero net emission initially by 2060, which was revised in 2019, to a net zero by 2045 target. The interim target which ACT met under the previous Climate Change Strategy (2012) was a 40% reduction in greenhouse gas emissions from 1990 levels by 2020. The current strategy, ACT Climate Change Strategy 2019-2025, outlines the steps now needed to reduce emissions by 50–60% (below 1990 levels) by 2025, the next interim target to net zero.

The Climate Change Strategy acknowledges ACT's phased approach to emission reduction with 5-year targets to 2045. The approach to subsequent Climate Change Strategies is to develop and implement short-term action plans to achieve these interim targets. The Climate Change Strategy 2019-25 replaces the previous ACT Climate Change Strategy and Action Plan 2 (2012) and the ACT Climate Change Adaptation Strategy (2016).

The Policy was developed in collaboration with other significant territory policies on planning and transport, enabling the policy goals and actions regarding emissions reduction and climate change to be consistent across different departments. The ACT Climate Change Strategy 2019-2025 has been developed in coordination with the ACT Planning Strategy 2018, the ACT Housing Strategy 2018 and the ACT Transport Strategy 2020. Another complementary instrument is the Living Infrastructure Plan: Cooling the City, which addresses climate change impacts like urban heat and offers direction to protect natural assets and build resilience within the ACT. Climate change is also a key consideration of the City Renewable Authority's Sustainability Strategy 2021-25, which sets out the transformational path for urban renewal in Canberra. These strategies together provide a comprehensive vision and approach to building a smart, healthy, net-zero emissions city.

Description of climate change policy in the ACT

The Climate Change Strategy (2019-2025)

ACT's Climate Change Strategy 2019-25 is the main policy instrument for leading climate action. It articulates a vision that: *By 2045 the ACT will be a leading net zero emissions territory that demonstrates that a healthier, smarter future is possible.* It spells out the emission reduction targets to 2045 and identifies the actions to meet them, as well as build resilience to climate change impacts. The strategy aims to embed the consideration of climate change in Government and community decision making.

Canberra's Living Infrastructure Plan: Cooling the City, 2019

The aim of the Plan is to protect and enhance the city's natural assets, to create a climate-wise, prosperous, and healthy city. It identifies challenges from climate change, urban growth, and declining urban forests. It sets out a target to enhance Canberra's urban environment with 30% tree canopy cover and 30% permeable surfaces, and actions to achieve this target through a series of programs that look at asset management systems, microclimate assessments, landscape plans, and demonstration projects for city cooling, local park upgrades, shade ways and urban design. It also calls for the development of an urban forest strategy and tree protection act review.

Policy development since the 2019 State of Environment Report

Urban forest strategy 2021–2045

The strategy helps plan out the path to achieve the Climate Change Strategy's target of 30% canopy cover by 2045. It sets out the ACT Government's vision for a resilient and sustainable urban forest that supports a liveable city and the natural environment and contributes to the wellbeing of the community in a changing climate. The objectives of the strategy are to protect urban forests, enhance tree cover, balance and diversify the urban forests, support biodiversity, develop infrastructure to support the urban forest and partner with the community to grow and maintain them.

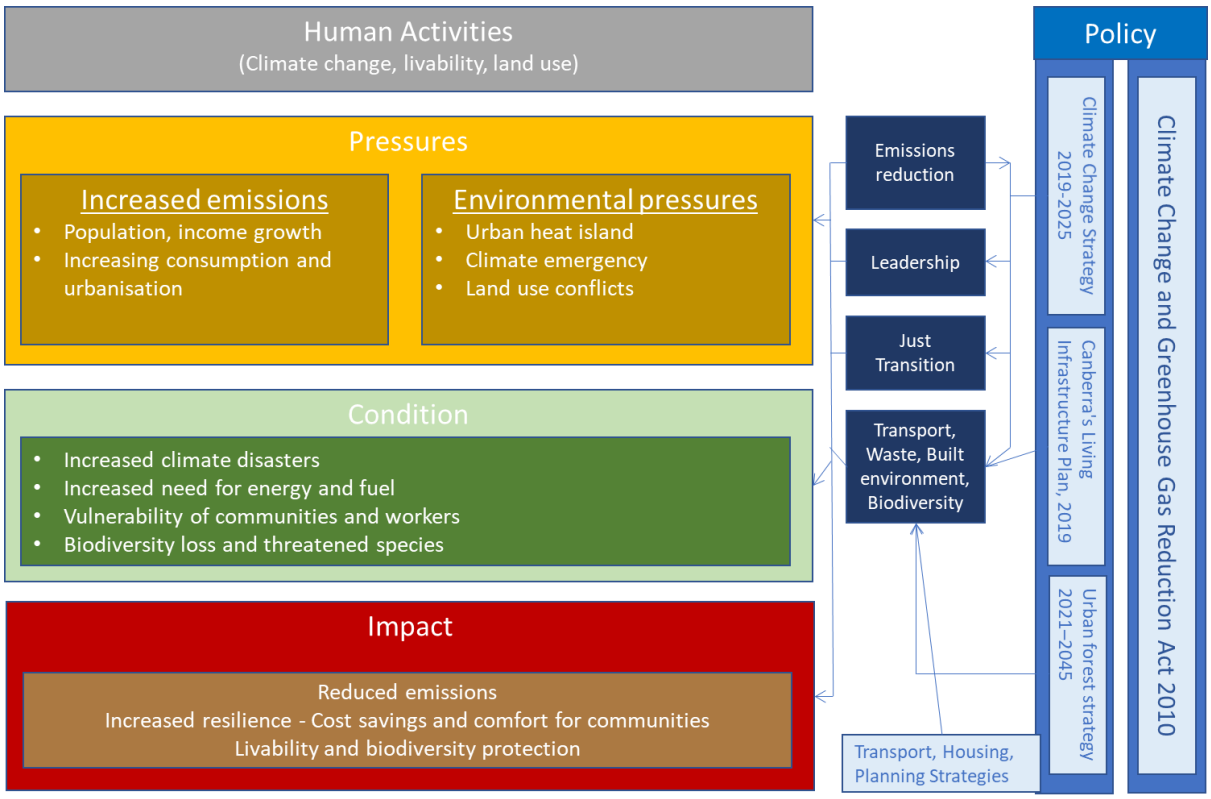


Figure 13. *Illustration of the areas of focus for climate change policy in the ACT*

Climate change policy analysis

From a national perspective, the ACT has set the most ambitious legislated target for net zero in Australia, net-zero by 2045. This target is also supported by a robust policy (Climate Change Strategy – 2019-2025) that introduces interim targets in 5-year increments and a detailed plan to achieve the next interim target. The ACT Climate Change Strategy 2019-2025 recognises the achievements to date and sets out new measures to meet the next interim target.

The strategy has actions across different sectors – transport, built environment, natural environment, waste – and across different stakeholders – communities, businesses, and the government. The actions in the strategy are directed at combatting the drivers and impacts of climate change through reducing emissions and increasing community resilience through co-benefits to community like cost savings, comfortable homes, and a more liveable city. The various overall as well as sectoral goals and targets are described in Table . It recognises that a collaborative approach with local communities and businesses is essential to get to net zero.

Table 7. Priorities of the ACT's Climate Change Strategy 2019-2025, and featured goals and targets of the strategy.

Key Priority	Goals & Targets
Emissions reduction	• Reduce emissions (from 1990 levels) by • 50–60% by 2025 • 65–75% by 2030 • 90–95% by 2040 • 100% (net zero emissions) by 2045 Strong emphasis on reducing emissions from transport and gas.

Key Priority	Goals & Targets
Community leadership & just transitions	Encourage community driven solutions and collaborate for resilience A just transition to net zero emissions that: • Supports low-income households and the most vulnerable in community • Works with industry to pursue opportunities for new, zero emissions industries
Transport	• Complements the ACT Transport Strategy and action plan • Goals on supporting sustainable travel including, zero emissions vehicles, active travel and public transport • Alignment with Planning & Transport Strategies for a compact and efficient city including reduced car use and smarter use of roads
Energy, buildings and urban development	Compact, liveable and sustainable built environment that supports achievement of net zero emissions goal • Maintain 100% Renewable electricity supply and reduce gas emissions • Climate-wise, zero-emissions, built environment – particularly buildings and homes including rental homes, public housing and low income houses • Reduce urban heat and improve liveability through Canberra's Living Infrastructure Plan
Waste avoidance and management	• Reduce waste generation – food waste and household waste • Reduce emissions from waste treatment – organic waste from households, hospitality and food retail
Land use and biodiversity	• Protect biodiversity (local species and habitats) from climate risks – action plans for threatened species • Sequester carbon in landscape with consideration of biodiversity outcomes and competing land uses. • Encourage sustainable and resilient farming
ACT Government leadership	• Leading by example to showcase best practice sustainability in Government operations and policies • Reducing risk in a changing climate for disaster and emergency prevention, preparedness, response and recovery

An independent review of the Climate Change and Greenhouse Gas Reduction Act 2010 conducted in 2021 found that it had been highly effective in allowing the ACT Government to set the groundwork for action, develop policy and successfully meet emissions reduction and renewable energy targets and was found to be appropriate to meet ACT's climate objectives post 2021 as well[1]. The interim targets have been particularly effective as per the review, as seen with the 2020 target of 40% emission reduction.

The annual ACT Greenhouse Gas Emissions Inventory Report provides estimates on emission reductions in different sectors as an update on how ACT is tracking against targets. In 2020-21, total emissions were 1,685 kt CO2-e, which is a 45% reduction from the baseline year of 1990. ACT's 100% renewable electricity supply target is a key driver of this emission reduction, emissions from electricity began gradually declining in 2015-16 and then fell to zero 2019/20. Emissions were slightly higher than the previous year at a 2.9% increase that can

[1] Review of the Climate Change and Greenhouse Gas Reduction Act 2010 (ACT) 10-year statutory review. https://www.climatechoices.act.gov.au/__data/assets/pdf_file/0011/1906625/review-of-the-climate-change-and-greenhouse-gas-reduction-act-2010.pdf

primarily be attributed to the transport sector, which rebounded to almost pre-pandemic levels as COVID-19 restrictions eased[2].

The ACT Government established the Office of the Coordinator General for Climate Action to coordinate and support the ACT Government's ambitious agenda for climate action. Their role includes looking at policy and planning reform, and facilitating some of the larger programs promised under the Climate Change strategy. The other responsibilities for delivery on the actions are split primarily across the Environment, Planning and Sustainable Development Directorate, Community Services Directorate and the Transport Canberra and City Services.

Besides goals to achieve the net zero targets, the Strategy also has in place actions to capture data, monitor, and report on the progress of the policy. Annual reporting on the actions of the Strategy is provided in the Minister's annual report[3]. Progress has been made on many of the policy measures proposed in the Strategy particularly those on behaviour change in community and businesses, partnerships and capacity building (Table 8). Many of the proposed planning and legislative changes are in progress. The waste initiatives are being piloted, transport initiatives are being finalised, while the biodiversity initiatives are now considered business as usual (BAU). Some of the climate wise built environment initiatives and just transition initiatives appear to have been delayed.

However, it is still early days, and a comprehensive review of the effectiveness of the Strategy has not been carried out. An independent review by the Office of the Commissioner for Sustainability and the Environment will be completed in 2024 to assess progress and inform the development of the next strategy from 2025.

Table 8. Policy measures and progress to date[4]

Method	Objective	Detail	Outcomes & Progress
Behaviour change	Support community-driven solutions	• Community grants to support emission reduction or resilience projects	• 2020–21 : five grants with a combined value of more than $127,000 • 2019–20 : seven grants with a combined value of more than $160,000
	Sustainable transport	• Promote Active Travel initiatives e.g., ACTsmart • Encourage Uptake of Zero Emission Vehicles (ZEVs), car free days, car share, parking	• Legalising the use of electric scooters and similar e-mobility devices on shared paths and footpaths • Establish the Canberra Electric Bike Library
	100% renewables / Zero emission homes	• Support the transition from gas • In home assessments for renters	• Energy Efficiency Improvement Scheme extended to 2030 and the Priority Household Target increased from 20% to 30% in 2020.

[2] ACT Greenhouse Gas Emissions Inventory Report 2020-21 https://www.climatechoices.act.gov.au/__data/assets/pdf_file/0003/1918038/ACT-Greenhouse-Gas-Emissions-Inventory-Report-2020-21.pdf

[3] https://www.environment.act.gov.au/__data/assets/pdf_file/0011/1910486/2020-21-ministers-annual-report-under-the-climate-change-and-greenhouse-gas-reduction-act-2010.pdf ; https://www.environment.act.gov.au/__data/assets/pdf_file/0007/1670353/2019-20-Ministers-Annual-Report-under-the-Climate-Change-and-Greenhouse-Gas-Reduction-Act-2010.pdf

[4] https://www.environment.act.gov.au/__data/assets/pdf_file/0011/1910486/2020-21-ministers-annual-report-under-the-climate-change-and-greenhouse-gas-reduction-act-2010.pdf

Method	Objective	Detail	Outcomes & Progress
	Zero emissions government	• Reduce staff travel needs, consider cost of carbon and Climate Change Adaptation in ACT policies, budgets and projects	• Now BAU
Partnerships	Community leadership	• Collaborate for resilient communities – landscape management with local traditional custodians • Trialling new models for collaboration, community participation in Climate Change initiatives	• Working with traditional owners now BAU • Dedicated climate change community liaison in the Environment, Planning and Sustainable Development Directorate and working with communities through ACT Climate Change Council
	Just transitions	• Partner with Civil Society Organisations to support vulnerable and disengaged communities to participate in net zero	• Delayed, in progress
	Waste Management	• Support food rescue organisations to avoid food waste	• In progress
	Biodiversity	• Land management and on ground works to increase resilience of terrestrial and aquatic habitats at risk	• In progress
	Zero emission government	• Government and on government partnerships for climate action and increased ambition • Global Green and Healthy Hospitals network • Zero emissions schools	• Engaged with Under 2 Coalition, Global Covenant of Mayors for Climate and Energy and the Cities Power Partnership • Global Green and Healthy Hospitals network joined • continued to support school communities through ActSmart
Capacity building	Just transitions	• Support re-training of workers for a just transition	• In progress
	Community leadership	• Provide tools and resources, liaison officer	• Dedicated liaison officer in department
	Zero-emission homes	• Information and training on zero-emissions climate-wise homes • Thermal performance assessment tool	• Training and info now BAU • Energy assessment tool under development
	Climate change resilience / biodiversity	• Encourage sustainable farming practices • Encourage community preparedness for climate risks	• In progress
Incentives	Sustainable transport	• Reward scheme for public transport / active transport – also see Moving Canberra • Financial incentives for ZEV	• Options report for reward scheme by ANU in 2019-20; Reward scheme e for community members who increase their use of public

Method	Objective	Detail	Outcomes & Progress
			transport and/or active travel implemented in 2020 • Full stamp duty exemption and an ongoing annual registration discount of 20% for ZEV
	Zero emissions homes	• Interest free loads , etc. to transition from gas to electric, energy efficiency, ZEV fleets	• zero-interest loans of up to $15,000 to help households with the upfront costs of investing in sustainable upgrades to their homes
Planning	Compact and efficient city	• Plan for a compact and efficient city with improved access to sustainable transport options • Climate wise built environment - code	• Opening transit lanes to electric vehicles from 1 July 2019 to the end of 2023 • Climate wise code delayed
	Sustainable transport	• New ways of using roads, higher uptake of public transport, approach to parking • Reform car registration fees	• Planning rules amended to install public electric vehicle charging without a development application. • two-year registration waiver for ZEV
	100% renewables	• Develop Sustainable Energy Policy 2020–25 • Develop Zero emissions from gas by 2045 Plan • Improve energy performance and climate change resilience requirements	• Updated commitments under the Parliamentary and Governing Agreement of the 10th Legislative Assembly commitments
	Zero emissions homes	• Mandatory disclosure of energy performance for all rental properties • New building codes for energy performance and climate resilience	• Delayed, in progress
	Climate change resilience / biodiversity	• Tree cover (Living Infrastructure Plan), local needs for managing heat • Threatened species action plans to include climate change • Identify sites for carbon sinks, planting plan • Reflect CC projections and risk vulnerabilities in disaster and emergency plans	• Release of the Urban Forest Strategy • Carbon sink site identification in progress • Climate change considerations emergency plans and species projection plans now BAU ?
Regulation / Legislation	Sustainable transport	• Commercial fleet transition through regulation	• 100% of new Government vehicle leases are ZEVs (2020-21)
	100% renewables	• 100% renewable electricity target to continue	• Target continues

Method	Objective	Detail	Outcomes & Progress
	Zero emissions homes	• Remove gas mandates and transition to all-electric new builds • Minimum energy performance requirements for rental properties	• Remove the mandatory requirement for new estate developments to have natural gas connections, allowing new suburbs to be all electric,
	Zero emissions government	• Sustainable procurement policy, large capital works to be consistent with sustainability ratings	• Zero Emissions Government Framework
Investment	Waste management	• Food and garden waste collection from households, investigate options to reduce emissions • Large organic waste collection from hospitality and food retail • Organic waste treatment opportunities	• Love Food Hate Waste pilot program and Food Waste Challenge plan commenced • Planning in progress for roll out of pilot in 2021
	100% renewables	• Efficiency and additional procurement of renewable electricity if required.	• Successfully met target for the second year
	Public transport	• Infrastructure for bus, light rail, connecting/ feeder services • Infrastructure and connectivity for active travel • Smart city technologies e.g., smart lights, congestion monitoring, etc. • Public charging infrastructure and ZEV fleet	• Public transport infrastructure commitments in Transport strategy • Active travel strategic plan / framework being finalised • Public Charging Outlook developed
	Zero emissions homes	• Upgrade appliances in public housing • Solar/ energy efficiency for low income / public housing • Demonstration projects	• Energy Efficiency Improvement Scheme to increase support for low-income priority households • Demonstration projects in progress

Conclusions and recommendations

Some areas for improvement in climate change policy have been identified.

- Policy ambition and alignment: While the Strategy overall has ambition, and good alignment with transport and housing policies, sectors related to waste and biodiversity are not as strong. The actions on waste are not in line with the ambition shown in the Waste Strategy. Biodiversity alignment with action plans is not evident.
- Targets: While there are overall targets, the targets are not broken down for other sectors. There are goals and actions but including targets will send stronger signals to stakeholders.
- Just transitions: This is mentioned as a key priority but the actions to achieve this objective are not defined beyond re-training. The links to energy security and justice and resilience can be made clearer through more defined actions and objectives.
- Adaptation: the previous adaptation policy had a stronger emphasis on resilience but was superseded by the current policy. It has a strong mitigation focus, but the adaptation is diluted and should be

revisited in the next version. Reporting on resilience measures is not as strong as on the mitigation initiatives.

Attachment 3. Policy Synthesis (Transport)

Transport Policy Synthesis

Transport policy overview

ACT Government's vision for transport is a world-class system that supports a compact, sustainable and vibrant city by providing flexible, reliable and sustainable options for Canberrans. The aim is to link the bus, light rail and active travel networks to encourage a shift away from private vehicles and thus reduce congestion and enhance liveability. The *ACT Transport Strategy 2020* sets out the Government's approach to achieving this vision. The ACT Government has also articulated an ambition for a zero-emission public transport system by 2040.

The Transport Strategy recognises the challenges due to the increasing population and urbanisation in Canberra over the past decade. In response it aims to provide Canberrans with flexible travel options that increase choice, reduce carbon emissions and facilitate a compact, vibrant urban form. The Strategy has three key outcomes it is seeking to achieve. These are:

- To manage congestion,
- To reduce emissions, and
- To support a compact and efficient city.

The Transport Strategy coordinates with related strategies. It sits within a suite of stategies and plans that influence it, and action plans and specific modal strategies that include greater detail about how the outcomes are to be achieved. The subordinate plans were prepared earlier than the Transport Strategy, and appear to have informed the Transport Strategy.

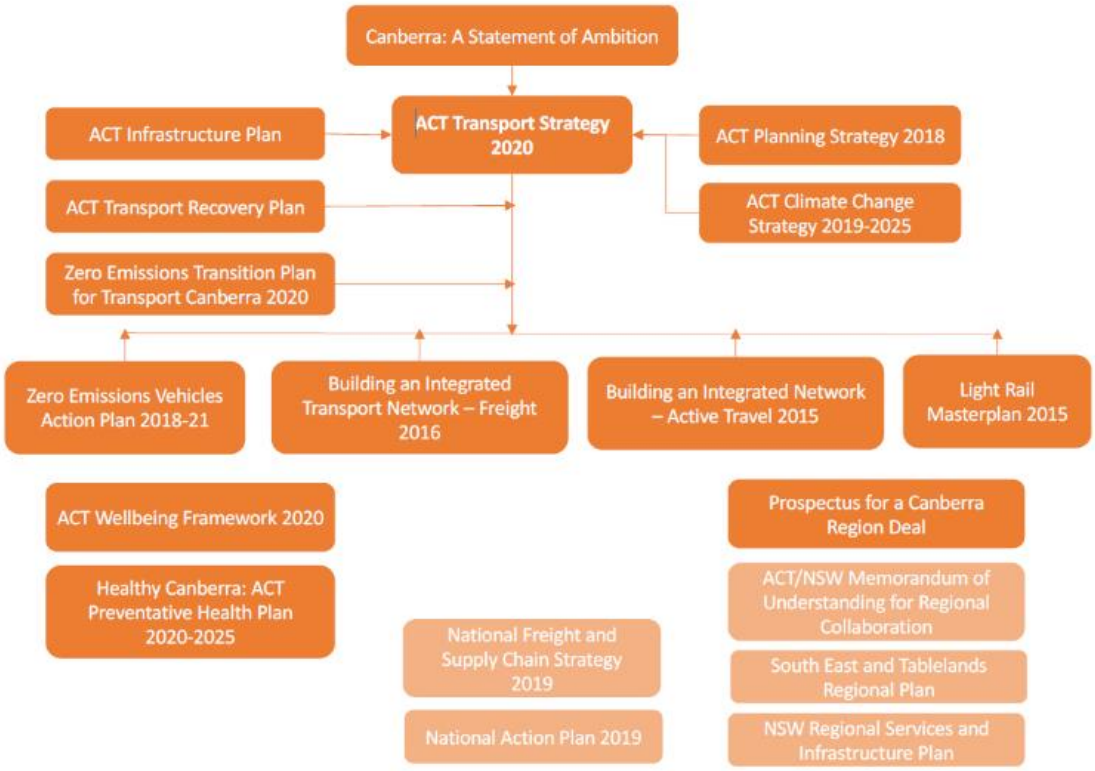


Figure 14. Policies, strategies and plans related to transport in the ACT

Policy progress since the 2019 State of Environment report

Making progress

The *Climate Change Strategy* has transport as a key priority area. It requires evaluation at regular intervals so transport achievements against those actions are available.

- Government vehicle fleet has been transitioned to zero emissions
- The use of electric scooters and similar e-mobility devices on shared paths and footpaths has been legalised
- The Canberra Electric Bike Library has been established
- Options report for reward scheme by ANU in 2019-20; Reward scheme for community members who increase their use of public transport and/or active travel implemented in 2020
- Full stamp duty exemption and an ongoing annual registration discount of 20% for ZEV
- Planning rules amended to install public electric vehicle charging without a development application.
- Two-year registration waiver for ZEV
- 100% of new Government vehicle leases are ZEVs (2020-21)

Light Rail Masterplan The first stage of the light rail system (Gungahlin to the City) opened on 20 April 2019 and celebrated 4.5million passenger boardings in its first year of operation. The next stage of the system is to connect the light rail from the City to Woden. The introduction of light rail to Canberra has seen 20% of Canberra trips powered by 100% renewable electricity

ACT Transport Recovery Plan was prepared in the early stages of the pandemic and should be reviewed against the knowledge generated since then, and current public health recommendations.

Public transport 2019-2020 (Annual Report* under the previous Transport Strategy):

- Recorded a 7.7% increase in the number of passenger journeys undertaken by bus and light rail prior to the impact of COVID-19.
- Procured 40 new buses providing higher levels of customer comfort and compliance with disability access standards
- The 2019-20 TCCS Customer Survey showed an increase in customer satisfaction from 68 per cent in 2018-19 to 74 per cent in 2019-20.

The *Active Travel Office* coordinates the delivery of active travel across the ACT Government and supports a collaborative approach to cycling and walking initiatives. Travel achievements during 2019-20* included:

- Finalised a land-use policy for dockless micromobility to expand the existing dockless bike share scheme to include e- scooters;
- Commenced construction on the Belconnen Bikeway;
- Completed design work for the Woden Cycle Loop
- Investing $6m in path upgrades through the Fast Track stimulus program.

Zero Emissions Vehicles Action Plan The number of zero emissions vehicles is increasing steadily. At 1 July 2022 there were 2,069 ZEVs registered in the ACT, which is 0.64% of the ACT fleet.

** ACT Government Transport Canberra and City Services Directorate Annual Report 2019-2020*

Policy Development

The *ACT Transport Strategy 2020* was developed following community feedback on a draft strategy *Moving Canberra 2019-2045: Integrated Transport Strategy*. Moving Canberra acknowledged that delivery of the Strategy will require review and changes to standards, regulations and legislation to enable the more progressive, innovative or experimental elements to progress, as well as collaboration across Directorates to

support contributing non-transport projects. Moving Canberra was to have been supported by an Implementation Plan.

The level of detail, reasoning and possible actions contained in Moving Canberra were not replicated in the final ACT Transport Strategy. It appears that the community was less accepting of the lesser role of private vehicles than the draft document was promoting. Use of public transport is complex and this needs to be reflected in the strategy. The Transport Strategy acknowledges that implementation will require accompanying policies, strategies and plans but includes little detail.

After the release of the draft strategy, key developments informed the approach in the published Transport Strategy:

- Introduction of a new bus network and Light Rail Stage 1, which have shaped both perceptions and expectations of Canberra's future public transport network.
- Planning and Climate Change strategies were released, which are closely linked with transport
- The Australian Infrastructure Audit Report 2019 on Australia's future infrastructure needs was finalised and released.

The *ACT Wellbeing Framework* and the *Healthy Canberra Plan* were released in the same year as the Transport Strategy. Both describe how transport and health are related and include priorities that will need to be actioned under the Transport Strategy.

Aligning with the Transport Strategy, the *ACT Infrastructure Plan 2020* includes investment priorities for transport, and the *Zero Emissions Transition Plan for Transport Canberra 2020* details the plan to transition Canberra's public transport to zero emissions.

COVID-19 impacts

Reflecting what occurred worldwide, Canberrans changed their travel habits in response to the pandemic. Overall, there was a significant drop in travel demand. The use of private vehicles and cycling recovered quicker than did the use of public transport. Some travel trends are likely to be retained. In recognition that some of these trends may have detrimental outcomes for the city, and to encourage viable alternatives to private car use, Canberra developed the *ACT Transport Recovery Plan* which identifies specific measures to achieve a transition to sustainable transport. The Plan was released in 2020, whilst the pandemic was still well underway and before vaccinations were available. It may need reviewing against ongoing travel trends and in light of more recent public health recommendations.

Transport policy context

The Australian Government Department of Infrastructure, Transport, Regional Development and Communications provides strategic policy advice to shape the framework underpinning road, rail, maritime and aviation transport in Australia. Urban transport systems are primarily the remit of respective state governments.

Canberra's Statement of Ambition presents a vision for making Canberra one of the most liveable and competitive cities in the world. One of the priorities identified is the need to deliver better metropolitan infrastructure which includes Canberra's modern mass transit system. The objective is to have a 30-minute city for its workforce and community. A suite of strategies, policies and plans are in place to facilitate this development of a better transport network. The three key documents are:

- The *ACT Transport Strategy* that provides a framework for planning and investing in transport for the next 20 years.
- The *Zero-Emission Transition Plan for Transport Canberra* that outlines the pathway to achieve a zero-emission public transport system by 2040.
- The *ACT Transport Recovery Plan* that will encourage Canberrans back on public transport post the pandemic.

The Transport Strategy has been developed in coordination with the *ACT Planning Strategy 2018* and *Climate Change Strategy 2019-2025*. This co-development recognises the critical partnership between transport and land use to meet the objectives for the ACT Government established in the *2016 Canberra: A Statement of Ambitio*n. The Climate Change Strategy shares the common ambition for reducing transport emissions and encouraging active and public transport. The Transport strategy takes those pathways forward for the future of zero emissions travel in Canberra. Additionally, the *ACT Infrastructure Plan* sets out a direction for ACT transport investments.

Several other plans and frameworks influence the Transport Strategy.

The *Prospectus for a Canberra Region Deal* is a three-point plan to invest in the Canberra Region that outlines how Commonwealth and NSW Governments can strengthen the region in the short to medium term. A key point is enhancing transport and connectivity. This is proposed to be achieved by investing in:

- High speed rail between Canberra and Sydney to improve connectivity
- Freight and passenger routes to open up tourism and trade connections to the inland regions
- Light Rail network to support the city's development as an employment, educational and services hub for the region

It recognises the need for ACT, NSW and Commonwealth Governments to work closely together and increased coordination and cooperation. These projects present a significant opportunity to facilitate urban renewal and shape the future of Canberra and while contributing to regional and national policy priorities relating to employment, productivity, housing affordability and economic diversification.

The *ACT Wellbeing Framework 2020* provides high-level indicator outcomes for Canberra encompassing various domains of wellbeing like health, safety, housing, environment, education social connection, identity, governance, access and economy. Transport is key to being able to move easily within the city and build connections between people, work, places and services. The Transport Strategy aims to contribute to the progress towards wellbeing in the ACT, particularly in the domains of 'Access and Connectivity' and 'Time'. The indicator on Transport will measure how Canberrans travel, satisfaction with access to types of transport, and access to places in the local area through self-rated surveys and national statistical data.

The *Healthy Canberra: ACT Preventative Health Plan 2020-2025* seeks to improve health and wellbeing by supporting and promoting healthy and active lifestyles. A three-year action plan was created to meet this goal. A key priority of the Plan is promoting active living by developing Canberra as a walkable and cycle-friendly city and prioritising walking and cycling as a mode of transport for people of all ages and abilities. This is intended to be done by enhancing active travel infrastructure to improve the safety and connectivity of the active travel network.

Description of transport policy in the ACT

ACT Transport Strategy 2020

The *ACT Transport Strategy 2020* articulates a vision for a world class transport system that supports a compact, sustainable and vibrant city. It presents transport network development principles that form a checklist for decisions to deliver this vision. These principles envision a people-focused, safe, connected, flexible, reliable, efficient, sustainable and healthy transport system that is city shaping and future focussed.

The key priorities the Strategy wants to achieve are listed below:

- A network structure that focuses movement by place and location, structured through local, central, orbital and regional links.
- World class public transport for a compact, efficient city with direct and intersecting routes, a clear route hierarchy, frequent services, safe and quick transfers and connected to different modes.
- Comfortable, accessible, zero-emissions fleet
- Walking and cycling for a liveable city with an updated strategic plan for active travel

- Regional transport for a connected city with public transport, freight, air and High-Speed Rail

The strategy identifies three main avenues for delivering this vision. These include:

- Future-focused investment
- Refocus network planning and design
- Getting the most out of the existing transport infrastructure

An investment framework with six investment principles to identify, assess, and prioritise initiatives is included in the Strategy. Similarly, a Movement and Place Framework for Canberra is introduced to focus on better coordinating land use and transport planning. Further, the Safe Systems Approach will be implemented on road design projects through the Safe System Assessment framework to maximise use of existing infrastructure.

The *ACT Transport Strategy 2020* replaces the previous transport strategy, *Transport for Canberra 2012-31*, building upon and updating its objectives. The Strategy was finalised after receiving feedback on the 2019 draft.

At the end of this attachment Table 10 summarises the policy approaches in the Transport Strategy to meet its objectives.

ACT Transport Recovery Plan, April 2021

The ACT Transport Recovery Plan has been developed to drive the Government's Transport Strategy and map out the key steps to encourage Canberrans back (to pre-COVID patronage levels) on board buses and light rail by harnessing lessons learnt during the pandemic, setting Canberra up for a future where more people choose public transport, essential to cutting Canberra's emissions.

The Plan identifies six key areas for investment and action. These include hygiene and safety, account-based cashless and contactless ticketing, accessible network design and expanded capacity, integrated transport including micro-mobility and active travel, customer focus, and feedback. The Recovery Plan outlines progressive measures as Canberra returns to pre-pandemic levels and establishes a new normal beyond 2022. Measures include increased services and expanded networks, the next-generation ticketing system and improved passenger communication, investment in promoting public transport and active travel and transition to ZEV fleets.

It explicitly lists guiding strategies that include the other Recovery Plans & Strategies for ACT, the Transport, Climate Change and Planning Strategies.

Zero Emissions Transition Plan for Transport Canberra, 2020 (CC)

This Plan details the actions required to transition ACT's public transport particularly the bus fleet to zero emissions by 2040, including the infrastructure, investment and skills needed to make the transition operationally successful. The 5 actions to direct this journey are

- Building the infrastructure, we need: zero emissions depots with electric charging infrastructure and a charging regime to support the growing fleet of zero-emissions buses
- Procuring zero-emission buses: replace ageing diesel and Compressed Natural Gas (CNG) buses with battery-electric buses powered by the ACT's 100% renewable electricity
- Partnering with the energy sector: sector coupling to identify opportunities to help manage the increasing loads on the energy grid, through on-site battery storage, co-located facilities, feed-in tariffs or other mechanisms.
- New skills, protecting jobs and growing the economy: just transition for workers, with diesel mechanics supported with the skills they need to work on the new electric fleet and Expand transition benefits to the ACT local market, involving businesses and organisations across the zero-emission supply chain
- Increasing public transport use through better buses and a better service: opportunities to deliver improvements to customer information, service frequency, travel times and comfort on-board buses

Zero Emissions Vehicles Action Plan (2018–21)

The Plan outlined the first steps in supporting the rapid uptake of zero-emission vehicles in the ACT. It lists the financial and other incentives in the ACT to encourage uptake, purchase, and registration of ZEVs. Further, it lists future actions to encourage the transition to ZEV passenger vehicles through regulatory measures like amending the parking code and traffic regulations (transit lanes, number plates, etc.), working with other governments to facilitate charging stations, investigating the potential for grid support and transitioning the Government fleet (passenger cards) to ZEVs.

Building an Integrated Transport Network – Freight 2016/ National Action Plan 2019 (Freight and Supply Chain Strategy)

A key part of the Transport for Canberra policy framework, the strategy informs future decision making by focussing on the key issues, current and future demand and planning required to ensure that the ACT has a sustainable and productive freight transport system at the local, regional or national level. It looks at air, road and rail freight. Key actions are:

- Data collection and analysis to understand the freight task and plan for the future
- Develop, evaluate and implement an infrastructure upgrade program to meet the needs of future freight activities, larger freight vehicles and urban planning and redevelopment directions.
- Implement local legislation to support national regulatory reforms.
- Engage the community in understanding of freight and traffic management challenges, treatments and opportunities.
- Work with Australian, state and local governments and industry to take a strategic approach to protect and enhance freight routes and facilities in the region.

Building an Integrated Network – Active Travel 2015 (Active Travel Framework)

This framework outlines how the government can better integrate planning and delivery of active travel initiatives to further encourage and support walking, cycling and riding as part of Canberra's overall urban planning, transport, health, environment and education systems. It lays out targets for active travel and lists principles and actions to support them. These include:

- PLAN: Include walking, cycling and riding when planning for land use and transport: integrate land use and transport planning, design networks with convenient connections, and adopt a place-based approach to facilitate active vibrant communities
- DELIVER: Build appropriate infrastructure for walking and cycling needs: create safe environments and increase public transport catchments
- ENCOURAGE: Programs to enable greater participation in walking, cycling, riding and accessing public transport
- MANAGE: Coordinate across agencies to improve safety, and encourage behaviour change

Light rail masterplan, 2015

The $14 billion AUD ACT Light Rail Network Master Plan is a 25-year vision for a full coverage service network for the national capital city, fully integrated into the existing metro bus network. It discusses the light rail network in context of the larger investment in public transport, including aspects of active transport, convenient access to transport services and suburban renewal. This leading investment to cater to the growing population proposed a staged approach to the development of this network. The master plan included:

- Route alignment
- High-level provisional costings

- Proposed Light Rail stops
- Land-use change assessment on each transport corridor
- Integration with the bus network, active travel, park and ride and bike and ride, advised on building demand for bus priority lanes and bus rapid transit to support Light Rail implementation

ACT Infrastructure Plan 2020

The Infrastructure Plan provides a framework for how the ACT Government will invest in infrastructure to cater for a liveable city of 500,000 people. The multi-decade plan details $14 billion of new and upgraded infrastructure investments on health, education, transport and community services. The priority for transport is an integrated transport network, connecting light rail routes with bus services and infrastructure to support walking and cycling. Thus, the investments will be in footpaths & cycleways – active transport infrastructure and its connection to public transport; and extending the light rail network.

Transport policy analysis

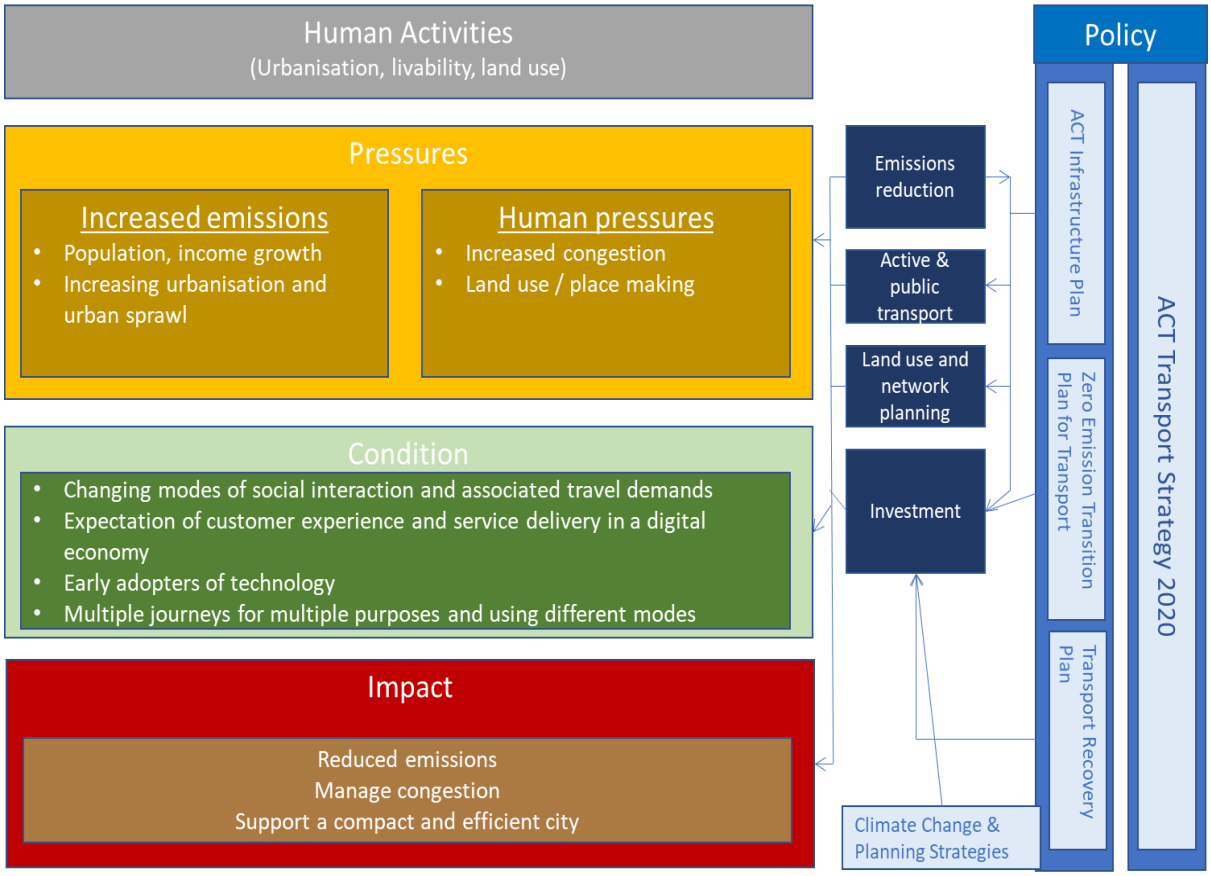


Figure 15. Illustration of the areas of focus for transport policy in the ACT

Table 9. Summary of transport policy drivers and pressures

Summary	Comment
Drivers	• Zero emissions public transport by 2040 • Population growth • Changing patterns of work and lifestyles • Focus on health and wellbeing • Need for transport choice
Pressures	• Human challenges: Growing population • New technologies and services in transport • Environmental challenges: transport biggest contributor of emissions in ACT • Air quality impact of traffic • Growing need for physical accessibility and inclusive transport for diverse population • Modelled increase in congestion on transport systems • Increasing use of walking and cycling • Large increases of urban and interstate road freight

The Transport Strategy 2020 takes a perspective of creating a transport system for the public good - for users, city shaping and environmental impacts - and is supported with commendable principles. It has expressed ambition for ACT to have a world-class efficient transport system that focuses on interconnections, active and public transport, which is in line with best practice. It acknowledges that good practice will be to effectively manage existing roads and parking rather than build more.

The interactions with the Planning Strategy are well articulated, particularly on the Movement and Place framework for integrating land use and transport for a 30-minute city. It recognises that roads and streets have dual purposes as places of transit but also destinations, and commits to defining a hierarchy of local, central, orbital and regional links which will reflect the changing role of transport according to location. The framework will help prioritise movement or place making in design and decisions.

Transport is the biggest climate change mitigation challenge for the ACT and the aim to reduce emissions and achieve a zero-emissions plan is mentioned in the Strategy. But there is limited discussion on how to achieve this aim. The co-benefits of emission reduction through promoting active and public transport are also mentioned in passing. The Climate Change Strategy and the Zero Emissions Transition Plan have some actions towards reducing transport emissions, but that is not reflected in the Transport Strategy. The update on these actions primarily related to zero emission vehicles in the public and private sector are mentioned in the section on climate change.

The Strategy outlines a vision and includes aspirations, and decision-making approaches and frameworks, but it lacks commitment to delivering on the vision and detail on the actions needed to achieve it. There are complementary plans that detail some of the aspects of the Strategy, e.g., the Zero Emission Transition Plan and the ACT Infrastructure Plan, but even these lack a clearly defined pathway for action, milestones, targets or assigned responsibilities. There is no overarching Plan to achieve the ambitions laid out in the Strategy, which makes it hard to follow through on implementation and monitoring progress. The draft Strategy did have concrete actions and targets, which seem to have been lost following public consultation.

The Strategy mentions that to measure its success it will need future data collection on household travel, emissions reductions and travel movements, without any detail of how those measure relate to the vision or will influence action. The Strategy is also very recent to have any reporting on progress and effectiveness. However future plans to do so are not apparent. The last evaluation was in 2018, before the launch of the current policy.

The Transport Strategy relies on separate action plans for various elements and impacts of the transport system. As a suite of documents, they set a good agenda for transport in ACT which covers key matters, with exceptions as outlined in the notes above. What they lack is evidence of planning for achieving in practice the desired outcomes, both as information to the community and as a plan for action for responsible agencies and officers.

Assessment: Effectiveness

As the Transport Strategy is relatively new, it has not been in place long enough to assess its effectiveness. With a vision but without targets or specific actions in the strategy there is insufficient basis to evaluate it well.

Annual reports from the Directorate mention the launch of the Strategy but there are no updates on specific actions as the Strategy was only recently released at the time of the last annual report. The most recent mode split data (a key indicator for evaluation) that can be found dates back to 2017.

To clarify an alternative approach to a transport strategy it services to compare it with other jurisdictions. The NSW Future Transport Strategy 2056 is a suite of strategies and plans that set the 40-year vision, directions, and principles for customer mobility in NSW, guiding transport investment over the longer term.

Future Transport 2056 was developed collaboratively with the Greater Sydney Commission, Infrastructure NSW, and the Department of Planning, Industry and Environment to ensure NSW's overarching strategies for transport and land use planning align and complement each other, delivering an integrated vision for the State.

It is also worth comparing it to the Draft document for public consultation prior to the Transport Strategy, Moving Canberra 2019-2045: Integrated Transport Strategy. The draft includes greater detail on approaches, plans, processes, priorities, and time frames than does the final document. It also assigns responsibilities. Although there is a blurring of the boundaries between the Strategy and Actions plans, it provides a clearer sense of how the vision will be achieved, and therefore gives greater confidence that it will be achieved.

Role in Portfolio

Transport and land use planning are highly interconnected policy areas. The dominant transport mode determines a city's structure, and provision of public transport services and support for active transport influences the liveability or otherwise of a city. Land use planning must be conducted in tandem with transport planning for a city to function. Emissions from transport are a significant contributing factor to air quality and to greenhouse gas emissions. The ACT government has recognised the interdependence of transport with planning and climate change and coordinated the development of the three strategies.

The ACT Wellbeing Framework and Healthy Canberra Plan recognise the potential benefits for the health and wellbeing of Canberrans from promoting active transport and reducing emissions and include transport priorities accordingly. The Transport Strategy recognises the role of transport in reducing emissions, improving air quality, and encouraging active lifestyles, and their impacts on health.

Getting transport right is important for a city's economic activity and prosperity. This is addressed in the Transport Strategy through its ambitions for regional connectedness, ease of access and connection within the city, and managing for efficient regional and urban freight networks and services. Investment in transport infrastructure is costly, requiring medium to long term planning. The Transport Strategy directs that the broader contribution of a solution to the liveability of the city must be considered, and that investment will be rebalanced towards public and active transport. It advocates a future-focus bringing forward the social, financial, and environmental benefits in cost-benefit analyses.

Conclusion and Recommendations

The principles outlined in the Strategy are consistent with the outcomes it seeks to achieve and describe an approach that is likely to succeed. But the Strategy is lacking in the detail to substantiate this and relies on action plans that are yet to be developed. A few areas for improvement have been identified:

- Policy ambition and alignment: While the Strategy overall has ambition, and some alignment with planning and climate change policies, tangible actions are not mentioned in the Strategy.
- The Transport Strategy recognises the city shaping potential of transport systems and the need to focus on better coordinating land use and transport planning. As they are integral to each other, a stronger relationship is needed with Planning Policy to commit to consideration of the impacts of actions under one on the outcomes of the other. Ideally, they would be produced in tandem so there is complete coordination.
- Whilst admirable as an ambition, the commitment to developing a Movement and Place framework has no time frame, nor any indication of how it will interface with land use planning or the wider Planning Policy.
- Targets: There are no overall targets or commitments. The priorities are expressed in a conceptual manner with little practical direction. There is a vision of where the Strategy wants Canberra to be but including targets will send stronger signals to stakeholders. It also lacks an evaluation plan and schedule. Alternatively, the implementation or action plans should be clearly listed and follow soon after release of the main strategy document.
- Air quality and Health: While health is mentioned from a perspective of promoting active transport, the Strategy does not link this to traffic and air quality impacts directly. The only mention of reducing pollution is promoting zero emission travel. However, the link to health and air quality could be made clearer through more defined actions and objectives.
- Transport use influences energy system: - With the emergence of zero emissions travel options, the Transport Strategy needs to acknowledge the interlinks with the electricity grid and the impact of large-scale uptake on the grid and electricity supply to Canberra.
- Co-ordination: The Strategy references the need to invest in enhancing regional transport connectivity through projects like the high-speed rail to Sydney or freight routes. It acknowledges the need for cooperation and coordination with NSW Government and Councils to support the region's transport future needs. However, the Strategy is not clear on the actions to facilitate this coordination.

The following table describes the approaches in the Transport Strategy in terms of the method employed for each objective.

Table 10. Transport Strategy - Policy Approaches

Method	Objective/ Vision	Comment
Planning	Support a compact and efficient city	• Develop a strategic plan and update Active Travel Framework to provide coordinated active travel networks • 30-minute city; mixed use neighbourhoods • Movement and Place Framework • More integrated transport and land use planning for new suburbs • ACT road hierarchy to support active transport within suburbs, prioritisation of intertown and inter-suburb central corridors for public transport, and development of orbital routes for cross-city traffic and freight. • Networked public transport routes for greater area coverage for same km travelled; clear route hierarchy • Three tiers of public transport: rapid, feeder and local, aligned with urban context • Bus priority measures
	Reduce emissions	• Encourage densification along rapid transport corridors to encourage car-free city-living • Public transport: direct routes, frequent services, safe and quick transfers; accessible; good intermodal connections; integration with last km and on-demand services
	Manage congestion	• High-quality, modern and sustainable public transport service • Radial mass transit supported by orbital feeder and local networks • Regional nodes to connect to interstate public transport seamlessly • Freight movement to be prioritised on key orbital routes
	Future ready	• Incorporate on-demand services into network • Consider new and innovative parking solutions
Asset Investment	Reduce emissions	• Grow PT fleet and replace older fleet with newer, safer, more accessible and more environmentally friendly vehicles • Commitment to buses and light rail carrying bikes • Improve lighting on key walking and cycling corridors • Bus fleet to be zero emissions by 2040
	Manage congestion	• Provision of freight hubs

Method	Objective/ Vision	Comment
Infrastructure Investments	Reduce emissions	• Walking and cycling infrastructure to be built ahead of demand • High quality walkable urban centres with footpaths, seating, road crossings and intersection priority • Walkable suburbs and school environments with prioritised walking and cycling safety, increased trees for shade cover • Safe Systems approach to assess safe road speeds • Harness new technologies for online journey planner, and new ticketing system using passenger devices of choice • Make data available for app development re access to services
	Support a compact and efficient city	• Creating walking and cycling streets • Deliver second stage of light rail (City to Woden) and later east-west corridor • Bring fleet up to accessibility standards for people with disabilities • Build new and upgrades off-road cycle paths and protected bike lanes, suitable for all ages and abilities • Accelerate roll-out of cycle routes with network and safety improvements, maintenance and wayfinding signage.
	Manage congestion	• Maintain and grow public transport to the airport • Investigate upgrading the Canberra to Sydney rail corridor; preserve corridor for high-speed rail • Expand Park and Ride and Bike and Ride • Road 9 investment to be focussed on improving safety and efficiency
Behaviour change	Reduce emissions	• The Active Travel Office to develop an ongoing public education campaign about the practical measures people can take to adopt new walking and cycling habits for local trips, or in combination with public transport, and to work with local communities for innovative solutions. • Slower Streets initiative promotes awareness of local streets as places for walking, cycling and community activity and encourages motorists to slow down.
	Net Zero emission transport	• Management practices to provide flexible and on-demand public transport: customer engagement, service scheduling, ticketing, fares, real-time information
	Manage congestion	• Support working from home through flexible ticketing and pricing options • Encourage virtual access to health and education services • Prioritise walking, cycling and public transport to schools; encourage part way drop off and collection by car; explore variation in school operating hours

Method	Objective/ Vision	Comment
Partnerships	Reduce emissions	• Develop best practice guidance for industry and stakeholders to inform better design outcomes for active travel infrastructure • Support micro-mobility and car share schemes; expand dockless bike share to include electric scooters and bikes
	Manage congestion	• Work with partners in the private and public sectors to encourage working from home and remote working

Attachment 4. Policy Synthesis (Energy)

Energy Policy Synthesis

Energy Policy Overview

A discussion paper was released on the ACT's Sustainable Energy Policy for 2020 – 2025 in 2019. Based on the ACT Government website, the Energy Policy remains under review following the close of public comment. There are components of energy policy within the Climate Change Strategy.

Figure 16. *Policies, strategies and plans related to energy in the ACT*

Progress Snapshot

The ACT has been a leader in renewable energy policy with achievement of the 100% renewable energy target in 2020 through power purchase agreements, which have also delivered consumer bill savings and leveraged local industry development.

The ACT Government has also implemented a range of rules, incentives, and programs to support electrification, energy efficiency and local renewable energy. These include:

- preventing gas infrastructure in new suburbs
- preventing gas connections in suburban infill developments from 2023
- financial incentives to remove and replace wood burning heaters
- rebates through the Home Energy Support Program
- rebates under the Business Energy and Water program
- the Renters Home Energy Program, which provides expert advice on making rental homes more energy efficient
- the Sustainable Schools Program to support schools to work towards zero emissions by 2040.

Nonetheless, the ACT does not have a current version of the energy policy strategy published which is recommended.

Energy policy context

The ACT is the smallest jurisdiction within the National Electricity Market, which stretches from Queensland along the Eastern Seaboard across the Bass Strait to Tasmania and across to South Australia. Energy markets are regulated through national institutions and the COAG Energy council, of which the ACT is a member. The National Electricity Law sets the legislative framework and National Electricity Rules govern the operations of the National Electricity Market. Whilst many of the energy market regulation decisions are made at a national level or through non-government regulatory institutions (such as the Australian Energy Regulator, Australian Energy Market Commission, Energy Security Board), sub-national jurisdictions have significant energy policy levers to increase energy efficiency and renewable energy and energy access and affordability.

The Independent Competition and Regulatory Commission, established under the Independent Competition and Regulatory Commission Act 1997 (the ICRC Act), is required under the Price Direction for Standing Offer Prices for the Supply of Electricity to Small Customers 1 July 2020 to 30 June 2024 (the price direction) to

update the maximum average percentage change by which ActewAGL can increase its regulated retail electricity tariffs.

Description of energy policy in the ACT

Before the 2019 State of Environment report, the major policy document was the Renewable Energy Industry Development Strategy, which was designed to accelerate the development of a vibrant, export-oriented, renewable energy industry alongside and leveraging reverse auctions to achieve a target of 100 per cent renewable electricity.

Policy development since the 2019 State of Environment Report

In 2019, the *ACT Sustainable Energy Policy 2020-25 Discussion Paper* was released for public review, but to date, no policy has been released. In the absence of a formal policy, we did not undertake an assessment of effectiveness in this policy areas. Additionally, there are a range of active programs in operation. The ACT Sustainable Energy policy is also a component of the ACT Climate Change Strategy.

Energy policy analysis

Policy goals

The ACT's Sustainable Energy Policy covers a range of policy domains each with their own objectives and goals.

Table 11. Energy domains and goals in the ACT.

Energy Domain	Goal
Renewable Electricity	• To maintain the ACT Government's 100% renewable electricity target • To leverage this target to continue growing the ACT's green economy while minimising costs.
Energy Costs and Consumer sentiment	• To help ACT consumers manage cost of living pressures • To properly support vulnerable members of the community to ensure our transition to a zero emissions future is an inclusive one
Energy Efficiency	Improving energy efficiency in the ACT to help consumers reduce their bills, limit the growth of ACT energy demand and support emissions reduction.
Demand Management	To enable customers to better manage their energy demand to reduce network costs and to empower individual consumers.
Gas	To determine future gas sources and needs and provide the regulatory and technical environment to allow a smooth and orderly transition to new gas types or alternatives.
Zero Emissions Vehicles	To understand the impact of Zero Emission Vehicles (ZEVs) on energy sources for transport, and what implications these may have for the electricity network, electricity peak demand and grid security.

Table 12. Energy policies, instruments, stakeholders and impacts in the ACT.

Domain	Policy / program	Instrument type	Stakeholder Target	Impact
Renewable Electricity	100% renewables electricity	Investment Procurement of renewable energy	Communities, Businesses, Government	• Environmental: 100% of ACT's electricity consumption supplied by renewable energy • Economic: fixed-price agreement for renewable energy reduces volatility in electricity prices paid by ACT consumers. For 2022-23, whilst electricity prices are increasing dramatically across the NEM, ACTEW's standing offer will reduce by 1.25% (or 4.93% in real terms). The standing offer in ACT is lower than other states.
	Renewable Energy Industry Development (REID) Strategy	Investment, Incentives, Regulation The Strategy was created to accelerate the development of a vibrant, export-oriented, renewable energy industry. Associated with the REID, the Renewable Energy Innovation Fund supported industry development and the 100% renewable electricity policy criteria encouraged industry commitments.	Businesses	• Economic: the REID led to investment attraction, university research facilities, the Renewable energy Skills Centre of Excellence.
Energy Costs and Consumer Sentiment	ACTsmart Low income program		Communities	• Collaborate for resilient communities – landscape management with local traditional custodians • Trialling new models for collaboration, community participation in CC initiatives
	ACT Solar for Low Income Program	Incentives 50% subsidy for low-income households to install rooftop solar	Communities	• Environmental: increase renewable energy • Social: reduce energy bills for low-income earners

Domain	Policy / program	Instrument type	Stakeholder Target	Impact
	ACT Energised Consumers Project	Capacity-building Support for energy consumer advocacy	Communities	• Social: advocacy for energy programs to benefit consumers
Energy efficiency	Energy Efficiency Improvement Scheme	Regulation and incentives Retailer obligation to surrender energy efficiency certificates, including 30% from initiatives for low-income households	Businesses, Communities	• Environmental: reduced emissions from energy consumption • Economic: lower energy bills for all consumers and participants • Social: incentives for initiatives that focus on low-income households
	Sustainable Household scheme	Incentive Interest-free loans for households to invest in energy efficiency, solar and battery storage	Communities	• Economic: reduced energy bills • Environmental: reduced energy emissions
	ACTsmart business energy and water program	Capacity-building and information Support for businesses to reduce water and energy consumption	Businesses	• Environmental: reduced emissions from energy consumption and reduced water consumption • Economic: lower energy bills for all consumers and participants
	ACTsmart schools	Capacity-building and information Support for schools to reduce water and energy consumption, waste and increase sustainable energy	Communities	• Environmental: reduced emissions from energy consumption and reduced water consumption • Economic: lower energy and water bills for participants
	ACTsmart sustainable home advice	Capacity-building and information Support for residents to reduce water and energy consumption, waste and increase sustainable energy	Communities	• Environmental: reduced emissions from energy consumption and reduced water consumption • Economic: lower energy and water bills for participants

Domain	Policy / program	Instrument type	Stakeholder Target	Impact
	ACT Carbon Neutral Government Program	Incentives ACT has set a carbon neutrality target and established the Carbon Neutral Government Fund which provides interest-free loans for Government agencies to increase energy efficiency and renewable energy	Government	• Environmental: reduced emissions from energy consumption • Economic: lower energy bills for agencies
	Mandatory Energy Efficiency Rating Disclosure	Regulation, Information Property sellers are required to disclose the energy efficiency rating of the house.	Communities	• Environmental: incentive for improved building energy efficiency
Demand Management	Next Generation Energy Storage	Roll-out of 36 MW of energy storage in 5000 businesses and homes	Communities, Businesses	• Environmental: increased storage supports higher penetrations of renewable energy within the AC • Economic: bill savings for participants and all customers
Gas	ACT Estate Development Code	Regulation Mandates the development of gas infrastructure to all greenfield sites	Communities	• Environment: increased emissions as the alternative is renewable electricity
	Sustainable Energy Policy Discussion Paper	Information Discussion as to whether the ACT should have a whole-of-Government position on the future of natural gas	Communities, Business, Government	n/a

Conclusions and recommendations

The ACT's Sustainable Energy Policy has implemented some innovative and leading energy programs, notably:

- The ACT was the first jurisdiction to achieve 100 per cent renewable electricity – which has delivered most of the greenhouse gas emission reductions towards the 2020 target;
- Innovative energy efficiency programs, including the mandatory rating scheme for homes and the Sustainable Household Scheme (which received an Energy Efficiency Council award in 2022);
- Local industry development leveraged from its investment in renewable electricity;
- A strong focus on equity and low-income households to ensure benefits are more evenly spread

Beyond these achievements, some policy gaps and opportunities for improvement have been identified.

Table 13. Overview of key policy gaps.

Area	Policy gaps and opportunities for improvement
Policy transparency	• There does not appear to have been an update to the Sustainable Energy Policy after the release of the 2019 discussion paper. Effectively, there has been no public release to replace the 2011-2020 ACT Sustainable Energy Policy. The ACT has continued to develop and implement energy programs but without an energy policy framework in the public domain against which to assess ACT policy. • The ACT Government should publish update an updated version of the Sustainable Energy Policy.
Targets, data and evaluation	• Beyond renewable electricity and the ACT Carbon Neutral Target, there are no quantified targets for other areas of the Sustainable Energy Policy. • Targets could be set to improve transparency, identify the scope for contributing to emissions targets and providing a better signal to communities, businesses and governments. • In general, data is not readily available to assess the impact of the policy and programs and there is no published evaluation.
Energy Affordability	• The ACT policy has a commendable focus on low-income households – but there are further opportunities to extend these programs. • For example, the NSW Government has enabled low-income households who are eligible for utility or support payments to bundle forward payments to purchase rooftop solar in exchange for exiting the program. This approach provides a more lasting solution to energy affordability whilst also reducing emissions and future government expenditure.
Energy efficiency	• The Energy Efficiency Improvement Scheme would benefit from target-setting that gradually increased the obligation on retailers over time to realise more cost-effective opportunities for energy efficiency. NSW and Victoria implement equivalent schemes with regular updates to targets, rules and eligible activities to keep driving change in the energy efficiency market.
Demand Management	• Based on publicly available information, the demand management initiatives are limited. For example, the ACT government could update the Energy Efficiency Improvement Scheme to also include demand management certifications (or align with the NSW Energy Savers Scheme)

Attachment 5. Policy Synthesis (Waste)

Waste Policy Synthesis

Waste Policy Overview

ACT Waste Management Strategy[5] is supported by several acts and policies (Figure 17) towards achieving the four strategy goals:

1. **Less waste generated** (the waste growth to be less than the population rate growth)
2. **Full resource recovery** (over 90% by 2025)
3. **A clean environment** (low litter levels and incidents of illegal dumping, protected, and enhanced through waste management, natural resources)
4. **Carbon neutral waste sector**

Since the waste management strategy has been developed in 2011, the most important impact on the waste sector has been the introduction of the waste export bans by the Federal Government. This has led to specific acts addressing problematic, hard to recycle items, such as single use plastics. Consequently, the change in waste management opportunities called for a transition from a linear to a circular economy and has prompted introduction of circular economy strategies and policies in most of the Australian States. ACT Government is yet to develop a circular economy strategy or policy, even in the conjunction with a waste strategy. To develop a circular economy policy or strategy will also require the ACT Government to identify and create new markets for circular economy, support for business, industry and community in the transition, and use of government procurement to lead in the transition.

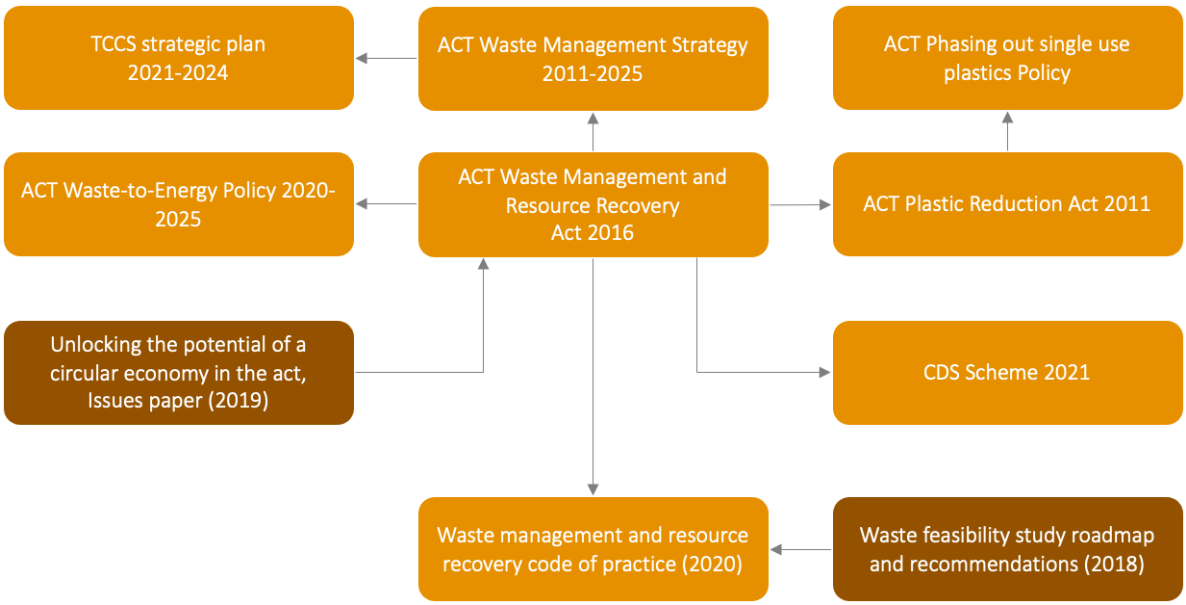


Figure 17. *Policies, strategies and acts related to waste in ACT.*

[5] ACT Government Environment and Sustainable Development (2011), ACT Waste Management Strategy: Towards a sustainable Canberra 2011-2025.

Policy progress since the 2019 State of the Environment report

Waste related policy development

Waste was not included in the 2011[6] and 2015[7] State of the Environment reports. The reports however did recommend firstly to develop and implement a waste strategy and secondly to develop a waste strategy evaluation.

In the 2019 State of the Environment Report[8], waste was explicitly considered, and waste was identified as one of the sources of greenhouse gas emissions. The report recommended developing strategies to move towards a circular economy to improve waste recovery rates and to reduce resource consumption and waste disposal to landfill.

ACT is participating and committing to the targets on resource recovery and circular economy of the following forums:

(1) State and Territory Environmental Ministers Meetings (EMM) committed to *National Waste Policy*[9] and associated *Action Plan*[10] with the following targets:
   - Banning the export of waste plastics, paper, glass, and tyres.
   - 10% waste reduction by 2030 per person
   - Significantly increased use of recycled content
   - Phasing out problematic and unnecessary plastics by 2025
   - Halving the amount of organic waste sent to landfill by 2030
   - Making comprehensive, economy-wide, and timely data publicly available

(2) Resource Recovery Reference Group
(3) Government Officials Group overseeing the APCO (Australian Packaging Covenant Organisation)[11]
(4) Other waste related working groups on circular economy, photovoltaics, and single-use plastics

ACT developed in September 2020 a Code of Practice to legislate ***National Environmental Protection (Used Packaging Material) Measure 2011***[12] in ACT, which encourages waste avoidance, re-use and recycling of used packaging materials.

Phasing out single use plastics – *Plastic Reduction Bill 2020*[13] passed in March 2021, phasing out in first tranche (1 July 2021), single-use plastic stirrers, cutlery and polystyrene food and beverage containers. Second tranche (from July 2022) will ban single-use plastic straws, single-use plastic fruit and vegetable 'barrier bags', cotton buds with plastic sticks as well as all plastic products made from oxo-degradable plastics.

Waste-to-Energy – *Waste to Energy Policy*[14] was released in March 2020. The policy bans introduction of new facilities proposing thermal treatment of waste by any means (incineration, gasification or pyrolysis).

[6] Commissioner for Sustainability and the Environment (2011), ACT State of the Environment Report 2011. ACT Canberra. Canberra.
[7] Commissioner for Sustainability and the Environment (2015), ACT State of the Environment Report 2015. OCSE, Canberra.
[8] Office of the Commissioner for Sustainability and the Environment (2019), ACT State of the Environment Report 2019, Office of the Commissioner for Sustainability and the Environment, Canberra.
[9] 2018 National Waste Policy: less waste more resources, Commonwealth of Australia 2018.
[10] National Waste Policy Action Plan, Australian Government, state and territory governments and the Australian Local Government Association 2019.
[11] https://apco.org.au
[12] https://www.legislation.gov.au/Details/F2011L02093
[13] https://www.legislation.act.gov.au/b/db_63522
[14] ACT Government (2020), ACT Waste-to-energy Policy 2020-25

Progress of the waste related issues identified in the 2019 State of the Environment Report

The 2019 State of the Environment Report[4] identified several waste related issues:

- Export of waste outside ACT is not captured in data and therefore the amount send to landfill is underestimated
  Progress since the report
  Currently ACT recycling quantities in National Waste Report[11] are estimated by deduction from NSW recycling data to avoid double counting. Also, some of the landfill waste is sent to levy-free landfills in rural NSW however this could not be quantified in the National Waste Report.[11]
  However, ACT Government showed the commitment towards improving data governance, collection and analysis related to waste management through the development of the new *Waste Services Management System* and *Waste Regulation Management System*. The introduction of these two new services is predicted to improve the quality of data captured in relation to waste services, waste facilities and waste transporters[15].
- While waste recovery is increasing, the waste generation is also increasing resulting in the overall resource recovery to plateau.
  Progress since the report
  Resource recovery rate has been declining from 79% (in 2018-19), to 76% (in 2019-20) and to 75% (in 2020-21)[16,17]. The decline has been attributed to a higher accuracy in waste collection data and decline in construction and demolition waste (the construction and demolition stream has the highest recovery rate compared to other waste steams).
  An increase in waste to landfill (10%) was attributed to COVID-19 lockdown and restrictions.
- Mr Fluffy program was identified to be a big source of waste generated in the ACT. As the program has been completing, the waste generation was anticipated to decrease.
  Progress since the report
  A decline in construction and demolition waste was observed in the latest ACT TCCS annual reports.[12,13]

Waste performance since the 2019 State of the Environment Report

Waste avoidance – GIVIT program[18] – virtual warehouse matching donation from people who have items to give to individuals who need them. The program uptake has increased. The requests for items increased from 55,325 in 2019/20 to 135,255 in 2020/21. Similarly, the program facilitated matches increased from 76,776 to 235,080 at the same time. In addition to the ACT, the program covers South East NSW and surrounding local council areas.

Waste recycling – in addition to the kerbside recycling, the ACT NoWaste continued to provide mattress recycling program. A new corflute recycling trial started in October 2020 to provide an opportunity to recover election signage (ACT election in October 2020), with a trial evaluation currently underway.

Container Deposit Scheme – established in 2018, 123 million containers collected from 2019, new CDS depot opened in Belconnen in October 2020 (bringing total return points to 19).

National stewardship schemes – ACT participated in National Paintback scheme[19] and Television and Computer Recycling Scheme[20].

Green waste recycling – sign up for green waste bin service has been increasing since 2019: from 48% take up rate in 2019/20 to 51% in 2020/21, with contamination rates decreasing from 0.03% to under 0.001%. These results are attributed to the Canberra residents use of the bin correctly[12,13].

[15] Department of Agriculture, Water and the Environment (2020), National Waste Report 2020, Prepared by Blue Environment Pty Ltd.
[16] ACT Government (2020), Transport Canberra and City Services Directorate Annual Report 2019-20.
[17] ACT Government (2021), Transport Canberra and City Services Directorate Annual Report 2020-21.
[18] https://www.givit.org.au
[19] https://www.paintback.com.au
[20] https://www.dcceew.gov.au/environment/protection/waste/product-stewardship/products-schemes/television-computer-recycling-scheme

Bulky waste collection – introduced on 1 July 2020 with the target of minimum 30% recovery rate. By June 2021 recovery rate reached 41%[13].

Waste education and engagement with the community

- Award winning Recycling Discovery Hub education centre
- Award winning 2019 Garage Sale Trail
- National Recycling Week – theme for 2019 was 'Design out waste'
- Love Food Hate Waste pilot program
- Food waste challenge
- Recycle right campaign – theme 'Keeping it safe', including move in/move out resource kits for real estate agencies
- Recycling and waste truck signage design competition with school students
- Regular ABC Radio Canberra spot for recycling and waste

Waste infrastructure development to increase resource recovery rates

- Household Food Organics and Garden Organics (FOGO) collection service – feasibility study underway including analysis of the infrastructure capacity and capability, strategic planning and procurement options
- New 15-year contract signed to upgrade gas infrastructure services at landfill sites
- Landfill capacity expansion at Mugga Lane Resource Management Centre to accommodate demands till 2030
- Increase in storage capacity at the Materials Recycling Facility. In September 2020, the ACT signed a National Partnership Agreement with the Commonwealth through the Recycling Modernisation Fund delivering joint funding for significant upgrades to the facility.

COVID-19 impacts

COVID-19 measures caused a shift of waste generation in commercial sector to the residential waste stream, where 14% increase was observed with a 24% reduction in commercial waste in the period from March – June 2020[12].

Waste education programs at the Recycling Discovery Hub and community outreach activities were suspended in line with health and safety advice and the drop off facility at the Soft-Landing mattress recycling facility was temporarily closed.

Capital Linen Service developed COVID-19 safety protocols to maintain the linen service to ACT Health and the commercial sector.

Circular economy initiatives

Circular economy initiatives towards improving waste recovery rates and to reduce resource consumption and waste disposal to landfill since 2019:

- Use of collected glass bottles and plastic bags through the Container Deposit Scheme to develop trials using sustainable road base made from the recycled materials (each tonne of road base used 800 plastic bags, 300 glass bottles, 18 used printer toner cartridges and 250 kg of reclaimed asphalt[12]).
- ACT Government partnered with Icon Water to develop circular economy solutions to ensure waste glass containers can be recovered and utilised in local infrastructure projects.
- Establishment of Recycled Materials Working Group (TCCS) to increase use of recycled material in infrastructure

Carbon neutral waste sector

Initiatives for diversion of organics from landfill will contribute to reduce emissions from waste sector. The following initiatives taken since the last State of the Environment report are contributing to the goal:

- Providing a green waste and food waste collection services to residents (feasibility studies about collection models, organics processing location, viable processing technologies and markets)
- Providing a bulky waste collection service to the residents
- Gas collection from landfills – install on all landfills and increase efficiency
- Participation in the national initiatives in relation to climate change
- Waste from renewable technologies
- Phasing out single use plastics
- Release of Waste-to-Energy policy in 2020

Waste policy context

The ACT was the first government in the world, in 1996, that set a goal to achieve no waste going to landfill by 2010. The developed waste management strategy viewed waste as a resource and established a framework for sustainable resource management and listed actions needed to achieve waste-free society. This strategy successfully reduced the waste sent to landfill from nearly 60% of total waste in 1995-96 to below 30% by 2003-04. The current *ACT Waste Management Strategy 2011-2025: Towards a Sustainable Canberra*[1] was developed in 2011, replacing the *No Waste by 2010 Strategy*[21] and aiming to generate less waste, full resource recovery, clean environment and a carbon neutral waste sector.

While the waste strategy is ambitious and it was an early adopter of waste targets and single-use plastic shopping bags ban, the China's policy changes to the imported recycled waste in 2018, impacted the waste management performance and waste exports from Australia. This prompted discussions and actions were taken on the Federal level that resulted in the introduction of waste export bans. A range of new policies have been developed on both ACT and Federal levels aiming to build domestic waste processing industry while achieving set diversion rate targets from landfill.

Description of policies in effect in the ACT

There are several waste related, acts, policies, strategies, and action plans, in effect on the national and the ACT levels.

National waste policy context

National food waste strategy (2017)[22]

Introduced in 2017 to support collective action towards halving Australia's food waste by 2030. The strategy contributes towards global action on reducing food waste by aligning with Sustainable Development Goal 12 (ensure sustainable consumption and production patterns) and helps give effect to Australia's obligation in helping reduce greenhouse gas emissions, primarily by keeping food waste from landfills. The strategy outlines a framework for action through policy support, business improvements, market development and behaviour change.

National waste policy (2018)[5]

The National waste policy aims to support the economy, protect health of the communities, and reduce environmental impacts by harnessing the value of materials that are disposed as waste and return them to productive use. The policy embodies a circular economy by shifting away from "take, make, use and dispose" to

[21] ACT Government (1996), A waste management strategy for Canberra: No Waste by 2010.
[22] National Food Waste Strategy: Halving Australia's food waste by 2030, Commonwealth of Australia 2017.

a more circular approach where the value of resources is maintained for as long as possible. The policy guides collaboration between all Australian governments, businesses and industries through 5 principles:

- Avoid waste: through waste avoidance, design products and systems that avoid waste, conserve resources and maximise material's value, and knowledge sharing, education and behaviour change
- Improve resource recovery: through product stewardship, implementation of a common approach, improving access for everyone to participate in a circular economy and increasing industry capacity
- Increase use of recycled material and build demand and markets for recycled products: through sustainable procurement by governments, businesses and individuals
- Better manage material flows to benefit human health, the environment and the economy: by reducing impacts of plastics and packaging on the environment, sound management of chemicals and hazardous waste and reducing organic waste
- Improve information to support innovation, guide investment and enable informed consumer decisions: through better data and reporting, market development and research.

National Waste Policy Action Plan (2019)[6]

The action plan presents targets and actions to implement the *2018 National Waste Policy*[5]. The plan complements and supports implementation of national packaging targets developed and agreed by APCO (Australian Packaging Covenant Organisation)[23] and separate state and territory jurisdiction policies. It includes the *ACT Waste Management Strategy 2011-25*[1] targets of (1) the growth in ACT waste generation is less than the rate of population growth and (2) the rate of resource recovery increases over 90% by 2025.

The action plan sets the following targets (measured against the baselines in *2018 National Waste Report*[24]):

- Ban the export of waste plastic, paper, glass and tyres, commencing in the second half of 2022
- Reduce total waste generated in Australia by 10% per person by 2030
- 80% average resource recovery rate from all waste streams following the waste hierarchy by 2030
- Significantly increase the use of recycled content by governments and industry
- Phase out problematic and unnecessary plastics by 2025
- Halve the amount of organic waste sent to landfill by 2030
- Make comprehensive, economy-wide and timely data publicly available to support better consumer, investment and policy decisions

A roadmap for reducing Australia's food waste by half by 2030[25]

A roadmap of halving Australia's food waste by 2030 target of the *National Food waste strategy*[18] has been developed by Food Innovation Australia Limited (FIAL) in collaboration with the stakeholders across the food value chain. The four-year delivery plan sets in the planning stage a framework, commitments, initial investment analysis and consumer behaviour baseline. Data and program analysis are evidence based and reviewed and refined along the roadmap against the targets and trajectory, showcasing success stories along the path. The roadmap success relies on the partnerships and collaboration along the whole supply chain including governments, industry, researchers and communities.

Recycling and Waste Reduction Act 2020[26]

The Act was introduced to promote circular economy, improve the Australia's waste management and increase domestic recycling. It establishes a legislative framework enabling Australia to effectively and safely manage environmental and human health, products, waste material and impacts of disposal of our waste. One of the key features of the Act is to legislate the framework for the ban of the export of waste plastic, paper, glass and

[23] https://apco.org.au/national-packaging-targets
[24] Department of Agriculture, Water and the Environment (2018), National Waste Report 2018, Prepared by Blue Environment Pty Ltd.
[25] A Roadmap for reducing Australia's food waste by half by 2030, Food Innovation Australia Limited (2019).
[26] https://www.legislation.gov.au/Details/C2020A00119

tyres agreed by Commonwealth, state and territory governments in March 2020. The ban applies to unprocessed waste and is designed to stimulate onshore processing of waste to new materials ready for manufacturing overseas. The details of the bans are further described through the rules. While rules for glass, plastics and tyres are already in place, the paper and cardboard will start to be regulated from 1 July 2024.

This Act also replaces the *Product Stewardship Act 2011* and reforms the regulation of product stewardship. It sets out obligations for manufacturers, importers, distributors and designers of certain products identified in the Product Stewardship Rules (co-regulatory or mandatory as well as accreditation of voluntary product stewardship).

Export-Waste Glass Rules

Waste glass rules came into effect on 1st January 2021. The waste glass exporters need to hold a licence to export their product and comply with the conditions of their licence that dictate that glass is processed to an acceptable specification prior to exporting, that that specification is appropriate for the importing country ensuring the glass will be used as intended.

Export-Waste Plastic Rules

The export plastic rules are coming into effect in two phases. From 1 July 2021 only plastic that has been sorted into single resin or polymer type or processed with other materials into processed engineered fuel can be exported. Mixed waste plastics are no longer possible to export. From 1 July 2022 only plastics that have been sorted into single resin or polymer type and further processed (e.g. flaked or pelletised) or processed with other materials into processed engineered fuel can be exported. Exporters will need a waste plastic export licence.

Export-Waste Tyres Rules

Specifies the type of the tyres that can be exported with the waste export licence. The ban was implemented from 1st December 2021.

National Plastics Plan 2021[27]

National Plastics Plan was developed capturing the ideas put forward in the National Plastic Summit in March 2020 that brought together leaders from government, industry and community sectors. The plan focuses on preventions (addressing plastic at the source), recycling, information for consumers, plastics in oceans and waterways, and need for research, innovation and data.

A circular economy roadmap for plastics, tyres, glass and paper in Australia[28]

The roadmap informs about the preparedness of industry and the Australian innovation system to collaboratively develop opportunities for waste innovation and a circular economy for plastics, glass, paper and tyres across the whole supply chain of these waste materials. It identifies strategies, enablers and opportunities Australia can invest in to create economic development, employment and reduce waste and pollution.

Description of waste policy in the ACT

ACT Waste Management Strategy: Towards a sustainable Canberra 2011-2025[1]

Set direction for the management of waste in the ACT and builds on the previous strategy *No waste by 2010*[17]. The strategy provides a framework for sustainable resource management with the target of resource recovery to over 90% by 2025. The strategy is analysed in detail in the Waste policy analysis.

[27] DAWE 2021, National Plastics Plan 2021, Department of Agriculture, Water and the Environment, Canberra, December. CC BY 4.0.
[28] Schandl H, King S, Walton A, Kaksonen AH, Tapsuwan S and Baynes TM (2020), National circular economy roadmap for plastics, glass, paper and tyres. CSRIO, Australia.

ACT Waste Management and Resource Recovery Act 2016 (including 2021 amendment)[29]

The *ACT Waste Management and Resource Recovery Act 2016* established a regulatory framework to support the achievement of the resource recovery objectives of the *ACT Waste Management Strategy 2011-2025*[1]. The Act intends to facilitate and reward good practice in waste collection, transportation, recovery and reuse and discourages disposal of waste to landfill. In 2021, the Act has been amended to enable introduction of household Food Organics and Garden Organics (FOGO) service in the ACT by allowing food waste to be placed in territory organic recycling containers. Other amendments include modernised waste activity reporting, improved enforceability at waste facilities, simplified CDS administration, clarified and improved kerbside container management and updated waste definitions and streamlined process.

ACT Container Deposit Scheme[30]

The CDS was created as a litter reduction initiative and was introduced by the ACT Government in 2018. It allows consumers to return eligible, empty drink containers and receive a 10-cent refund per item. Residents can claim the refund or donate it to a charity. The ACT CDS is managed separately to the NSW CDS.

Waste Feasibility Study Roadmap and Recommendations (2018)[31]

The white paper provides the recommendations based on the outcomes of the feasibility study. The study was prompted by China's waste importation policies ('National Sword') and with the aim of identifying pathways towards the ambitious targets set in the *ACT Waste Management Strategy 2011-2015*[1]. The strategy includes an aspirational target of 90% of waste being diverted from landfill by 2025 and a carbon neutral sector by 2020, while the ACT resource recovery has plateaued at around 70 percent for the last decade. The key outputs from the study are initiatives that will take ACT closer to its 90 per cent resource recovery target through best practice waste management. The recommendations include initiatives that will divert organics from landfill, stimulate industry development and support, and exploration of energy from waste.

Unlocking the potential of circular economy in the ACT (2019)[32]

The issues paper explores what is the current status and future potential for a circular economy strategy for the ACT and aims to raise awareness and understanding of circular economy in the community and engage and motivate key stakeholders to take actions. It acknowledges that action to date focused around waste management and identifies that there are still unlocked opportunities through economic potential and business transactions. It also notes that there is no comprehensive economic strategy to transition to a circular economy and recommends to conduct further material flow analysis in the ACT in its business systems to identify strategic focus areas, opportunities through procurement, especially in the construction industry.

Development Control Code for best practice waste management in the ACT 2019[33]

The development control code aims to enable flexible waste design solutions based on the unique characteristics of the development. It defines the minimum necessary waste management requirements for new development, demolition and excavation work.

ACT Waste-to-Energy Policy 2020-25[10]

The Waste Feasibility Study Roadmap identified that in order to achieve the ambitious targets of 90% resource recovery in the *ACT Waste Management Strategy 2011-25*[1], a waste-to-energy approach would be required. In addition, ACT has set to achieve a net zero greenhouse gas emissions by 2045. The ACT Climate Change Strategy identified that waste sector contributes about 4% of the ACT greenhouse gas emissions and waste-to-energy may have a role in reducing emissions from waste. The policy generally prohibits thermal treatment of waste,

[29] https://www.legislation.act.gov.au/a/2016-51
[30] https://actcds.com.au
[31] ACT Government (2018), Waste feasibility study roadmap and recommendations, Discussion paper, Prepared by ACT NoWaste.
[32] Office of the Commissioner for Sustainability and the Environment (2019). Unlocking the potential for a circular economy in the ACT.
[33] ACT Government (2019), Development Control Code for best practice waste management in the ACT.

promotes the waste hierarchy and supports investment in anaerobic digestion in the ACT. For the transition to circular economy are established underlying principles and outcomes with activities that are permitted.

ACT Waste Management and Resource Recovery (Environment Protection – Used Packaging Materials) Code of Practice (2020)[8]

The Code of Practice lists the overarching obligations for brand owners to recover, re-use and recycle packaging materials according to the *National Environment Protection (Used Packaging Materials) Measure 2011*. It provides targets that the brand owners must work towards. The targets are consistent with the *ACT Waste Management Strategy 2011-25*[1] and *National Packaging Targets*[19] and *National Waste Policy Action Plan 2019*[6].

ACT Phasing out single use plastics policy[9]

On 1 July 2021 ACT Government banned single-use plastics through the *Plastics Reduction Act 2021*. In the first tranche single use plastic cutlery, single use plastic stirrers and expanded polystyrene takeaway food and beverage containers are banned. In the second tranche, from 1 July 2022 will be banned single use plastic straws, cotton buds with plastic sticks and all oxo-degradable plastics. In the third tranche, from 1 July 2023, microbeads, expanded polystyrene products and packaging and plastic takeaway containers will be banned.

Transport Canberra and City Services Strategic Plan 2021-2024[34]

Transport Canberra and City Services Strategic Plan 2021-2024 is an overarching guide to deliver government agenda to the Canberra community through the three objectives: community-centric, sustainable outcomes, a great place to work and delivering services safely and efficiently. It includes sustainable waste management committing to implement Food and Garden Organics (FOGO) household collections and processing, implementation of the *Plastic Reduction Act 2021*, upgrading the Materials Recycling Facility to produce cleaner, higher quality recycled materials and developing the circular economy legislation for the ACT.

Waste policy analysis

Waste strategy goals and targets

The *ACT Waste Management Strategy 2011-2025*[1] sets strategy outcomes and the targets to achieve them, which are summarised in Table 14.

Table 14: ACT Waste Management Strategy 2011-2025[1] overview.

Strategy Outcome	*Strategy Target*
Less waste generated	The growth in ACT waste generation is less than the rate of population growth
Full resource recovery	The rate of resource recovery increases to: • Over 80% by 2015 • Over 85% by 2020 • Over 90% by 2025
A clean environment	ACT leads Australia in low litter levels and incidents of illegal dumping ACT natural resources are protected and, where feasible, enhanced through waste management.
Carbon neutral waste sector	Energy generated from waste doubles by 2020 The ACT Waste Sector is carbon neutral by 2020

[34] https://www.cityservices.act.gov.au/__data/assets/pdf_file/0005/1851008/Strategic-Plan-2021-24.pdf

The ACT target to reach a 90% resource recovery by 2025 across all waste streams is the most ambitious target of all the Australian states and territories. The ACT is also the only jurisdiction in Australia that sets a target for the waste sector to become carbon neutral.

The waste strategy aims to impact:

- **Human health** – Protecting human health with waste management, including hazardous waste.
- **Environment** – Protecting environment with waste management, decrease littering, manage landfill leachate and contamination sites.
- **Sustainable development** – Sustainable development through the education and awareness, product reuse through second hand business and charities, resource recovery and reduction of waste to landfill.
- **Climate change** – Addressing climate change through generation of renewable energy from organic waste streams and reduction of disposal of waste, generating greenhouse gas emissions, to landfill.
- **Waste to landfill** – Reduction of waste disposal to landfill by increasing recycling, separate organic waste from residual waste and reduction of waste generation.

Areas of focus for waste policy

Error! Reference source not found. illustrates areas of focus for waste policy in the ACT, with the outcome goal of waste generation reduction, full resource recovery, clean environment and a carbon neutral waste sector.

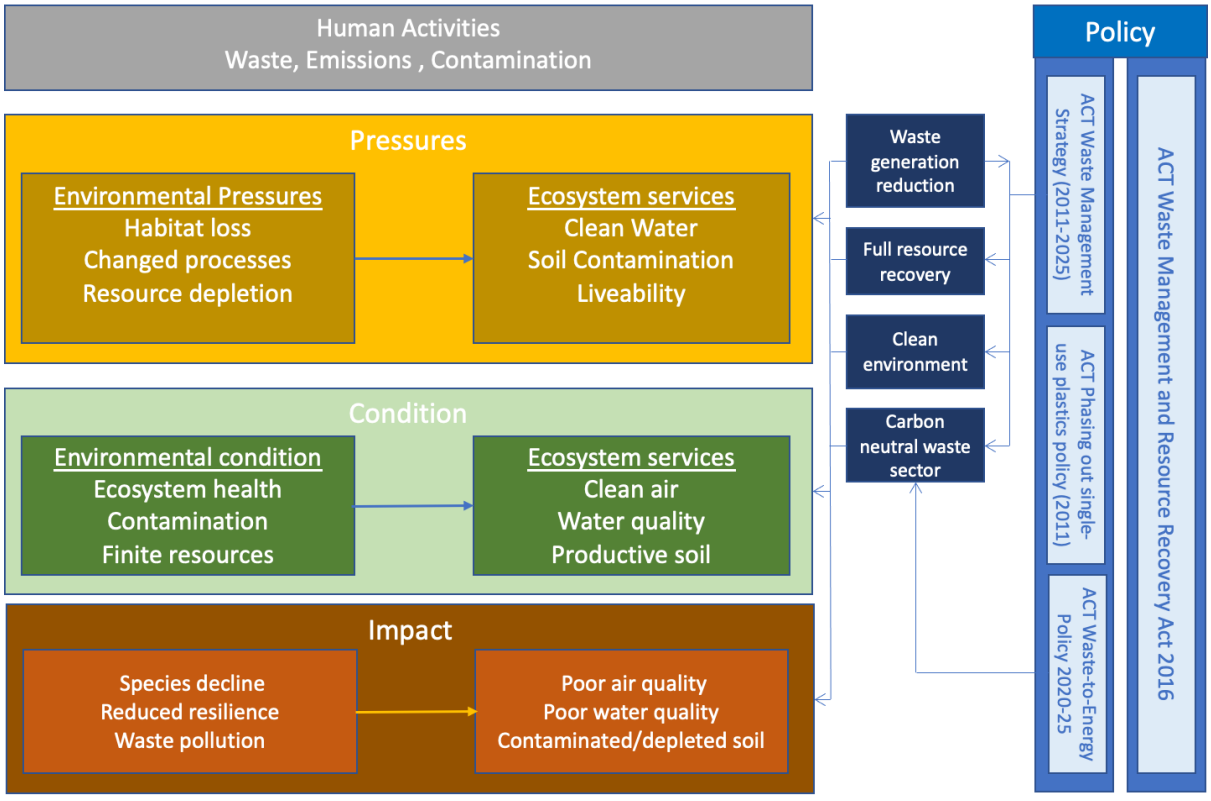


Figure 18. *Illustration of the areas of focus for waste policy in the ACT.*

Human Activities – The Waste Management Strategy seeks to modify human activities that generate waste, cause contamination/pollution and emissions. Indirectly it aims to influence consumption and use of resources.

Pressures – The environmental pressures of the habitat loss due to the polluted environment with waste, depleted resources, and impacted ecosystems are addressed in the Waste management strategy through reduction of waste generation and sustainable waste management practices, ensuring clean air and water.

Sustainable organic waste management reduces greenhouse gas emissions for the sector and restores nutrients to the soil.

Condition – The waste strategy aims to restore the condition by restoring ecosystem health, avoid contamination and reduce littering, and reduce use of finite resources.

Impact – The waste strategy aims to address Impacts by reducing and managing waste towards set targets and outlining the actions.

Strategy Outcome 1: Less waste generated

The first objective of the Waste Management Strategy is: "the growth of waste generation to be lower than population growth". The waste strategy sets out actions to achieve that. It uses instruments such as education, behaviour change and regulation to enable waste avoidance and products reuse. It involves Government, communities, businesses, and charities.

- Education and behaviour change: Actions to conduct awareness raising campaigns to encourage waste avoidance and product reuse targeting communities, businesses and integrating charities.
- Waste avoidance via reuse: Initiatives such as bulky waste collection, encouragement of on-site reuse of construction and demolition waste.
- Regulations facilitating waste management:
  By supporting community and home compositing with simplified approval process: introduce 'one stop shop' – grant licence to establish community garden, waiver licence fees, and exemption from development approval on unleased land.
  Plastic Reduction Act 2011 – ban of single use plastics.
- APCO – businesses signing up to APCO to optimise packaging, reduce environmental impact, subscribe to national packaging targets.

National Waste Policy (2018)[5] and *National Food Waste Strategy (2017)*[18] target reduction of waste generation with strong focus on reduction of food waste generation and application of circular economy principles. While ACT does not have a circular economy policy as yet, an issue paper *Unlocking the potential of circular economy in the ACT (2019)*[28], identifies the benefits such policy would have on waste management and waste avoidance as well.

Strategy Outcome 2: Full resource recovery

The second objective of the Waste Management Strategy is the full resource recovery with the ambitious target of 90%. The instruments used in the strategy to achieve this objective are policy and regulation, stewardship schemes, government procurement, education and waste management programs, development of the recycling assets and waste-to-energy technologies. To achieve this outcome Government needs to support and work with households, communities, businesses and industry.

- Policy: subscribing to National waste policy and development of markets for recyclable materials and strengthening regional connections.
- Regulation: disincentives to disposal to landfill by regulating landfill levy
- Stewardship schemes: *Product Stewardship Act 2011* and *Recycling and Waste Reduction Act 2020* enabling producer responsibility of take back and recycling for selected materials, e.g. e-waste.
- Government procurement: Government's use of sustainable procurement principles provides a market driver for increased use of recycled materials in materials with recycled content for the goods and works that Government procures.
- Education and waste management programs: Information on the ACT Government website, targeted education and awareness programs for citizens, initiatives such as Australian Sustainable Schools Initiative (AuSSI), ACTSmart business, ACTSmart Office program, ACT NoWaste, Public place recycling program, Public event recycling (ACTSmart Public Event program)
- Waste management: separation of organic waste by increasing waste diversion and reduction of greenhouse gas emissions.

- **Waste processing technology development:** expanding recycling facilities, enable organic waste separation, processing of organic waste, bioenergy generation from organic waste.

The ACT has the second highest resource recovery rate (79 %) in Australia, after South Australia, however reaching the 90% target remains challenging. The resource recovery in Australia has been impacted by the changes in the past five years following the China's change to their waste import policy. The Council of Australian Governments (COAG) established a timeline to ban the export of waste plastic, paper, glass and tyres whilst building capacity to generate higher value commodities and demand. The *Recycling and Waste Reduction Act 2020* with *Export-Waste Glass Rules*, *Export-Waste Plastic Rules* and *Export-Waste Tyres Rules* set the legislative framework for the waste export bans.

The Commonwealth and all State and Territory governments also supported the establishment of the 2025 National Packaging targets: 100% reusable, recyclable, or compostable packaging; 70% of plastic packaging being recycled or composted, 50% average recycled content included in packaging and the phase out of problematic and unnecessary single-use plastic packaging. APCO is championing the delivery of the Targets and transition to the circular economy for packaging.

Strategy Outcome 3: Clean Environment

The targets that the Waste Strategy sets to achieve the clean environment are through the ambition for ACT to become a leader in Australia in low litter levels and incidents of illegal dumping and for the natural resources to be protected and where feasible enhanced through waste management.

This objective strongly relies on the regulation instrument through a number of Acts that are in place:

- *ACT Litter Act 2004*
- *ACT Dangerous Substances Act 2004*
- *National Environment Protection Act 1994*
- *Environment Protection Act 1997*
- *Clinical Waste Act 1990*
- *Dangerous substance Act 2004*
- *Waste minimisation Act 2001*

The other instruments that the strategy uses are education and behaviour change as well as waste management programs. A safe management of the established and newly developed waste management assets will also ensure that the environment remains protected.

- **Education and behaviour change through waste management programs:** education about rising awareness of the impact of litter and dumping, changing behaviour in soil reuse and rehabilitation through waste management programs that focus on littering (Keep Australia Beautiful, National Litter Index, Container Deposit Scheme)
- **Waste management assets:** maintain safe and responsible landfill to stop leakage and littering, methane capture from landfill to decrease impact on emissions; waste operation in planning requirements.

Majority of states and territories in Australia, including the ACT, have established a Container Deposit Scheme[26] (CDS), as a litter reduction initiative that also provides a collection method with cleaner and more efficiently sorted plastic and glass streams compared to the comingled kerbside municipal solid waste or commercial and industrial collection. These provides an opportunity for a higher quality recycling processing and implementation of a circular economy.

Strategy Outcome 4: Carbon neutral waste sector

The greenhouse gas emissions generated from the waste sector (4% of ACT greenhouse gas emissions) are predominantly addressed in the strategy through the waste management assets and asset development. The aim is to capture the emissions from organic waste and increase the waste management efficiency.

- **Waste management assets:** Landfills that are safe, environmentally responsible and capture methane, waste collection and transport solutions that are energy efficient
- **Recycling organic waste:** Separation of organic waste from mixed residual waste
- **Energy-from-waste technology**: development of markets for organic waste, Sustainable Energy Policy 2011-2020 (Sustainable Energy 2011-2025 in preparation) – waste not covered, expand bioenergy generation from energy-from-waste technologies (such as anaerobic digestion)

An *ACT Waste-to-Energy Policy 2020-25*[10] was developed following the *Waste Feasibility Study Roadmap*[27], that identified the need for a waste-to-energy approach in achieving the resource recovery target and in reduction of emissions from waste. The policy has a strong focus on utilising anaerobic digestion to process organic waste and to follow the waste hierarchy for the other types of waste.

Effectiveness of the ACT Waste Strategy

In Table 15 are listed instruments used to achieve the four ACT Waste Strategy objectives and an assessment on their effectiveness based on the available data or publicly available evaluation reports.

Table 15: Effectiveness of ACT Waste Strategy's instruments

Instrument (Act, strategy, plan)	Objective / Vision	Assessment of effectiveness
Education for behaviour change	Less waste generated	Recycling behaviour study[35] in ACT Multi-Unit-Developments found evidence that ACT NoWaste campaign consisting of newly designed signs for bins and bin areas and an informational brochure was effective at reaching residents and changing their behaviour.
Regulation	Less waste generated	Enabling home and community composting – 50% of general waste is food waste, which at landfill rots to produce methane. Enabling home and community composting will reduce the carbon footprint significantly. NSW councils use programs like "Compost Revolution[36]" to assist households establishing composting at home. *Plastic Shopping Bags Act 2011* (replaced by *Plastic Reduction Act 2021*) – ban on use of single use plastic bags – An ACT seven-year study[37] concluded that even though there was observed reduction of single use polyethylene bags (by 2600 t), consumption of other bags increased resulting in net overall reduction of 275 t. A better understanding of plastic bag consumption is needed.
APCO membership	Less waste generated	Membership to APCO provides access to the resources on sustainable solutions for the businesses and help them to adhere to NEPM standards. Members also sing up to commitments.

[35] ACT Government (2019), Understanding Drivers of Recycling Behaviour in ACT Multi-Unit Dwellings, Department of the Environment and Energy.
[36] https://compostrevolution.com.au
[37] Macintosh A, Simpson A, Neeman T and Dickson K, (2020) *Plastic bag bans: Lessons from the Australian Capital Territory*, Recycling, *154*, 104638.

Instrument (Act, strategy, plan)	Objective / Vision	Assessment of effectiveness
Landfill levy	Full resource recovery	The intent is to encourage diversion of waste from landfill to recycling. When appropriately designed they are effective and provide a source of funding. The levy needs to be higher than cost of alternative higher order disposal pathways (leading to reuse and recycling). The landfill levies can also have perverse outcomes, such as transport of waste between jurisdictions (due to variability in levy), stockpiling and illegal dumping.[38]
Product Stewardship Schemes	Full resource recovery	They enable design of products to be recyclable, product use of recycled materials, limit use of hazardous materials in the products and enable recycling for people using the products.[39] Product Stewardship Centre of Excellence is currently assessing the benefits and effectiveness of product stewardship schemes in Australia.[40]
Government procurement	Full resource recovery	Government procurement has been identified as a key driver in transition to circular economy as it leads by example, identifies the priorities and is providing security to the private sector for investment in the transition. ACT government procurement is estimated to be $1.5b annually[41] (3.5% of the ACT economy[42]).
Education and waste management programs	Full resource recovery	ACTSmart Schools – as of June 2020, 55 schools were awarded for sustainable waste management ACTSmart Business recycling program – 960 businesses signed up[43]
Organic waste separation	Full resource recovery Carbon neutral waste sector	In the ACT, about one third of the household landfill bin is food (26,000 tonnes per year)[44]. Separating organic waste from red bin will reduce waste disposal to landfill by about 30%.
APCO targets	Full resource recovery	Progress towards APCO targets in 2019-20[45] • 100% reusable, recyclable or compostable packaging: in 2019-20 at 86% • 70% of plastic packaging being recycled or composted: in 2019-20 at 16% • 50% average recycled content included in packaging (revised from 30% in 2020): in 2019-20 at 39%

[38] https://www.aph.gov.au/Parliamentary_Business/Committees/Senate/Environment_and_Communications/WasteandRecycling/Report/c04
[39] https://www.dcceew.gov.au/environment/protection/waste/product-stewardship
[40] https://stewardshipexcellence.com.au/news/assessing-the-benefits-and-effectiveness-of-product-stewardship/
[41] https://www.procurement.act.gov.au/about/act-government-procurement-reform
[42] https://www.treasury.act.gov.au/__data/assets/pdf_file/0012/399990/SUM.pdf/_recache
[43] https://www.climatechoices.act.gov.au
[44] https://www.cityservices.act.gov.au/recycling-and-waste/collection/fogo
[45] https://apco.org.au/national-packaging-targets

Instrument (Act, strategy, plan)	Objective / Vision	Assessment of effectiveness
Keep Australia Beautiful and National Litter Index	A clean environment	ACT is not a member of Keep Australia Beautiful[46] and unlike other states does not publish a report on littering index. It enforces penalties[47] for people and business caught littering but there are no publicly available evaluations of the effectiveness of the enforcements.
Container Deposit Scheme (CDS)	A clean environment	Introduced in 2018, working closely with LEAD (Live Experience Access Develop) (Canberra organisation that works with local business and government to provide employment opportunities to people with disability), with target of 90% recovery rate for acceptable containers by 2025. It is expected that the target will be achieved. As of July 2022, 339 million containers have been returned through the scheme[26]. Container Deposit Scheme was introduced first in South Australia[48] 40 years ago as a litter reduction program. The South Australian Government is now seeking to modernise the scheme to become more as a resource recovery and product stewardship model.
Energy efficient waste collection fleet	Carbon neutral waste sector	Transport is responsible for 60% of ACT harmful emissions. A first electric garbage truck has been rolled out this year[49].
Energy-from-waste technology (e.g. AD)	Carbon neutral waste sector	In ITP Thermal Pty Ltd report[50] is has been estimated that the potential yearly generation of biogas within ACT from landfill gas, food and garden waste (currently sent to landfill) and sewage solids to be 0.74PJ (10% of the natural gas demand in the ACT). If the garden waste currently composted was also converted to biogas, the yearly production would increase to 1.98PJ (28% of total ACT natural gas use).

Role in the portfolio

With the transition to a circular economy, waste management becomes a resource in the economy. This entails designing management of the resource generated through the waste disposal streams. Therefore, it needs to be included in the urban environment design and planning to enable separation and collection of the valuable resource.

The collection of waste is predominantly with garbage trucks, which contribute to the emissions and therefore need to be considered in the transport strategies.

[46] https://kab.org.au/our-members/
[47] https://www.cityservices.act.gov.au/public-land/maintenance/littering
[48] https://www.epa.sa.gov.au/environmental_info/waste_recycling/container_deposit
[49] https://www.fullyloaded.com.au/industry-news/2204/act-introduces-new-electric-garbage-truck
[50] ACT Government (2020), *Green Gas Trading, a tool for a zero emissions ACT*, A report prepared for the ACT Environment, Planning and Sustainable Development Directorate by ITP Thermal Pty Ltd.

As waste contributes to the climate change impacts due to greenhouse gas emissions, particularly from the organic waste, it needs to be considered in energy and climate change strategies. Energy generated from organic waste can be used as a renewable source of energy and towards targets for zero emissions. Therefore, the performance of organic waste separation (which needs to be enabled by offering the service of food waste collection), directly impacts the generation of biogas from organic waste. Also, as organic waste can be composted as opposed to digested in an anerobic digestion, the split between the two processes will also impact the generation of energy.

There is also an opportunity for co-digestion of organic waste with sewage to generate energy and therefore waste should feature in water strategies.

The negative impact of waste leakage to the environment needs to be considered in air pollution and biodiversity strategies as well.

Waste management performance is impacted by the actions taken in the planning and urban design as it enables participation in waste separation and collection.

Energy and climate change targets also improve waste performance, particularly in relation towards net zero targets. Renewable energy sector is also generating a new, hard to recycle, waste stream, that is currently being predominantly disposed to landfill influencing the landfill diversion targets aspirations.

However, as it can be noted through this report and past State of the Environment reports, waste has often not been considered at all. The inclusion of Waste is, however, a positive change in the past 5 years.

Conclusions and Recommendations

The *ACT Waste and Management Strategy 2011-2025*[1] was an ambitious strategy with strong targets and clearly outlined outcomes. As the Strategy is reaching its end of life and due to disruptions caused by the China's waste import changes, it has become outdated. However, several policies and acts have been put in place both on Federal and ACT level addressing the changes in the waste sector over the last decade.

As the ACT might be preparing to develop a new waste strategy and to remain a policy leader in Australia, it is recommended that the new waste strategy:

- Adjusts strategic planning and actions that account for the changes that occurred in the waste sector over the last decade;
- Takes the opportunity to connect with the net zero targets;
- Includes the circular economy principles; and,
- Integrates with the strategic plans from energy, water, planning and transport to guarantee both net zero and circular economy visions are fulfilled.

Attachment 6. Policy Synthesis (Fire)

Fire Policy Synthesis

Fire policy overview

The Strategic Bushfire Management Plan (SBMP) (2019-2024) is the document that sets out how bushfire risk is managed in the ACT. The SBMP is a requirement under the Emergencies Act 2004 and is the strategic planning document that sits above the Regional Fire Management Plan (long-term operational planning instrument) and bushfire operational plans (short-term operational planning instrument).

The SBMP aims to provide a strategic framework to protect the ACT community from bushfires and reduce resulting harm to the physical, social, cultural, and economic environment of the Territory. It sets the following objectives:

- Agency and community preparation and response for bushfires,
- Bushfire hazard assessment and risk analysis,
- Bushfire prevention, including hazard reduction, and,
- Adaptive management to apply best practice to bushfire management and prevention practices in the ACT in a changing environment.

The SBMP is based on the following system concepts:

- Bushfires are a natural phenomenon in Austrian landscape. Bushfires become a risk when vulnerable assets (or values) are impacted beyond their tolerances.
- The threat from bushfire is driven by dynamics in fuel loads, fuel availability, and fire weather.
- Policy measures are targeting:
    - the threat by managing fuels and investing in fire suppression, and,
    - the vulnerability of social, economic and environment valuers by reducing magnitude of impact and increasing resilience in the event of bushfires
- A major challenge with bushfire policy is to optimise management strategies to maintain ecosystem function and biodiversity values whilst protecting property and life.

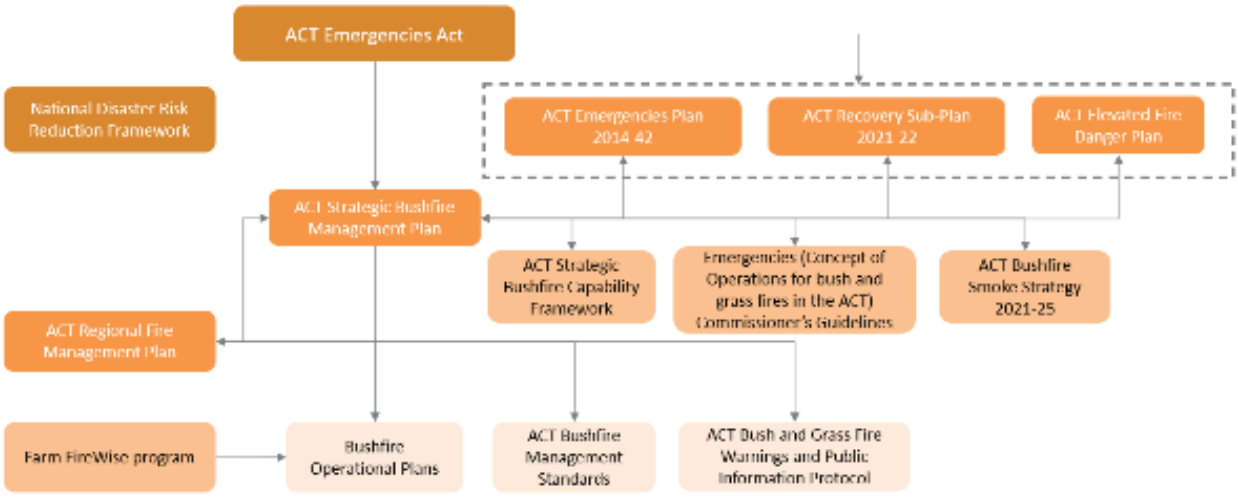


Figure 19. *Policies, strategies and acts related to Fire in ACT.*

Progress snapshot

Following bushfires in the ACT in 2020, in line with the Strategic Bushfire Management Plan, a Rapid Risk Assessment Team deployed immediately post fire. The team identified 27 risks, including impacts on cultural heritage, risks to public safety, impacts on biodiversity, and threats to biodiversity. A rapid risk assessment report was produced and subsequently the ACT Bushfire and Flood Recovery Plan was published in September 2020, identifying key recovery actions.

Fire policy context

With Canberra considered as the “bush capital” and the ACT’s history of devastating bushfires, fire policy has a critical role to fill in protecting communities, infrastructure, and the environment.

The ACT’s fire policy sits within both an international and national emergency services context. The United Nations Office for Disaster Risk Reduction: The Sendai Framework for Disaster Risk Reduction 2015-2030 sets four priorities for action to prevent new and reduce existing disaster risks:

- Understanding disaster risk
- Strengthening disaster risk governance to manage disaster risk
- Investing in disaster reduction for resilience
- Enhancing disaster preparedness for effective response, and to "Build Back Better" in recovery, rehabilitation, and reconstruction.

Nationally, the National Disaster Risk Reduction Framework 2018 has the purpose of guiding national, whole-of-society efforts to proactively reduce disaster risk to minimise the loss and suffering caused by disasters. The priorities under the framework are:

- Understand disaster risk
- Accountable decisions
- Enhanced investment
- Governance, ownership, and responsibility
- Share and build knowledge

In addition to working within international and national frameworks, the ACT Government must actively work with fire and emergency services agencies in NSW. This relationship is critical to ensuring strategies are aligned to manage bushfire risk within each jurisdiction.

The Strategic Bushfire Management Plan (SBMP) (2019-2024) is the primary document that sets out how bushfire risk is managed in the ACT. The SBMP is a requirement under the Emergencies Act 2004 and is the strategic planning document that sits above the Regional Fire Management Plan (long-term operational planning instrument) and bushfire operational plans (short-term operational planning instrument). The SBMP aims to provide a strategic framework to protect the ACT community from bushfires and reduce resulting harm to the physical, social, cultural, and economic environment of the Territory. It as framed around the National Disaster Risk Reduction Framework.

It sets the following objectives:

- Agency and community preparation and response for bushfires
- Bushfire hazard assessment and risk analysis

- Bushfire prevention, including hazard reduction
- Adaptive management to apply best practice to bushfire management and prevention practices in the ACT in a changing environment.

The SBMP is based on the following system concepts:

- Bushfires are a natural phenomenon in Austrian landscape. Bushfires become a risk when vulnerable assets (or values) are impacted beyond their tolerances.
- The threat from bushfire is driven by dynamics in fuel loads, fuel availability, and fire weather.
- Policy measures are targeting
    - The threat by managing fuels and investing in fire suppression.
    - The vulnerability of social, economic and environment valuers by reducing magnitude of impact and increasing resilience in the event of bushfires.
- A major challenge with bushfire policy is to optimise management strategies to maintain ecosystem function and biodiversity values whilst protecting property and life.

Description of fire policy in the ACT

ACT Strategic Bushfire Management Plan (2019-2024)

The ACT Strategic Bushfire Management Plan is a document stipulated under the Emergencies Act to oversee all levels of bushfire planning in the ACT. It provides a strategic framework to protect the ACT community from bushfires and reduce harm to physical, social, cultural and economic environmental of the Territory. The Plan sets out objectives and actions for preparedness and response for bushfires, bushfire hazard assessment and risk analysis, prevention and hazard reduction and adaptive management to apply best practice to bushfire management and prevention practices in the ACT in a changing environment. It is reviewed every 5 years and prepared by ACT Emergency Services Agency.

Regional Fire Management Plan (2019-2029)

The Regional Fire Management Plan covers the majority of land managed by ACT Environment Planning and Sustainable Development Directorate and Transport Canberra and City Services Directorate. It is a 10-year plan reviewed every 5-years that balances fire fuel management with other values that the natural estate is managed for in the ACT. The Plan links Strategic Bushfire Management Plan to the Bushfire Operational Plans. It informs the Strategic Management Plan and outlines the land management plans and activities for Territory land managers to implement major fire fuel management, fire access management and fire infrastructure management strategies over a 5–10-year period.

National Disaster Risk Reduction Framework 2018

The National Disaster Risk Reduction Framework (2018) is led by the Australian Government to provide a coordinated approach to reducing natural disaster risk. It draws on United Nation's Sendai Framework for Disaster Risk Reduction 2015–2030, which focuses on increasing resilience by reducing new and existing disaster risks. The National Disaster Risk Reduction Framework includes the follow priorities:

- Understanding disaster risk—increase public awareness through trusted and authoritative mechanisms, and the broad disclosure of risk information that is integrated into risk planning across sectors
- Making accountable decisions—ensure decision makers recognise the impact of their decisions on disaster risk, with a focus on infrastructure, land-use and development planning
- Targeting investment—ensure investments target high priority and significant disaster risk and recognise that risk reduction reduces future recovery costs

- Understanding governance, ownership and responsibility—ensure all sectors and communities understand the extent to which they are responsible for reducing disaster risk and acting to reduce that risk.

Bushfire Operational Plans (annual)

Bushfire Operational Plans are annual operational plans that sit under the Strategic Bushfire Management Plan and the Regional Fire Management Plan. As stipulated in the Emergencies Act (2004), the Plan is required for all unleased territory land, land occupied by the Territory, and may also be required for other land within the Bushfire Abatement Zone if identified under the Strategic Bushfire Management Plan.

All landholders within the Bushfire Abatement Zone must prepare a Bushfire Operational Plan for that land. Each plan details the specific type, location and timing of fuel reduction, access and infrastructure activities proposed to be undertaken by the landholder. The Bushfire Operational Plan also helps landowner to seek support and assistance through the Rurual Fire Service Farm FireWise program in preventing, preparing, responding and recovering actions and capability in any bushfire event.

Ecological Guidelines for fire, fuel and access management operations

The ecological guidelines provide a set of actions to guide the conservation of the ACT's ecological assets during the planning and implementation of the annual ACT Parks and Conservation Service (PCS) Bushfire Operational Plan (BOP). The guidelines are applicable for prescribed actions. While they may be useful in unplanned fires, the guidelines do not supersede the PCS pre-suppression plans. Preparation of the Ecological Guidelines has been through the Environment, Planning and Sustainable Development Directorate (EPSDD) Conservation Research (CR) Unit. The Unit provides scientific advice to land managers, policy makers and other decision makers on the environment of the ACT with a particular emphasis on biodiversity including declared species and communities. The compilation of the Ecological Guidelines is a synthesis of research knowledge at the time of publication from the ecologists in the Unit and other knowledge available through research networks or publication.

Fire and Cultural Heritage

The ACT Strategic Bushfire Management Plan recognises that aboriginal people developed a sophisticated understanding and use of fire to manage land and resources and reduce bushfire risk. Within this context, there is a commitment to integrate traditional knowledge into landscape management, as part of fuel reduction across the natural and rural landscape of the ACT.

The Plan also proposes establishing an Aboriginal Fire Management Zone within the Tidbinbilla Nature Reserve. Within the zone cultural burning and other cultural activities would be supported to promote bush tucker, production of fibre for weaving, access to bark, traditional medicines and other materials, maintenance of a desirable vegetation structure, and connection of community with country. It is not clear from the Plan, whether the Aboriginal land management practices might be applied in other areas to achieve environmental objectives.

ACT Bushfire Management Standards

The ACT Bushfire Management Standards sets out the technical specifications for the requirements stipulated under the ACT Strategic Bushfire Management Plan. It contains standards for fuel management requirements for fire management zones, specifications for widths for inner and outer asset protection zones and fire access roads. It supports the Fire Services, land managers, developers and general community in achieving effective results in reducing bushfire risk.

ACT Elevated Fire Danger Plan

The ACT Elevated Fire Danger Plan sets out the standing and emergency arrangements for a coordinated all-agencies approach to elevated fire danger conditions in the Territory. It provides information for ACT

Government for preparation during forecast periods of elevated fire danger, ensuring effective liaison and information sharing, establishing roles and responsibilities of organisations involved during these conditions.

ACT Bush and Grass Fire Warnings and Public Information Protocol

The ACT Bush and Grass Fire Warnings and Public Information Protocol is an internal document within the ACT Government to provide guidance and protocols to agencies involved in bush and grass fire incidents. It is included in the Emergencies (Concept of Operations for bush and grass fires in the ACT) Commissioner's Guidelines 2017. The rationale for adding this protocol is to ensure a consistent approach to delivering warnings and public information for bush and grass fire incidents in the Territory. It specifies when and how warning or information is required to be sent to the community in regard to bush and grass fire incidents.

Fire policy analysis

With land-use planning the policy seeks to address components of bushfire risk that stem from human activities. This is particularly relevant on the urban edge where people are increasingly vulnerable to bushfire as population centres expand into bushfire prone land. There are two objectives under land-use planning:

- Land-use policy and planning that reduces bushfire risk. The policy states that the assessment and mitigation of bushfire risk through effective land-use policy and planning will reduce the exposure of built and natural environments to bushfire. The Territory's planning and development regime is based on the concept that bushfire protection is a shared responsibility between the ACT Government, landholders and the public. The responsibility for risk mitigation does not rest solely with government or landholder. A hierarchy of strategic, operational and tactical plans and maps prescribes the ACT's planning and development requirements. They provide a Territory-wide, tenure-neutral approach that reflects the principal purpose for land-use and takes ecological, cultural and heritage considerations into account. These planning frameworks are supported by fire management zones, which identify key areas that warrant specific fuel management actions to reduce risk to the urban area. These include Asset Protection Zones and SFAZs.

- Integrated bushfire protection at the urban edge. The policy suggests a range of complementary measures will be used to achieve integrated bushfire risk reduction on the urban edge. The ACT is unique among Australian jurisdictions in that its rural/urban edge is a clear, fixed boundary, unlike in other jurisdictions where the boundary is less defined. This concentrates a significant number of people in an exposed, bushfire-prone area that has a perimeter of more than 500 kilometres. This concentration renders it vital for integrated measures to be undertaken to protect residents in these areas.

The actions under land use planning are clearly articulated with regards to how planning and land zoning reduces translates to reduction in bushfire risk to social and economic values. There is a strong commitment to targets and specific and actions that are measurable. The strategy is supported by more specific plans, building codes and bushfire management standards

In rural setting and in the forested areas, the bushfire policy evolves mainly around three main components of risk – ignition management, fuel management and building resilience through community engagement and planning. The policy balances investment in technology and research, enhancing operational capabilities through investment in equipment and facilities, improved planning and governance and community outreach and education. There are clear actions that feed into the objectives which are clearly articulated in the policy.

The management of fuels across natural and rural landscape is a major component of the policy when considered in terms of the potential for environmental impacts from management intervention. Fuel reduction can impact on ecosystem function, biodiversity, ecosystem services (e.g., water) and liveability (e.g., air quality). The impacts and trade-offs associated with this management strategy are not clearly articulated in the policy.

The policy recommends research, but the research questions and specific challenges with respect to understanding environmental impacts are sometimes unclear.

Table 16. Summary of Effectiveness ACT Fire Instruments

Instrument (Act, strategy, plan)	Objective / Vision	Assessment of effectiveness
ACT Strategic Bushfire Management Plan (SBMP)(2019-2024)	Provides a strategic framework to protect the ACT community from bushfires and reduce resulting harm to the physical, social, cultural and economic environment of the Territory.	The SBMP (the strategy) provides clearly articulated goals, and specific actions to achieve those goals. The strategy is supported by strong conceptual models of risk and mechanisms for risk reduction. There are clear links to monitoring, evaluation, and research, all of which form part of the adaptive approach advocated by the strategy. The importance of community and government in working together to reduce risk is clearly articulated. It outlines a framework for Government and community to work together and identifies clear policies and standards for land managers. It provides information for the community to better understand bushfires and fire management and to assist them in preparing themselves and their properties In terms of sustainability, and maintaining ecosystem function, there are two points that the strategy acknowledges but which would benefit from more specific definition and targeted actions: • Impacts of fuel management on ecosystem services. Issues are noted in the plan and research needs are articulated. However, there is a need for more clarity around trade-offs and optimisation with regards to ecosystem function and quality. There are trade-offs in bushfire risk reduction and biodiversity values, carbon, air quality and water. • Planning and zoning at the urban-rural interface. The strategy outlines several measures around fuel management and zoning to reduce risk to life and property. It also acknowledges the need to maintain or increase canopy cover in urban settings. There is a conflict here around managing risk through planning and zoning, whilst maintaining ecosystem services that support liveability outcomes that are important to the health and livelihoods of residents.
Regional Fire Management Plan (2019-2029)	The Regional Fire Management Plan (RFMP) is informed by the SBMP, and outlines how bushfire fuel management will be conducted on ACT Government managed land. The RFMP includes the location of prescribed burns where the primary objectives are fuel reduction, ecological or cultural	The plan provides an effective mechanism for a robust planning process to implement fuel management actions in the Strategy. The plan is developed with a view to achieve measurable reduction in risk, whilst maintaining ecological and cultural values:

Instrument (Act, strategy, plan)	Objective / Vision	Assessment of effectiveness
	outcomes. Prescribed burning is used to modify fuels (especially within Asset Protection Zones and Strategic Fire Fighting Advantage Zones) and to maintain vegetation communities within ecological thresholds, particularly within Landscape Fire Management Zones. Prescribed burning is the primary practical means of modifying fuels over large or inaccessible areas.	• Requirements for ecological burning are determined through collaboration with the land manager and the Environment, Planning and Sustainable Development Directorate (EPSDD)Conservation Research unit. • Cultural burns take place in specific locations to meet objectives determined by Traditional Custodians or to meet cultural objectives determined by Murrumbung Rangers. Treatments will be conducted by EPSDD in consultation with Traditional Custodians. Fuel breaks and access routes also form part of the Region Fire Management Plan. Ecological impacts of roads, fuel breaks and fuel reduction activities are considered in the planning phase according to the *Ecological Guidelines for fire, fuel and access management operations,* which provide a set of actions to guide the conservation of the ACT's ecological assets during the planning and implementation of the annual ACT Parks and Conservation Service (PCS) Bushfire Operational Plan (BOP).
Bushfire Operational Plans (annual)	BOPs detail the specific type, location and timing of fuel reduction, access and infrastructure activities proposed to be undertaken by the landholder. Parks and Conservation Service (PCS) implements an extensive ongoing bushfire fuel management program throughout the year in accordance with the annual Bushfire Operations Plan (BOP). The BOP sets out the work and activities that PCS aims to achieve each financial year to help manage bushfire risk. The BOP is a requirement of the Strategic Bushfire Management Plan (SBMP)	The BOPs operationalise the RFMP. The *Ecological Guidelines for fire, fuel and access management operations* provide, which provide a set of actions to guide the conservation of the ACT's ecological assets during the planning and implementation of the annual ACT Parks and Conservation Service (PCS) Bushfire Operational Plan (BOP).

Effectiveness of Policy Portfolio

The ACT Strategic Bushfire Management Plan (SBMP) (2019-2024) is a primary document which sets the fire management policy in ACT. There are clear actions that feed into the objectives which are clearly articulated in the policy (Table 16). The strategy is supported by more specific plans (e.g. operational, local) building codes and bushfire management standards. At the same time, it is aligned and informed by broader policy instruments and frameworks. When considered as a whole, the overall policy as determined by the various acts, strategies and plans, provides a coherent and evidence-based approach to bushfire management in ACT. It balances investment in technology and research, enhancing operational capabilities through investment in equipment and facilities, improved planning and governance and community outreach and education. There is a strong commitment to targets and specific and actions that are measurable.

In rural setting and in the forested areas, the bushfire policy evolves mainly around three main components of risk – ignition management, fuel management and building resilience through community engagement and planning. The management of fuels is a major component of the policy, and one which introduces the potential for environmental impacts from management intervention. Fuel reduction can impact on ecosystem function, biodiversity, ecosystem services (e.g., water) and liveability (e.g., air quality). The impacts and trade-offs associated with this management strategy are not clearly articulated in the policy. The policy recommends research, but the research questions and specific challenges with respect to understanding environmental impacts are sometimes unclear.

At the rural-urban interface land-use planning and zoning is a key instrument for managing risk. The actions under land use planning are clearly articulated with regards to how planning and land zoning reduces translates to reduction in bushfire risk to social and economic values. With land-use planning the policy seeks to address components of bushfire risk that stem from human activities. This is particularly relevant on the urban edge where people are increasingly vulnerable to bushfire as population centres expand into bushfire prone land. There are two objectives under land-use planning:

- Land-use policy and planning that reduces bushfire risk. The policy states that the assessment and mitigation of bushfire risk through effective land-use policy and planning will reduce the exposure of built and natural environments to bushfire. The Territory's planning and development regime is based on the concept that bushfire protection is a shared responsibility between the ACT Government, landholders and the public. The responsibility for risk mitigation does not rest solely with government or landholder. A hierarchy of strategic, operational and tactical plans and maps prescribes the ACT's planning and development requirements. They provide a Territory-wide, tenure-neutral approach that reflects the principal purpose for land-use and takes ecological, cultural and heritage considerations into account. These planning frameworks are supported by fire management zones, which identify key areas that warrant specific fuel management actions to reduce risk to the urban area. These include Asset Protection Zones and Strategic Fire Advantage Zones.

- Integrated bushfire protection at the urban edge. The policy suggests a range of complementary measures will be used to achieve integrated bushfire risk reduction on the urban edge. The ACT is unique among Australian jurisdictions in that its rural/urban edge is a clear, fixed boundary, unlike in other jurisdictions where the boundary is less defined. This concentrates a significant number of people in an exposed, bushfire-prone area that has a perimeter of more than 500 kilometres. This concentration renders it vital for integrated measures to be undertaken to protect residents in these areas.

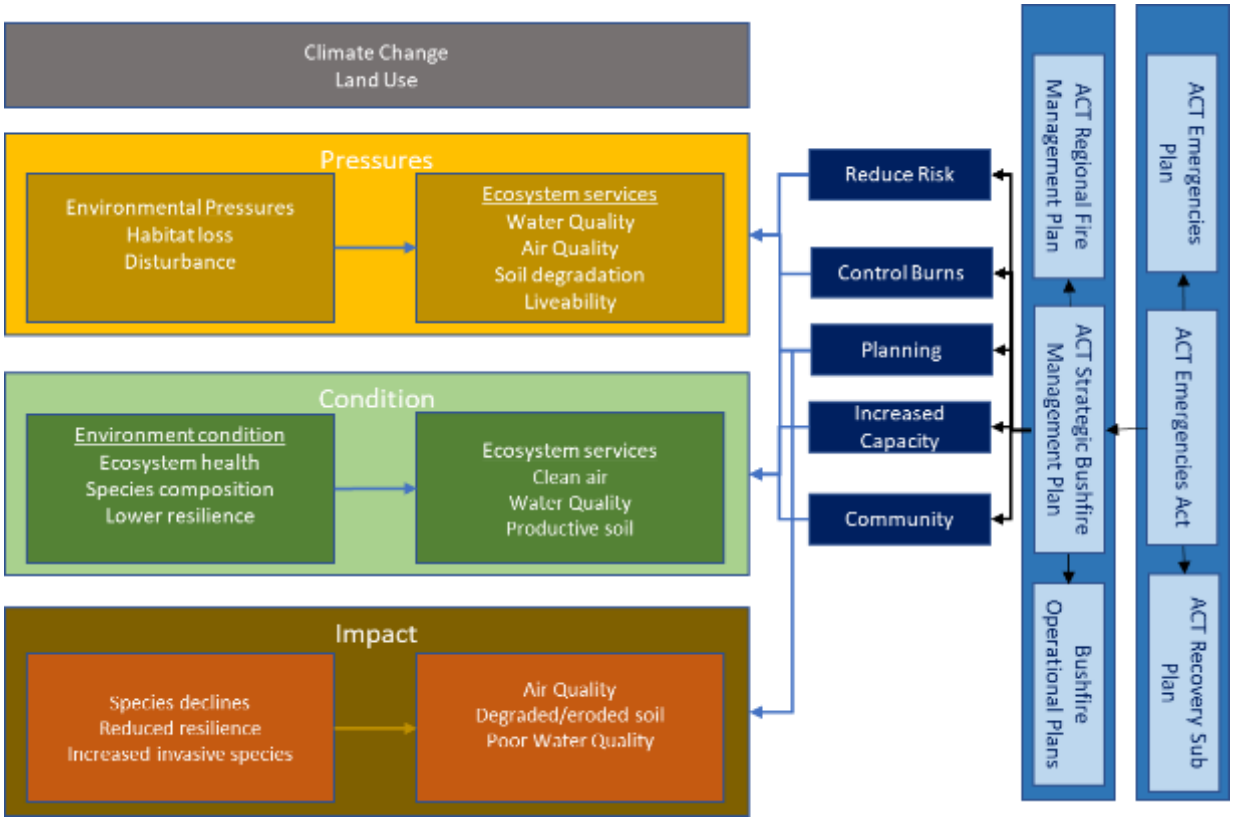


Figure 20. *Illustration of the areas of focus for fire policy in the ACT*

Conclusions and recommendations

The major document guiding the bushfire policy is the ACT Strategic Bushfire Management Plan. The plan is structured around clear objectives and actions with links to measurable targets and outcomes. Strategies are framed around national and international frameworks for disaster risk reduction. Actions are aligned with current state of knowledge related to bushfire behaviour, ecology and proved mechanisms for effective bushfire protection. It has a strong emphasis on monitoring and evaluation with specific actions around improvement and adaptive management that is informed by research.

Some limitations in the current bushfire management policy:

- The policy does provide a basis for prioritising actions and assess return on effort in investment in measures for bushfire protection and maintenance of ecosystem services. It would be beneficial for the policy to provide some measure of priority attached to actions and recommendation for research.

- The policy does not explicitly address issues associated and trade-offs between bushfire protection and maintenance of ecosystem services. There is strong emphasis on monitoring and evaluation and specific recommendation for areas of future research. However, these are not framed in the context of optimising fire regimes and fuel management to provide protection for communities whilst supporting biodiversity values and maintaining ecosystem values.

- The issue of increasing population size and increasing exposure to risk in bushfire prone land at the rural-urban interface. Maintaining liveability and ecosystem function in these settings whilst protecting communities from fire is a major challenge. The strategy 'supports government tree canopy targets through the development of urban vegetation guidelines to limit the risk of fire spread and other measures to increase infrastructure resilience.' However, there is no specific reference to how this outcome will be achieved.

Attachment 7. Policy Assessment (Air Pollution)

Air Pollution Policy Assessment

Air pollution policy summary

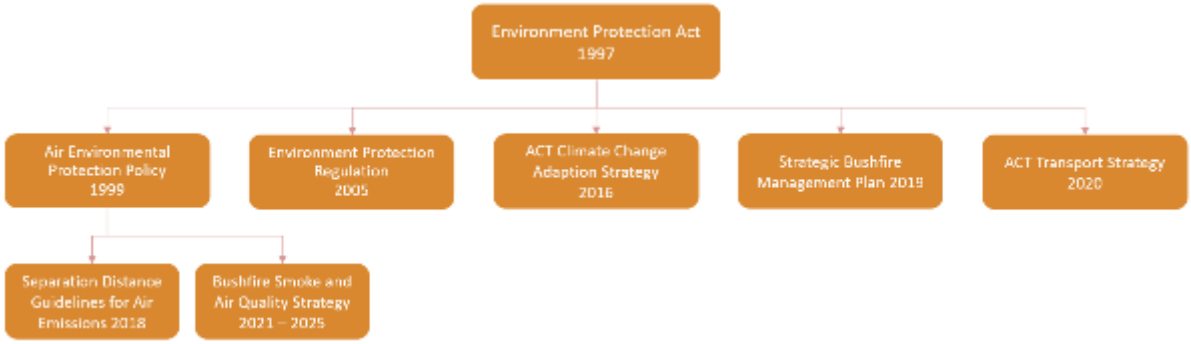


Figure 21. Policies, strategies and acts related to air pollution in ACT.

Progress snapshot

Following the 2019-20 summer, when the ACT and surrounding areas were subject to extended periods of unprecedented extreme smoke pollution from bushfires it became clear that there is a complex relationship between the health, environment, social and economic impacts of poor air quality, and also a significant link between climate change, bushfires and air quality that needs to be addressed. In response the Bushfire Smoke and Air Quality Strategy (2021-2025) was developed. In addition the Act Transport Strategy 2020 and Zero-Emission Transition Plan for Transport Canberra policies have been released which focus on transport and climate (greenhouse gas emissions) but also have implications for air quality impacts on the community.

At a federal level, since the 2019 ACT State of Environment Report, the NEPM (ambient air quality) goals for ozone, NO_2 and SO_2 have been revised and draft regulation impact statements have been released for light and heavy vehicles which propose mandates for Euro 6/VI emissions standards.

Air pollution policy context

There are a range of both relevant commonwealth and ACT specific policies relating to air quality in the ACT (Figure 21). As the ACT is bordered by NSW it is also important to consider how NSW's polices and near border activities and planning may impact upon air quality in the ACT. The policies have been reviewed with regard to a modified drivers, pressures, state, impact and response (DPSIR) framework.

The key drivers/ human activities which impact air quality are identified as climate change, intensified urbanisation (reduction in urban vegetation), growing population (expanding urbanisation), aging population (greater sensitivity to air pollution) and increased transport and energy demands.

Air quality pressures include domestic emissions (i.e. wood heater smoke, small engines), industry, transport, land use conflicts, bushfires and hazard reduction burns, and health and wellbeing.

The resulting state or condition could be a decline in air quality and a population with greater sensitivity to air pollution.

Impacts from these conditions could include a decline in physical and mental health and a decline in air quality amenity. National Clean Air Agreement

The National Clean Air Agreement was established to address the impacts of air pollution on human and environmental health. The agreement provides a framework to identify and prioritise specific air quality issues where concentrated effort is needed to optimise health, environmental and economic outcomes for Australians and to formalise cooperative management of air quality at the national, state and local levels to help develop effective and efficient policy settings that enable swift and informed responses to current and emerging air quality priorities.

The Agreement identifies existing air quality issues including pollutant levels frequently approaching or exceed national air quality standards and continued major human health concerns due to air pollution. Future drivers that risk accelerating air pollution impacts identified in Australia include population growth and ageing population, urbanisation, increased transport and energy demands.

The agreement aims to improve human and environmental health outcomes, empower communities to better deal with air pollution and to ensure air quality policy development and implementation is underpinned by up-to-date and robust information and evidence.

The Agreement considers four strategic approaches:

- Standards ensure consistent approach to monitoring and reporting air quality
- Emission reduction measures are targeted towards reducing air pollution and/or population exposure to air pollution with associated health outcomes
- Partnership and cooperation activities will complement government action to address air quality issues by fostering partnership opportunities aimed at promoting and sustaining improved air quality outcomes
- Better knowledge, education and awareness are essential requirements to inform policy decisions and to help empower communities and individuals to better deal with air pollution

Two Work Plans (2015-2017 and 2018-2020) have been developed under the National Clean Air Agreement. These work plans set out the timeframes for implementing actions.

Actions delivered under the 2015-2017 work plan included strengthened ambient air quality reporting standards for particulate matter pollution and the introduction of product emission standards for new outdoor power equipment and marine engines.

Actions on the 2018-2020 work plan include:

- Review of latest scientific evidence of health impacts in relation to annual average PM_{10} standards
- Review the national ambient air quality standards for SO_2, NO_2 and ozone, fuel quality standards and the National Pollutant Inventory
- Review legislative instruments made under the Fuel Quality Standards Act 2000
- Review the need for the Air Toxics and Diesel Vehicle Emissions National Environment Protection Measures (NEPMs)
- Reduce emissions from wood heaters
- Evaluating the potential for a national approach to managing non-road diesel engine emissions
- Engage and explore opportunities with non-government stakeholders to positively influence air quality outcomes
- Improve access to reliable air quality information for researchers, policy makers and the community

- National Pollutant Inventory reforms

Australia State of the Environment

Every five years the Australian Government engages independent experts to prepare the Australia State of the Environment reports. Previous versions include 1996, 2001, 2006 and 2001. The latest version is the 2016 report with the 2021 report anticipated to be released in 2022.

The purpose of these reports is to provide a strategic view to shape policy and action, engage with users to influence behaviour and assist with assessing our interventions as stewards for the Australian environment using the principles of collaborative partnerships to combine science, traditional and local knowledge.

The 2016 report included a review of ambient air quality including pressures affecting Australia's air quality, air quality trends, management, resilience, risks and the outlook for Australia's air quality. The objective of this report is to inform decision making at a national level by providing a more strategic focus on planning for a sustainable future.

These reports and their predecessors feed into the National Clean Air Agreement and work plans.

National Environment Protection Council

The National Environment Protection Council was established under the National Environment Protection Council Act 1994. The primary function of the National Environment Protection Council is to make National Environment Protection Measures (NEPM) and to assess and report on the implementation and effectiveness of NEPMs in participating jurisdictions. There are several measures that relate to air quality as discussed in the sub-sections below.

National Environment Protection (Ambient Air Quality) Measure

The National Environment Protection (Ambient Air Quality) Measure is a commonwealth policy for ambient air quality that aims to minimises the risk of adverse health impacts from exposure to air pollution.

The NEPM provides specific ambient air pollutant targets and future (2025) targets as outlined in Table 17 and Table 18 to achieve this goal.

In line with the National Clean Air Agreement 2018-2020 work plan, the National Environment Protection (Ambient Air Quality) Measure standards for SO_2, NO_2 and ozone were varied in 2021.

Table 17. NEPM standards for pollutants.

Pollutant	Averaging period	Maximum concentration standard
CO	8 hours	9.0 ppm
NO_2	1 hour	0.08 ppm
	1 year	0.015 ppm
Ozone	8 hours	0.065 ppm
SO_2	1 hour	0.10 ppm
	1 day	0.02 ppm
Lead	1 year	0.50 µg/m^3
PM_{10}	1 day	50 µg/m^3
	1 year	25 µg/m^3
$PM_{2.5}$	1 day	25 µg/m^3
	1 year	8 µg/m^3

Table 18. NEPM goals from 2025.

Pollutant	Averaging period	Maximum concentration standard
SO_2	1 hour	0.075 ppm
$PM_{2.5}$	1 day	20 µg/m^3
	1 year	7 µg/m^3

The NEPM policy is implemented by requiring relevant jurisdictions including the ACT to monitor, assess and report carbon monoxide (CO), nitrogen dioxide (NO_2), photochemical oxidants (as ozone), sulfur dioxide (SO_2), lead, particles as PM_{10} and particles as $PM_{2.5}$.

ACT Health operate three air quality monitoring stations (Civic, Monash and Florey). It is noted that the Civic monitoring station does not satisfy the NEPM compliance monitoring requirements. These monitors do not currently measure lead which ceased in 2002 with the phase out of leaded petrol and SO_2 has never been monitored due to a "lack of heavy industry".

The monitoring data is reported and assessed against the NEPM standards and Air Quality Index (AQI) which categorises the air quality ranging from "very good" to "hazardous" based on the NEPM standards.

This live access data is used to inform the community about air quality and provide general health advice and recommended actions (i.e., when air quality is poor or worse, limiting/avoiding outdoor activity). ACT Health will assess the air quality and publish a public health alert if required.

The ACT Environment Protection Authority (EPA) prepares annual reports under the National Environment Protection (Ambient Air Quality) Measure. It is understood that from 2019 onwards, the annual air quality reports adopt a lower annual average PM_{10} goal of 20µg/m^3 in line with the ACT policy position which is more stringent than the NEPM standard of 25µg/m^3.

National Environment Protection (Air Toxics) Measure

The National Environment Protection (Air Toxics) Measure is a commonwealth policy for air toxics that aims to improve the information base regarding ambient air toxics with the Australian environment in order to facilitate the development of standards.

The pollutants to which this measure applies are benzene, toluene, formaldehyde, xylenes and benzo(a)pyrene as a marker for polycyclic aromatic hydrocarbons.

The measure references stages for identifying sites for monitoring and evaluating monitoring results. It is understood that a mid-term review suggested that most of the pollutants were below the monitoring investigation levels and thus air toxics are measured by the states and territories as needed (Australia State of the Environment 2016).

Ambient air toxics are not measured at the ACT Health operated air quality monitoring stations.

National Environment Protection (National Pollutant Inventory) Measure

The National Environment Protection (National Pollutant Inventory) Measure is a commonwealth policy. The goal of this measure is to collect a broad base of information on emissions and transfers of substances on the reporting list, and to disseminate the information collected to all sectors of the community in a useful, accessible and understandable form.

This measure is implemented by requiring facilities which trigger the reporting thresholds to provide annual reports estimating their emissions (including emissions to air).

National Environment Protection (Diesel Vehicle Emissions) Measure 2001

The National Environment Protection (Diesel Vehicle Emissions) Measure is a commonwealth policy that aims to reduce exhaust emissions from diesel vehicles, by facilitating compliance with in-service emissions standards for diesel vehicles.

It is acknowledged that emissions from diesel vehicles have the potential to cause adverse health effects and detract from urban amenity.

The measure identifies four broad approaches for managing vehicle emissions:

- Specify emissions standards for new vehicles
- Specify emissions standards for in-service vehicles
- Provide appropriate clean fuels
- Reduce vehicle use and encourage efficient driving behaviour

With regards to in-service vehicles, the measure provides guidelines for smoky vehicle programs, emissions testing and repair programs, audited maintenance programs for diesel vehicles, and diesel vehicle retrofit programs.

This measure feeds into the vehicle emissions and fuel standards discussed in following sections.

Related national policies

Vehicle Emission Standards

The Department of Infrastructure, Transport, Regional Development and Communications provides vehicle emission standards. The current minimum standard for new light vehicles in Australia is based on Euro 5 standards and the current minimum standard for new heavy vehicles in Australia is based on the Euro V standards.

In 2020, draft Regulation Impact Statements were release for public consultation discussing options to further reduce emissions from light and heavy vehicles. The draft statements propose that the Government mandate the Euro 6 standards for light vehicles and Euro VI standards for heavy vehicles.

The introduction of these standards would result in significant projected decreases in NO_x and $PM_{2.5}$. Increasing the number of vehicles meeting more stringent vehicle standards would complement actions under the National Clean Air Agreement and National Environment Protection (Ambient Air Quality) Measure.

The importation of compliant vehicles by vehicle suppliers is enforced at a federal level.

It is noted that the current Australian vehicle emissions standards generally lag the international standards in similarly developed nations by approximately ten years. In the past this may have assisted the (now non-existent) Australian vehicle manufacturers, and was needed due to poor Australian fuel quality standards (which only exacerbates pollution further). Whilst some car makers have been importing new vehicles that surpass Australian requirements, the net effect however is that the majority of vehicles sold in Australia generate unnecessarily higher levels of emissions, resulting in excessive pollution effects whilst these vehicles remain in the fleet, potentially for decades longer than may be necessary.

States and territories are part of the COAG, and can influence national policy in this regard. They can also implement policies that can materially favour fewer polluting vehicles (e.g., at the time of registration etc).

Fuel Standards

The Fuel Quality Standards Act 2000 and The Fuel Quality Standards Regulation 2019 are used to regulate the quality of petrol and diesel sold in Australia. In terms of air quality, the Department of Industry, Science, Energy and Resources states that these fuel standards seek to reduce fuel pollutants and emissions. The following specific fuel standards are made under the Fuel Quality Standards Act 2000:

- Fuel Quality Standards (Petrol) Determination 2019
- Fuel Quality Standards (Ethanol) Determination 2019
- Fuel Quality Standards (Automotive Diesel) Determination 2019
- Fuel Quality Standards (Biodiesel) Determination 2019
- Fuel Quality Standards (Autogas) Determination 2019

- Fuel Quality Standards (Ethanol E85) Determination 2019
- Fuel Quality Standards (Register of Prohibited Fuel Additives) Determination 2019

Compliance with the fuel standards in the ACT is enforced via labelling requirements, inspections and testing. The relevant stakeholders impacted by these standards are the Federal Government, ACT Government and fuel suppliers.

It is noted that the current Australian vehicle emissions standards lag behind the international standards.

Product Emissions Standards

The Product Emissions Standards Act 2017 and Product Emissions Standards Rules 2017 establishes a national framework to address air pollution and minimise adverse impacts on human and environmental health emanating from certain products.

In line with the National Clean Air Agreement 2015-2017 work plan, product emission standards were introduced for new outdoor power equipment and marine engines.

Under the National Clean Air Agreement 2018-2020 work plan, the potential for a national approach to manage non-road diesel engine emissions is being evaluated.

Description of air pollution policies in the ACT

Environment Protection Act 1997

The Environmental Protection ACT 1997 establishes the Environment Protection Authority (EPA) as the statutory decision maker for environmental regulation and policy (including air quality).

The Environmental Protection ACT 1997 aims to:

- Protect and enhance the quality of the environment
- Prevent environmental degradation and risk of harm to human health by promoting the following:
    - Pollution prevention;
    - Clean production technology;
    - Reuse and recycling of materials;
    - Waste minimisation programs;
- Require people engaging in polluting activities to make progressive environmental improvements;
- Achieve effective integration of environmental, economic and social considerations in decision-making processes;
- Facilitate the implementation of national environment protection measures under national scheme laws;
- Provide for the monitoring and reporting of environmental quality on a regular basis;
- Ensure that contaminated land is managed having regard to human health and the environment;
- Coordinate activities needed to protect, restore or improve the ACT environment;
- Establish a process for investigating and, where appropriate, remediating land areas where contamination is causing or is likely to cause a significant risk—
    - of harm to human health; or
    - of material environmental harm or serious environmental harm.

The Act sets out people's general environmental duty to take steps that are practicable and reasonable to prevent or minimise environmental harm or environmental nuisance.

The EPA is responsible for the administration of the subordinate regulations and policies. The General Environment Protection Policy provides a useful summary of the legislative instruments available to the EPA.

These instruments focus on individual activities more so than on the direct connection between air quality, planning and greenhouse gas emissions. Under this Act the EPA can regulate and manage air quality through the following instruments:

- Environmental Protection Agreements – formal agreement between the EPA and businesses (primarily issued for land development) which allow businesses to manage their environmental performance in partnership with the EPA.
- Environmental Authorisations – a form of licence to conduct an activity which has a significant potential to cause environmental harm (activities that require environmental authorisation are specified in the Act). Environmental authorisations for facilities may include reporting requirements, air emission standards, monitoring/testing requirements, requirements for specific air quality mitigation measures and management plans.
- Environmental Improvement Plans – formal plans to improve the environmental performance of an activity and achieve best environmental practice over time. These can be voluntary or compulsory.
- Environmental Audits – assessment of an activity to identify the source, cause or extent of environmental harm or breaches of the Act resulting from the activity, determine the need for any change in management practices to reduce environmental impact or identify the extent and nature of any contravention or likely contravention. For both voluntary and compulsory environmental audits, the EPA would expect the environmental auditor engaged to be an EPA approved auditor.
- Emergency Plan – plans for dealing with the foreseeable but unplanned entry into the environment of unauthorised pollutants, where they may cause serious or material environmental harm.
- Financial Assurances – a financial assurance is a type of bond or security and acts as a financial guarantee that certain environmental harm will not result from the actions of the activity manager.
- Environmental Protection Orders – issued where the EPA is satisfied that the person has breached the Act or an environmental authorisation condition. The order requires the person to do, or not do, specified things to remedy the breach of the Act or environmental authorisation.
- Injunctive Orders – the EPA can apply to the ACT Supreme Court for injunctive orders. The Supreme Court can make in an injunctive order against a person/s where is it satisfied that the person/s has, is or is likely to contravene an environmental authorisation, environment protection order or a provision of the Act and serious or material environmental harm has happened, is happening or is likely to happen. An injunctive order can prevent, stop or remedy contraventions of the Act.
- Infringement notices – imposed under the Magistrates Court (Environment Protection Infringement Notices) Regulation 2005. Infringement notices do not fit easily into the traditional divisions of the law. An infringement notice is issued because an offence has allegedly been committed, but payment of the fine does not lead to a criminal conviction being recorded. On the other hand, if a person elects to have the matter heard, criminal proceedings are commenced in respect of the relevant minor environmental offence.
- Enforceable Undertakings – an alternative to infringement notices and criminal prosecutions. They are voluntary binding agreements that must be proposed by an alleged offender and accepted by the EPA. An enforceable undertaking requires the alleged offender to undertake tasks to settle an alleged contravention of the Act and remedy the harm to the environment and the community.

Environment Protection Regulation 2005

The Environment Protection Regulation 2005 was made under the Environment Protection Act 1997. Part 2 refers to emissions into the air identifying causes of environmental harm and offenses for the following:

- Chimney emissions,
- Open air fires,
- Burning, fires and firewood,
- Solid fuel-burning equipment,
- Air-filtration plants,
- Balloons, and
- Pollutants emitted from motor vehicles

Division 2.4A Solid fuel-burning equipment includes particulate emission factors. This regulation is enforced by the EPA.

Environment Regulation & Protection Compliance & Enforcement Guideline 2016

The Compliance and Enforcement Guideline is a tool intended to assist regulators in understanding the general principles of compliance and enforcement and the types of actions available under the legislation.

General Environment Protection Policy

This policy is a general environment protection policy designed to help people understand environmental protection policies, the Environment Protection Act 1997 and the Environment Protection Regulation 2005. It contains information and policies common to several areas of environment protection including air quality.

Air Environment Protection Policy

This Air Environment Protection Policy was prepared in accordance with the Environment Protection Act 1997. It provides information relating to the management of ambient air quality and pollutant emissions to the atmosphere in the ACT.

The objective of this policy is to ensure that air quality in the ACT at least meets national standards for ambient air and to minimise environmental harm from local emissions of air pollutants.

This document provides details on and references to the relevant policies and/or guidelines for:

- Ambient air quality,
- Emission of air pollutants,
- Industrial including commercial activities,
- Transportation activities, domestic,
- Social, rural and open space management activities, and
- Environmental management instruments.

This policy is enforced by the EPA.

Public Health Act 1997

The Public Health Act aims to protect the public from public health risks including those associated with facilities, equipment, products and activities and through the monitoring of health indicators, to provide the public with information about the health of the population and to design and implement appropriate policies and programs for the maintenance and improvement of the population's health.

As stated with regards to the National Environmental Protection Measures, ACT Health operate three air quality monitoring stations. The live access data is used to inform the community about air quality and provide general health advice and recommended actions (i.e., when air quality is poor or worse, limiting/avoiding outdoor activity). ACT Health will assess the air quality and publish a public health alert if required.

In specific reference to air or air quality, the Act only states that "*A person must not, without reasonable excuse, fail to notify the chief health officer of the presence or occurrence, at a place occupied by the person, in any food, water or air or elsewhere in the environment, of any substance or matter that the person has reasonable grounds for believing to constitute a significant public health hazard*." This relates only to a requirement to notify any air quality related public health hazards, for example, from an industrial facility.

In terms of public health, the WHO identifies that *"air pollution is one of the greatest environmental risk to health*". As such, it is reasonable to expect greater emphasis on air quality in the Public Health Act.

Australian Capital Territory (Planning and Land Management) Act 1998

The object of the Territory Plan is to ensure the planning and development of the Territory to provide the people of the Territory with an attractive, safe and efficient environment in which to live and work and have their recreation.

Planning and Development Act 2007

The Planning and Development Act aims to provide planning and land system that contributes to the orderly and sustainable development of the ACT.

The act requires an environmental impact statement assessment (which may include an assessment of air quality impacts) for some development proposals.

ACT Planning Strategy 2018

The ACT Planning Strategy 2018 is used to inform the future development of Canberra. It includes consideration of environmental policy and aims to support sustainable development. Planning strategies have implications for air quality as there can be conflict between sensitive land uses such as residential with emitters of air pollution such as from industrial precincts.

This strategy includes consideration of the ACT and NSW border interface and supports the provision of adequate buffer areas between the urban areas of the ACT and adjoining land uses within NSW in order to achieve compact and efficient growth, avoid land use conflict, protect rural and environmentally important areas, and maintain the setting and approaches to the National Capital. It specifically discusses a residential development buffer zone proposed by the Yass Valley Council and the Queanbeyan-Palerang Council South Jerrabomberra residential release near industrial land use in the ACT. This feeds into the ACT-NSW Memorandum of Understanding for Regional Collaboration.

Separation Distant Guidelines for Air Emissions

The Separation Distance Guidelines for Air Emissions is a tool to aid in the assessment of development proposals. The guideline is intended to be used by planning and land authorities, developers, planning consultants and the community. The guideline aims to protect the air quality amenity of residential and other sensitive land uses and to also protect industry from encroachment by sensitive land uses by providing recommended separation distances between various emitters and sensitive land uses.

The dual application of the guideline to both industrial development and also residential encroachment upon industry is considered to be a strength and is encouraged to be developed as a principle to be applied more widely in the planning and environmental policy framework.

It is noted however that the guideline does not cover some common activities (e.g., sewage works), and is relatively crude in terms of its utility for achieving efficient land management. For example, some of the separation distances do not appear to be adequate in all cases, and some may be too large, noting that the guideline makes it clear that it is but one of many tools that can be used, and that it *"…is not an alternative to the provision of appropriate planning policies and zoning"*.

Whilst it is certainly better than having no guideline at all, the concern we raise about this guideline is that it is one of the few clear and direct such guidelines in the ACT and due to this, it may in effect be used primarily for making planning decisions due to the absence of more effective planning policies and zonings.

The guideline, without more detailed supporting planning and assessment guidelines, is not perhaps the ideal tool to meet the objectives of the Territory Plan (per the Australian Capital Territory (Planning and Land Management) Act 1988), which are for "…*an attractive, safe and efficient environment in which to live and work …"*.

Environmental Guidelines for the Preparation of an Environment Management Plan

This document provides guidance on the preparation of environmental management plans. It provides the objectives and requirements for managing air, particulate/dust and odour.

Guideline for Stockpile Management

This document provides guidance on stockpile management for bulk solids. With regards to air quality, it provides management measures for dust emissions, odour emissions and biogas emissions.

Environmental Guidelines for Petroleum Storage in the ACT

This document provides guidance on the EPA's preferred methods for the installation, operation, maintenance, and removal of aboveground and underground petroleum storage systems, including used oil storage systems. With regards to air quality, it provides guidance on vapour recovery systems.

Environment Protection Guidelines for Construction and Land Development in the ACT

This document provides guidance on the EPA's preferred methods for pollution control design, construction operation and maintenance. With regards to air quality, it identifies that mismanagement of air quality from construction sites can have determinantal effects on health and amenity and provides guidance on measures to limit effects on air quality by minimising dust from construction activities and smoke from fires.

The ACT's Transition to Zero Emissions Vehicles Action Plan 2018-21

This action plan outlines the ACT's policy to transition to "zero emission" vehicles, which are vehicles that do not emit any greenhouse gas emissions, and include plug-in hybrid electric, battery electric and hydrogen fuel cell electric cars, as well as electric bikes. Other zero emissions forms of transport, such as walking and cycling, are not addressed in this action plan.

While this policy is predominately aimed at reducing greenhouse gas emissions, the stated benefits of the plan include reducing air pollution.

It is important to understand that there is no such thing as a zero air emissions vehicle. This is because invariably all vehicles have brakes and tyres, and brake, tyre and road wear causes the majority of harmful emissions in the form of fine particulate matter. Whilst the overall effect of removing exhaust emissions is of course a net benefit, it needs to be recognised that the reduction in the exhaust particulate emissions is somewhat offset because electric vehicles weigh more than fossil fuel powered vehicles, and have relatively higher brake, tyre and road wear emissions.

The plan outlines actions to facilitate the transition to zero emissions vehicles and incentives to promote the increase in uptake of zero emissions vehicles including:

- Transitioning ACT Government fleet passenger vehicles to zero emissions vehicles
- Amend the Parking and Vehicle Access General Code to require all new multi-unit and mixed-use developments to install vehicle charging infrastructure.
- Work with local and state governments to facilitate the installation of charging stations on major routes to and from Canberra including routes to Sydney and coastal areas.
- Zero stamp duty on new zero emissions vehicles
- Discounts on registration fees
- Permit zero emissions vehicles to drive in transit lanes until 2023
- Conduct a feasibility assessment for the installation of covered car parks with solar powered vehicle charging stations

- Investigate providing incentives to encourage the use of electric bikes including through more secure bike parking and bike charging stations.
- Amend tax arrangements to allow ACT Government staff to salary sacrifice an electric bike.
- Support new and innovative businesses in the zero emissions vehicles sector to maximise job creation and economic development in the ACT.
- Investigate the potential use of electric vehicle batteries to support the electricity grid at times of peak demand.
- Review parking and traffic regulations to ensure that priorities offered to zero emission vehicles can be enforced; and provide specific zero emissions vehicle number plates for easy identification and enforcement of zero emissions vehicles related regulations (e.g., ensuring only zero emissions vehicles park and charge in allocated spaces for vehicle charging).

Zero Emission Transition Plan for Transport Canberra

The Zero-Emission Transition Plan for Transport Canberra outlines the pathway to achieve the ACT Government's ambition of zero-emission public transport system by 2040. While this policy is predominately aimed at reducing greenhouse gas emissions, the benefits of the plan include reducing air pollution from vehicles including NO_x, SO_x, particulate matter, hydrocarbons and CO which can lead to harmful health effects.

The plan outlines five strategic priorities for achieving this goal:

- Building infrastructure i.e., upgrade bus depots to support zero-emission buses
- Procuring zero-emission buses
- Partnering with the energy sector
- New skills, protecting jobs and growing the economy
- Increasing public transport use through better buses and better services

ACT Transport Strategy 2020

The ACT Transport Strategy 2020 provides a framework for planning and investment in transport for the next 20 years. With regards to air pollution, the strategy identifies traffic as the source of approximately 60% of Canberra's total Particulate Matter pollution.

$PM_{2.5}$ levels can be reduced by decreasing car use and increasing the use of walking, cycling and public transport. Switching to zero emissions technologies such as electric vehicles is a further way to decrease pollution in our air.

- Transition public transport to zero emissions by 2040.
- Accelerate and support the uptake of zero emissions vehicles
- Encourage the uptake of zero emissions vehicles for private use by exploring and trialling financial incentives
- Investigate regulatory options to encourage the uptake of zero emissions vehicles in commercial vehicle fleets
- Develop partnerships with industry to trial zero emissions freight options.
- Continue to work with the Commonwealth Government to encourage the uptake of electric vehicles and with NSW Government on regional charging infrastructure to support Canberrans travelling interstate by electric vehicle.
- Encourage walking and cycling (including the uptake of electric bikes) by continuing to improve infrastructure and walkability.
- Prioritise improving public transport services and supporting infrastructure, including buses, Light Rail Stage 2 and connecting services.

ACT Government policy and programs that support climate choices

The ACT Government has a range of community programs on its website that support the net zero emissions target by 2045. Some examples which specifically relate to minimising exposure to air pollution are given in sub-sections below.

Wood heater replacement program

The ACTsmart Wood Heater Replacement Program aims to reduce the level of air pollution by helping residents replace their wood heater with a more efficient electric heater. Rebates are available for households removing/decommissioning wood heaters and replacing wood heaters with reverse cycle systems.

Generally, wood heater emissions tend to be the main, or at least a very significant contributor to poor air quality, and strategies like this policy that focus to replacing wood burning altogether, and instead using clean, renewable energy forms should be given a high priority, and possibly increased funding.

Food waste challenge

In terms of air quality, the Food Waste Challenge aims to reduce methane produced from landfill by providing households with advice for reducing food waste.

Ride or Walk to School Program

The Ride or Walk to School Program is part of the ACT's commitment to net zero emissions by 2045. Encouraging children to walk or ride to school aims to minimise traffic around schools and reduce air pollution.

Access Canberra

The ACT Government via Access Canberra provide a number of fact sheet resources to assist people in managing air quality.

Dust Suppression During Construction
This fact sheet identifies that construction dust can have determinantal effects on health and amenity and provides a range of alternative dust suppression measures to mains water use.

Air Pollution from Domestic Premises
This fact sheet recognises that ACT residents have a general environmental duty to take all practicable and reasonable steps to prevent or minimise environmental harm or environmental nuisance from activities. It provides guidance on substances prohibited from burning, open air fires, indoor fires, spray painting, motor vehicles and legal requirements.

Your Guide to Using a Wood Heater
This fact sheet identifies winter particle pollution from wood smoke as being harmful to health and the environment. It provides guidance for the efficient operation of a wood heater, burning techniques, buying and storing wood, heater and flue maintenance and legal requirements.

Preventing Pollution from Painting
This fact sheet identifies that spray painting has the potential to cause air pollution and provides guidance for managing air pollution from spray painting.

Odour Management in Retail Food Businesses
This fact sheet identifies that odour from retail food businesses can impact the community. It provides guidance on ventilation, design and construction, discharge, cleaning and maintenance, avoiding odour problems and legal requirements.

Minimum Standards for Submission of Pollution Control Plans
This fact sheet provides guidance for preparing a Pollution Control Plan for the Environment Protection Authority including dust suppression.

ACT–NSW Memorandum of Understanding for Regional Collaboration

In December 2016 the ACT–NSW Memorandum of Understanding for Regional Collaboration 2016–19 was signed, followed by the revised ACT-NSW Memorandum of Understanding for Regional Collaboration in June 2020. The provisions of the MoU are not legally enforceable but rely on the spirit of cooperation between the two jurisdictions.

The 2020-2021 Priority Focus Area Plans and 2020-2021 Ongoing Cross-Border Issues addendum documents outline the focus of the agreement between the two jurisdictions.

Response to the 2019 State of the Environment Reporting

The ACT is required to undertake 4-yearly State of the Environment reporting per the Commissioner for Sustainability and the Environment Act 1993. This reporting provides an independent assessment of the state and trends of the ACT's environment, the pressures on it and their impacts, the management initiatives that are in place to address environmental concerns, and the effectiveness of those initiatives.

The Commissioner uses these studies to provide recommendations to assist the ACT Government to make strategic and practical decisions, and to undertake specific actions to improve environmental outcomes.

The 2019 key actions/recommendations for air quality were:

- Build on the incentives to encourage the replacement of wood heaters, specifically targeting the Tuggeranong Valley.
- Increase the number of National Environment Protection (Ambient Air Quality) Measure compliance monitoring stations.
- Undertake an assessment of air pollutant emissions from diffuse sources to update the National Pollutant Inventory data from 1999.
- In collaboration with health professionals, improve knowledge of the impacts of air pollution on human health and the associated costs to the health system and economy.

The following summarises the ACT Governments response to the State of the Environment 2019 air quality recommendations.

Wood heaters
ACTsmart administers a Wood Heater Replacement Program to support householders to replace wood heaters with energy efficient electric heating options. The Government will consider potential further options to support the replacement of wood heaters with less polluting options.

Monitoring
The ACT Government is considering expanding the air quality monitoring network with several smaller stations around the region that only monitor particulate matter. At this stage it is understood that increasing monitoring of other pollutants is considered unlikely to benefit the community.

Assessment of air pollutant emissions from diffuse sources
This recommendation was not agreed with. The ACT Government considers that there is limited benefit in undertaking a diffuse source emissions inventory in the ACT due to the lack of industry in the ACT.

Health impacts of air pollution

The ACT Health Directorate has engaged the Centre for Air Pollution, to undertake more detailed research into the health impacts and costs associated with particulate pollution in the ACT. This work will inform future policy direction.

Air pollution policy analysis

The section compares the management of air quality in the ACT with national and international jurisdictions.

National

In general, air quality in the ACT is regulated in a similar fashion to other states and territories within Australia primarily relying on legislative acts and regulations administered by an "EPA" and supported by various guidelines.

Air quality management in ACT, but also for most other states and territories in Australia, refers to the national health-based NEPM standards.

ACT doesn't have best practice guidelines, but has a general environmental duty, which whilst good, sets a lower benchmark than other states where best practice is required for any activity with toxic emissions (i.e., for most industrial activities).

The current ACT strategies appear to have generally similar air quality priority areas to NSW (as described in the NSW Clean Air Strategy 2021-2030) including better preparedness for pollution events such as bushfires and hazard reduction burns, reducing wood heater emissions and reducing air emissions and impacts from vehicles.

However, the ACT does not identify improving management of air emissions from industry as a priority. Air emissions from industrial activities do not appear to be a significant a focus in the ACT, as in other Australian states and territories.

While the ACT's separation distance guidelines are a very useful planning tool, this is very general, and imprecise, and may not lead to optimal outcome sin many cases. It can hover minimise the risk of excessive impacts for the limited activities the guideline covers. We consider this to be a useful, efficient guideline that could be expanded, and refined periodically to retain currency.

In comparison with other jurisdictions, ACT does not prescribe guidelines for how to conduct an air assessment, or for the measurement or modelling of air quality. This can be helpful in providing the regulator with maximum flexibility; however, it is also likely to cause additional governance burden (requiring a higher degree of expertise, time and resources) when assessing, approving and regulating industry as each decision may need to be justified from first principals, and is more open to challenge.

While the ACT has planning requirements for environmental impact statement assessments, unlike some other jurisdictions, the ACT does not appear to provide specific guidance on the modelling and assessment of air pollutants. For example, NSW promulgates the Approved Methods for the Modelling and Assessment of Air Pollutants in NSW and Victoria has the Guideline for Assessing and Minimising Air Pollution in Victoria. These guidelines provide an assessment methodology including ground level impact assessment criteria for a range of pollutants beyond those specified in the NEPM standards. In light of cross-border considerations, it would be pragmatic to potentially accept on equal terms or more formally adopt the NSW guidelines, especially as these are due for update in 2022.

The NSW Protection of the Environment Operations (Clean Air) Regulation 2021 includes standards of concentrations for activities, as emitted from a point source (or in other words a stack, or a chimney as referred to in the ACT Environment Protection Regulation 2005). We note that the term chimney, when referring to industrial activities was generally replaced by the term stack or point source in the 1980's to 1990's.

The ACT Environment Protection Regulation 2005, Division 2.2 Chimney emissions, refers to repealed "National guidelines for the control of emission of air pollutants from new stationary sources, 1985". A hard copy of these guidelines exists in the national archives. We have obtained a copy of the document and can advise that it promulgates limits that in many cases are many tens of times higher than would be considered acceptable for new plant in the remainder of Australia and most comparable international jurisdiction or rely on long outdated and no longer available measurement methods for quantification.

The air emissions standards set out in the ACT Environment Protection Regulation 2005 urgently require updating to contemporary levels.

While the ACT may include air pollutant concentration limits in Environmental Authorisations that are much more stringent that the legislation sets out, it is unclear how these limits are derived. Some of the limits appears to be excessive by current standards, and it is not clear if these are historical (legacy limits) or modern, new limits, as the documents are undated.

Other jurisdictions within Australia provide guidance on the sampling and analysis of air pollutants, whereas the ACT does not. Nevertheless, for the most part, these refer to Australian or Australia/New Zealand Standards or US EPA test methods, and occasionally British or Californian methods.

While in the ACT Environmental Improvement Plans under the Air Environment Protection Policy aim to achieve best environmental practice there does not appear to be specific guidance on how to demonstrate best practice. EPA Victoria has published a Demonstrating Best Practice guideline which provides a suitable methodology to follow. While the ACT does provide general guidance for managing certain activities, more specific air quality documentation could be developed.

International

Vehicle emissions and fuel standards

With regards to vehicle emissions standards, Australia is generally considered to be lagging behind other developed countries such as those in European Union and the United States and is often described in the media as "dumping ground" for polluting vehicles. In general, there is a lag of between 6 to 12 years for the adoption in Australia of standards that are equivalent to those in similar developed nations.

While Australia currently implements the Euro 5/V standards, the Euro 6/VI standards were introduced in Europe in 2014. It is understood that as part of the European Green Deal, stricter Euro 7/VII standards for all petrol and diesel cars, vans, lorries and buses are being developed (anticipated to be implemented in 2025).

Similar to vehicle emission standards, Australia is generally considered to be lagging behind other developed countries with regards to fuel standards. Many countries such as those in Europe, US, China, India and Japan already limit the sulfur content of petrol to 10mg/kg, whereas per the 2019 Australian standards, currently Australia's limits allow for significantly higher sulfur contents (from 50 to 150mg/kg) and will only switch to 10mg/kg from 2027.

It is understood that petrol quality needs to be improved to the 2027 standards before Euro 6 for light vehicles can be mandated in Australia.

Based on the current trajectory, Australia will continue to lag behind best international practice when it comes to regulating vehicle emissions and fuel standards. Failure to keep up with international standards results could result in relatively high polluting vehicles being "dumped" into Australia.

The ACT appears to have good programs and incentives to increase the uptake of electric vehicles, however, there appears to be scope for the ACT's air quality strategy's to consider further measures to specifically target air pollution from any new petrol and diesel vehicles, given the long fleet life cycle.

Whilst the ACT government cannot alone change national standards, it can contribute to the national debate, and otherwise can implement vehicle pricing policies that favour low emissions vehicles over polluting vehicles,

especially for new vehicle registrations, or potential by establishing Low Emission Zones (LEZ) as applied in large European cities to minimise urban pollution.

Other strategies to tackle emissions from the existing fleet are to consider mandatory exhaust emissions testing at the time of registration, similar to NSW brake tests.

Product emissions standards

Australia is investigating the potential for a national approach to manage non-road diesel engine emissions. Both the US and EU have emissions standards for non-road engines which should be considered when developing a national approach for Australia.

Relationship with other Policy themes

This section aims to identify relationships among policy themes that could be synergistic, antagonistic or lead to unexpected outcomes.

Climate change

Air pollution and climate change are directly linked, for example the combustion of fossil fuels generates air emissions, and land clearing or land degradation result in dust and other emissions. Excessive air emissions may also exacerbate warming trends.

Generally, any actions that result in a net greenhouse gas emission reduction, e.g., reduce reliance on fossil fuels and to better vegetate land are beneficial for air quality and are considered synergistic.

Strategic Planning

Good strategic planning can address many issues, including noise, air quality, transport, climate etc. However, poor planning decisions can lead to ongoing, intergeneration adverse impacts on a locality.

It is crucial to consider air quality in strategic planning at the very outset, and not as an issue to be dealt with after the key planning decisions are made.

Air quality is one of the largest single environmental factors for good health, and can be optimised through good planning, Providing liveable areas with sufficient separation between residential activities and industrial areas and transport routes is challenging, or impossible to achieve unless it is dealt with at the conceptual planning stage.

Transport

According to the available data, wood heater and transport related emissions are the key factors affecting air quality in the ACT.

Greater reliance on public transport reduces air emissions relative to equivalent private vehicle use. Maintaining steady, medium speed traffic flows, as well as providing adequate separation between transport routes and roadside receptors is crucial to minimising the impacts of transport emissions, which diminish relatively rapidly with distance from a road.

National Fuel Quality Standards and National Vehicle Standards however govern air emissions from vehicles. Australia lags approximately 6 to 12 years behind other developed nations in regard to national fuel and vehicle standards.

The ACT Government can contribute to the National debate, and can implement a range of fiscal and policy measures to improve transport effects on air quality, for example:

- Apply preferential pricing for vehicle charges, e.g., to favour electric vehicles.
- Public transport policies
- Transport corridor design
- Public sector purchasing

It needs to be understood that whilst electric vehicles can eliminate exhaust emissions and can result in a net reduction in overall emissions relative to a fossil fuel powered vehicle, they tend to have greater particulate emissions from brake, tyre and road wear, simply because they weight more (or have higher power/ performance). Thus, whilst electric vehicles will have lower emission overall, they may provide relatively less benefit for particulate emissions.

Bushfire Management

The planning of hazard reduction burns may conflict with air quality outcomes i.e., often must be conducted under poor air dispersion conditions to limit the risk of a runaway fire.

Alternative, strategies can assist, including the use of more sophisticated predictive tools, and more frequent but much smaller burns.

Generally, there is an antagonistic relationship between bushfire management and air quality, and care needs to be taken to balance the befits from fire risk reductions with calculable harm to population health.

Waste

The ACT waste policies follow the waste hierarchy, which is important and necessary minimise the issue in the first instance.

The policy favours anerobic digestion, which can only deal with putrescible wastes. Care is needed to contain the methane that this generates, and to ensure no contamination of the residue.

The policy prohibits thermal treatment of waste, other than for health management. It appears somewhat incongruous that the production of refuse derived fuel is permitted, (i.e., fuel derived from ACT waste that cannot be used in the ACT). It is noted that modern waste to energy plant can operate without tangible air quality impacts, and depending on the specifics, may have net greenhouse, air quality, social and economic benefits when compared with the way such waste is dealt with under the current policy settings.

Summary of Analysis

Table 19 provides a summary of the individual air pollution policy analysis including the strengths and weaknesses of individual environmental policies and the overall air quality policy portfolio to support the OCSE to achieve sustainability objectives in the ACT.

Each policy was assessed against the following criteria:

- Clearly articulated goals
- Program logic – clear and aligned with conceptual model
- Outcomes are stated in measurable terms
- Includes an assessment of risk and feasibility
- Implemented within an adaptive management framework

Table 19. Summary of air pollution policy analysis

Instrument	Objective/ vision with regards to air quality	Assessment of effectiveness	Comments and Recommendations
Environment Protection Act 1997	Regulate and manage air quality in the ACT	The EPA is established per the Act and is responsible for the administration of the subordinate regulations and policies, including environmental authorisations and environmental protection agreements, enforces reporting and notification of environmental harm, operates the ACT pollution hotline, provides environmental protection guidelines and guidelines for the preparation of environment management plans. Sets out a General Environmental Duty, which considers risk of harm to human health and risk of material environmental harm. Effective at controlling an individual or company action, but ineffective at tackling the primary causes of air pollution: • Lacks specific emphasis on good/ strategic planning. • Does not empower action/ authority in other policy areas causing environmental damage. • No links between air policy, greenhouse gas emissions and public emissions (e.g. traffic and wood heaters).	Scope to link air quality with other areas that affect air quality, and also to align with other suggested amendments to Regulations and guidelines.
Environment Protection Regulation 2005	Regulate and manage air quality in the ACT	First technical aspect, Part 2, relates to air. Flexibility gives regulator large discretion on how to act. Flexibility can make enforcement task more burdensome. No apparent mention of fugitive emissions. **Adopts 1985 National emission guidelines for to stack (chimney) emissions but these are excessive and outdated.** Clause 15, division 2.5 is outdated/ no longer applicable as for a modern bag filter the bags are serviced whilst the plant runs. Flexibility makes it effective for controlling individual activities, but has reduced effectiveness due to excessive criteria levels for stack(chimney) emissions, and not directly dealing with fugitive	**Recommendation: cease using the revoked 1985 "National guidelines for the control of emission of air pollutants from new stationary sources" (Division 2.2 Chimney emissions) and instead adopt more stringent stack criteria appropriate for new plant.** Consider mechanisms to control fugitive emissions and to better integrate with other policy and actions. Whilst novel, perhaps no need for the Reg. to formally exempt air emissions from a person using their body? (see Part 2, Division 2.1, Note1,(c)).

Instrument	Objective/ vision with regards to air quality	Assessment of effectiveness	Comments and Recommendations
		emissions. Does not appear to link with other policy areas that affect air quality.	
Air Environment Protection Policy	Regulate and manage air quality in the ACT	Simple and flexible. General environmental duty is broadly applied. Lacks detail, may be harder to quantify or enforce expectations. **Applies out of date NEPM values.** Note that NEPM applies to the ACT government, not to industries, and does not apply to hotspots e.g., near roads and industry. No clear over-arching/ integrating policies evident for how ACT is planning to meet the upcoming stringent NEPM values for annual average $PM_{2.5}$, (a key component of ACT's main emissions). Meeting the criteria will require significant co-ordinated action across many policy areas. Using the NEPM inventory to identify localised environmental harm may not be always be reliable because the Inventory mostly applies generic factors and not actual emissions, and in any case the link between emissions and local impacts/harm is variable and not always directly correlated. **Part 5.3.1, the 1985 national emission guidelines for stack (chimney) emissions are excessive and outdated.**	**Recommendation: Specify quantifiable criteria: for example, set criteria for acceptable levels of impact at a receptor due to the additional burden of emissions from a regulated source, Criteria could be consistent with NEPM standards and, for cross-border consistency, the NSW EPA Approved Methods guidelines (which cover a wider range of pollutants (and are currently under revision).** Assess whether existing policy/ approach (overall framework) is sufficient to ensure compliance with more stringent upcoming NEPM standards for annual average $PM_{2.5}$. (This is unlikely based on the available monitoring data showing many exceedances due to wood heaters). **Further develop or strengthen policies and actions to minimise emissions from wood heaters. Do so via an integrated, overarching approach. (e.g. education campaigns so citizens understand the health risks of wood smoke, assessing social impact on low income households and cost benefit to the health system (long term).** Review NEPM inventory data to identify which facilities use generic factors and which report actual emissions, where possible identify any risks this poses to the current approach for identifying localised areas of harm.
State of the Environment	Improve air quality, and frameworks for managing air quality	The Commissioner provides recommendations to the ACT government through the State of the Environment reporting. Provides a mechanism for a regular review that can achieve continuous improvement of the framework for managing the environment, with government agreement. Not clear how this work is integrated with or balanced against other competing issues and policies	The ACT Government is investing in health impact research for particulate pollution. ACT Government is considering expanding the monitoring network. Consider deployment of additional monitors, noting that some of the current monitoring locations may not be ideally representative of air quality for the ACT population (see NEPM also).

Instrument	Objective/ vision with regards to air quality	Assessment of effectiveness	Comments and Recommendations
Separation Distance Guidelines for Air Emissions **Planning and Development Act** **ACT Planning Strategy**	Maintain appropriate buffers between emission sources and air quality sensitive land uses	Separation distance guidelines are helpful in most cases. Separation distance guidelines are however imprecise and may omit many industries, so will not always result in the best outcome, but provides a simple indicative tool to assist in many cases. Would be more effective with detailed guidelines to support circumstances where it may not work well (e.g. cumulative impacts, complex terrain etc). Implemented through the planning assessment and approval process.	Scope to make amendments to better integrate air quality considerations and align with other suggested amendments to Regulations and guidelines.
ACT Transport Strategy, **The ACT's Transition to Zero Emissions Vehicles Action Plan 2018-21** **Zero Emission Transition Plan for Transport Canberra**	Reduce air quality impacts from transport Transition to "zero emissions vehicles" (greenhouse gas)	Implemented through a range of actions including financial incentives for "zero emissions vehicles" and upgrading the public transport fleet. It is noted that "zero emissions vehicles" refers to greenhouse gases. The transition to these vehicles would also decrease exhaust emissions however does not address increases in non-exhaust emissions (i.e., brake, tyre and road wear) that (currently) arise from most electric vehicles. Not clear if fully considered (cost/ benefit) that electric vehicles generally emit more non-exhaust particulate emissions from brake tyre and road wear, thus reduce overall particulate less than for gaseous emissions reductions.	May need to re-calibrate policies in the event of any new cost/ benefit assessment considering likely reductions in fine particulates.
ACT Climate Change Adaption Strategy **ACT Climate Change Strategy 2019-25**	Clean air via 50% to 60% reduction in greenhouse gas emission by 2025 Net zero greenhouse gas emissions by 2045	Sets beneficial, quantifiable targets. Implemented through a range of measures	Important to frequently monitor progress and adjust policy as needed to meet (or surpass) targets.
Strategic Bushfire Management Plan 2019-24,	Reduce air quality impacts from bushfires	Responds to two related issues. Use planned burning to reduce fuel loads and reduce bushfire risks	Consider adoption of better predictive systems/ modelling tools and alternative strategies such as more frequent, very small burns.

Instrument	Objective/ vision with regards to air quality	Assessment of effectiveness	Comments and Recommendations
Bushfire Smoke and Air Quality Strategy 2021-25		The planning of hazard reduction burns may conflict with air quality outcomes i.e., often must be conducted under poor air dispersion conditions Hazard reduction burns, per current practices are generally not compatible with smoke reductions.	
Various guidelines for industry and construction	Minimise air pollution from industry and construction activities	Generally good, broad guidelines Guidance documents provided on minimising air pollution from industry and construction Unclear how and if enforced/ enforceable, effectiveness is not measurable at this time.	Consider an audit program to evaluate performance at a representative number of locations.
Community programs and information, e.g., Guide to using a wood heater, wood heater replacement program	Community informed and engaged with air quality issues Assist the community to minimise the impacts of wood heater smoke	Generally good, broad guidelines. Implemented through various community programs and information factsheets Wood heater guide is too equivocal: wood smoke is toxic and carcinogenic and is harmful to users and the public at any level (not just "can be harmful"). Better to not burn plastics and treated timber for health reasons (not only legal reasons). Refers to AS2918, which is costly to acquire. **Policy has not resulted in acceptable levels of winter air quality, and needs to be strengthened.**	**Strengthen policy around wood heaters** Consider updating wood heater guideline to: • inform the community about known harm from wood smoke; • add key content from AS 2918 for public access; • add comments that alternative forms of heating (e.g., ACTsmart initiative) and home insulation are better for health. **Further develop or strengthen policies and actions to minimise emissions from wood heaters. Do so via an integrated, overarching approach. (e.g. education campaigns so citizens understand the health risks of wood smoke, assessing social impact on low income households and cost benefit to the health system (long term).**
NEPM (Ambient Air Quality)	Require states and territories to collect ambient air quality data to monitor compliance with the ambient air quality standards and	Stringent, health-based standards for the Nation May not be achievable for some cases, appear to be set near to non-anthropogenic levels. Implemented through ambient air quality monitoring Provision of live access data/ Air Quality Index (AQI) for community	Amongst the most stringent global standards for Particulate emissions, and recently updated for O_3, SO_2 and NO_2 also. Investigate expansion of particulate monitoring in the ACT ACT can participate in the national NEPM review process.

Instrument	Objective/ vision with regards to air quality	Assessment of effectiveness	Comments and Recommendations
	identify trends and inform decision making	Provision of public health alerts as required Annual air quality reporting and assessment by EPA N/A -no direct ACT jurisdiction	
NEPM (National Pollutant Inventory)	Collect emissions data from industry to inform decision making	National and consistent requirements Implemented by requiring facilities which trigger the reporting thresholds to provide annual reports estimating their emissions (including air emissions) N/A -no direct ACT jurisdiction	ACT can participate in the national NEPM review process.
Product standards	Compliance with product emission standards Evaluate the potential for a national approach to manage non-road diesel engine emissions	Implemented by banning the import of new outdoor power equipment that does not comply with the standards and banning the supply or advertisement of new outdoor power equipment and marine engines that don't meet the standards. N/A -no direct ACT jurisdiction	ACT can participate in the national process, or set Government procurement criteria.
Fuel standards	Compliance with fuel standards	Implement via labelling requirements, inspections and testing N/A - no direct ACT jurisdiction.	ACT can participate in the national process.
Vehicle emissions standards	Compliance with Euro 5 and Euro V standards Introduction of Euro 6 and Euro VI emission standards	The importation of compliant vehicles is enforced by the federal government. N/A - no direct ACT jurisdiction.	ACT can participate in the national process, and adjust state policies and vehicle charges according to emissions (e.g., discount low or zero emissions vehicles, see below).

Table 20 and **Error! Reference source not found.** present summaries of the DPSIR framework.

Table 20. DPSIR Framework – Air quality

Element	Description
Human activities/ drivers	Climate change, Temperature increase Intensified urbanisation (reduction in urban vegetation) Growing population (expanding urbanisation) Aging population (greater sensitivity to air pollution) Increased transport and energy demands
Pressures	Domestic emissions (i.e. wood heater smoke, small engines) Bushfires, hazard reduction burns Transport Industry Health and wellbeing Land use conflicts
Condition	Decline in air quality Aging population (greater sensitivity to air pollution)
Impact	Decline in physical and mental health Decline in air quality amenity (odour, clear air, soiling)

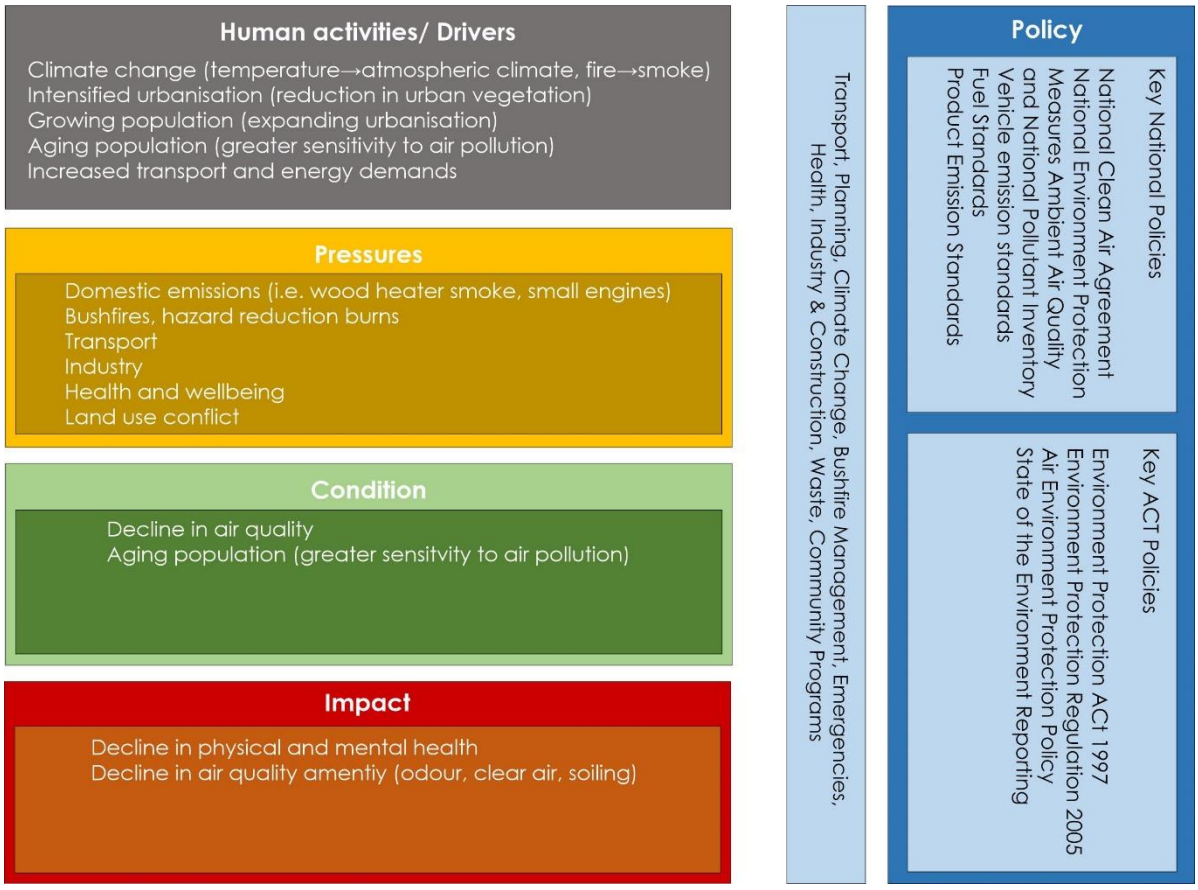


Figure 22. *Illustration of the areas of focus for air pollution policy in the ACT*

Effectiveness of Air Quality and Related Policy Portfolio

The simplest and most direct performance measure of the effectiveness of air policies in the ACT can be determined by the measured level of air quality relative to the applicable air quality standards and criteria, or alternatively the air quality index, which allows a like-for-like comparison between all air pollutants to be made.

In this regard, the air quality in the ACT does not meet the ACT criteria for $PM_{2.5}$, one of the most harmful air pollutants for human health. For example, in 2020 there were 39 days with exceedances of the 24-hour average $PM_{2.5}$ criteria, and whilst 26 of these are attributable to bushfires and dust storms, 13 days are due to wood heater impacts in the cooler periods (refer to the *ACT Air Quality Report 2020*, ACT EPA dated June 2021).

The data indicate that the suite of policies applied to manage wood heater emissions is presently failing to achieve air quality at the levels required to protect community health. Further action is needed in this regard, and it is acknowledged that reducing wood heater emissions is a complex policy and social issue to tackle.

The ACT Government is considering expanding the air quality monitoring network to add several smaller stations that monitor particulate matter, and if this is done it may better define the extent of the wood heater particulate impact problem in the ACT. Based on our experience, this is a common problem in any significant city or town in a cool climate where wood heater use is common, and it is reasonable to expect that the expanded monitoring will confirm the problem is widespread in the populated areas of the ACT. In this context, it is recommended to not wait for the results from an expanded monitoring program, but to commence developing new, more effective policies to tackle the issue.

This would need to consider how to best integrate the various and potentially conflicting issues such as the need to provide socially affordable winter heating, carbon efficient energy policy, equitable regulation, and consider a ban on new and replacement wood heater also. There are many other related matters to consider in tackling this issue, for example evaluating the potential benefit to public health and calculating the savings in hospital admissions and increased productivity that can be achieved through better air quality.

Conclusions and recommendations

The assessment found that the ACT has in place the appropriate legal and policy mechanisms, albeit they are relatively general without detailed guidance. Our assessment is that whilst this provides the regulator with excellent flexibility it does have the potential to significantly increase the regulatory burden in terms of assessing approving and regulating air emissions. The lack of specific details in the legislation and guidelines may also present challenges when defending government decisions in legal proceedings.

The review however identified three key aspects that warrant change, and thus we make the following recommendations.

- Environment Protection Regulation 2005 - update the reference to the revoked 1985 “National guidelines for the control of emission of air pollutants from new stationary sources” (Division 2.2 Chimney emissions) to other stack criteria appropriate for new plant.

- Air Environment Protection Policy - specify criteria for impacts at a receptor due to a regulated source, consistent with NEPM and, for cross-border consistency, the NSW EPA Approved Methods guidelines.

- Further develop or strengthen policies and integrate actions to minimise emissions from wood heaters.

The assessment considers that overall, the strategies in place for air quality in the ACT are good, however associated policies and actions aiming to reduce the amount of wood heater emissions are not adequate to maintain acceptable air quality. Some suggestions for potential improvements have been made in this report. The scope of the review does not permit in depth analysis such as cost benefit analysis however it is likely that further consideration of the issues identified in this report may lead to benefits for the ACT.

Case study – planning for good air quality

The 2020-2021 Priority Focus Area Plan of the ACT-NSW Memorandum of Understanding for Regional Collaboration outlines that a coordinated approach across jurisdictions is required to address strategic land use planning issues. The NSW Southeast and Tablelands Regional Plan 2036 and ACT Planning Strategy are the principal frameworks for land use planning to inform regional growth in the Canberra Region.

Queanbeyan-Palerang Local Government Area is expected to require an additional 12,050 dwellings to accommodate 25,050 more people by 2036. Residential growth areas include Googong and Bungendore, and South Jerrabomberra.

Presently the NSW Government is developing industrial land uses in the vicinity of Environa and South Jerrabomberra. The residences and town centre under construction in NSW are essentially adjacent to the Hume industrial estate in the ACT. Several studies that are publicly available indicated that air quality impacts would occur upon the then proposed NSW residential land due to emissions from ACT industries in Hume. Notably, key studies dismissed the land use conflict an issue that the ACT environmental regulator would manage. We consider that these studies have failed to flag that the only realistic option to manage the land use conflict would be for some ACT industries to cease or curtail operations. We do not have information regarding any objections of feedback on these studies from the ACT.

This appears to be a poor planning outcome, leading to likely impacts upon NSW residents and pressure on ACT industries to curtail activities and emissions.

Based on the limited data and reports that are available for this situation, it does not appear that there was adequate engagement between NSW and ACT planners in the approval and planning process for the NSW residential land alongside ACT industrial land.

This situation indicates that a review of the factors leading to these outcomes may be warranted, and if necessary, bolstering the NSW and ACT obligations under the memorandum. So that all new development in either NSW or ACT that may affect, or be affected by activities in the other jurisdiction, must comply with all NSW and ACT requirements.

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Attachment 8. Policy Assessment (Nature Conservation)

Nature Conservation Policy Assessment

Nature Conservation Overview

There are numerous frameworks and policies that contribute to the protection of biodiversity within the ACT. The primary piece of legislation is the Nature Conservation Act (2014) legislates the protection of native flora and fauna in the ACT and allows the declaration of threatened ecological communities and preparation of reserve management plans for conservation areas. The Nature Conservation Strategy sits beneath the Act and aims to guide a coordinated and integrated approach to nature conservation.

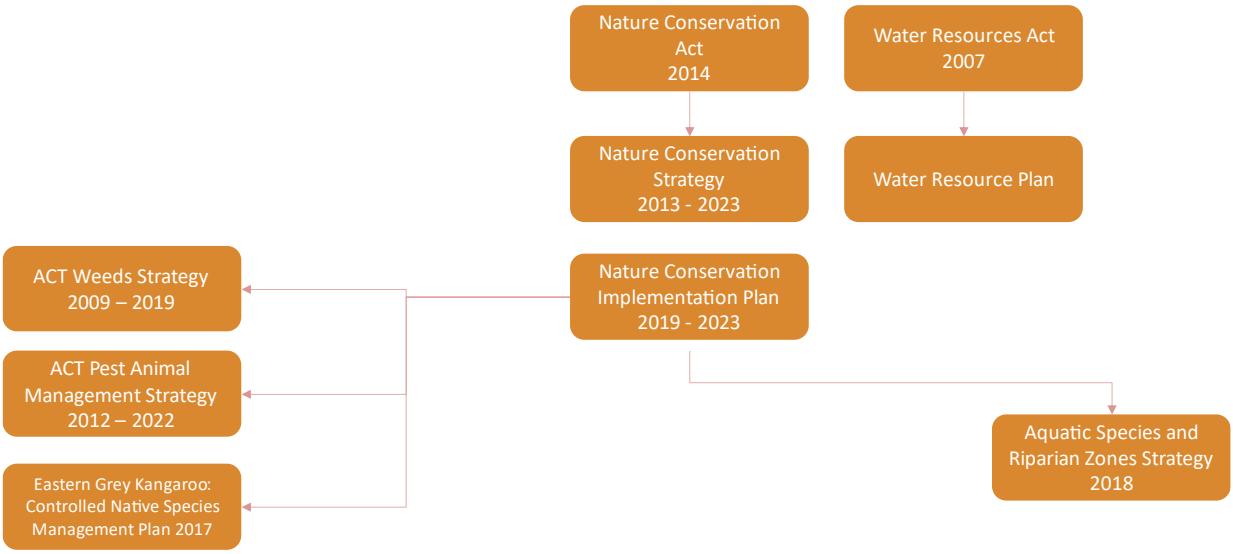

Figure 23. Policies, strategies and acts related to nature conservation pollution in ACT.

Progress snapshot

In 2022 ACT implemented new cat containment rules. Cat containment is management option listed in the ACT Pest Animal Strategy. Under these rules all cats in the ACT born from 1 July 2022 must be contained. This rule is in addition to complete containment of all cats in specific new suburbs.

The Namadgi National Park Feral Horse Management Plan was also implemented in 2022. The Plan recognises the significant threat posed by feral horses to the biodiversity of Namadgi National Park and sets goals, objectives, and strategies for controlling the threat.

Biodiversity policy context

Internationally there are several instruments to which Australia is a party which work toward the protection of biodiversity. Two of these emerged from the Rio Earth Summit in 1992; the United Nations Convention on Biological Diversity (CBD) and the United Nations Framework Convention on Climate Change (UNFCCC). The CBD was established recognising that global biodiversity has intrinsic social and economic value and is immensely important to the health and continuation of present and future generations. The CBD remains a legally binding international agreement which has three objectives.

- The conservation of biodiversity.
- The sustainable use of biodiversity, and,
- Fair and equitable sharing of the benefits arising from the use of genetic resources.

Australia has been a party to the CBD since 1993 and is dedicated to meeting its obligations in alignment with its national priorities. As a signatory to the CBD Australia developed The National Strategy for the Conservation of Australia's Biological Diversity (1996). This was Australia's first national strategy for the protection and conservation of biodiversity. The strategy has since undergone review and revisions to address emerging and evolving challenges e.g., climate change, with Australian governments making collaborative commitments to manage shared natural resources.

The United Nations Framework Convention on Climate Change (UNFCCC) is the second international instrument generated from the Rio Earth Summit. It is focussed on the stabilisation of atmospheric greenhouse gas concentrations "at a level that would prevent dangerous anthropogenic (human induced) interference with the climate system." As greenhouses gas emissions are the primary driver of climate change the UNFCCC is focused on addressing this driver and seeks to stabilise atmospheric CO_2 concentrations at a level that "should be achieved within a time-frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened, and to enable economic development to proceed in a sustainable manner." Industrialised countries such as Australia are required to regularly report on the progress of their climate change policies and legislation, inclusive of the stipulations of the Kyoto Protocol which Australia is also party to. Australia, as an industrialised country must also submit a record of their annual emissions inclusive of annual records from 1990 through to the present.

Additional international frameworks that address the conservation of biodiversity which Australia recognises or is a signatory of, are the United Nations Sustainable Development Goals (SDGs), the Convention on the International Trade of Endangered Species (CITES), the Ramsar Convention on Wetlands, the Convention on Migratory Species and the World Heritage Convention. The SDGs comprise 17 globally interlinked goals to promote and achieve greater sustainability to the benefit of all. Specifically addressing biodiversity conservation are the goals for Climate Action (13), Life Below Water (14) and Life on Land (15) though several other goals are related to ecological and biodiversity sustainability e.g., Clean Water and Sanitation (6), Affordable and Clean Energy (7), Sustainable Cities and Communities (11) ad Responsible Consumption and Production (12). The CITES focuses on the protection of some 5,600 species of animals and 30,000 plants, ensuring that the international trade of these wildlife does not threaten native populations or habitats.

The Ramsar Convention on Wetlands (the Ramsar Convention) was the first modern treaty aimed at the preservation of a natural resource. It aims to arrest the destruction of wetlands world-wide and conserve remaining habitats through the designation of representative or unique wetlands as listed areas for protection. Within the ACT Ginini Flats Wetlands are a designated Ramsar wetland.

Australia became one of the first signatories to the World Heritage Convention (WHC) in 1974. Its focus is on international cooperation to protect heritage sites of outstanding universal value and importance for current and future generations. As a party to the WHC Australia has agreed to identify, protect, conserve and present areas that meet the WHC criteria with our own resources through appropriate policies, research and legislation to protect and preserve these areas.

In terms of Australian Commonwealth frameworks and policies that seek to protect biodiversity there are two major Acts (Figure 23). The first, the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act), provides a framework for environmental impact assessments on proposals or developments that may impact on nationally significant environments inclusive of threatened species and endangered ecological communities as listed by the Commonwealth. The second, the Commonwealth Water Act 2007 relates to the management of water sources. As part of this Act the ACT is required to manage surface and ground water sources in accordance with the Murray Darlin Basin Plan and maintain appropriate water usage and quality within its catchments.

On a territory scale there are numerous frameworks and policies that contribute to the protection of biodiversity and habitats within the ACT. Primarily, the Nature Conservation Act 2014 legislates the protection

of native flora and fauna in the ACT, allows the declaration of threatened ecological communities and preparation of reserve management plans for conservation areas. Additionally, the Emergencies Act 2004 legislates the requirement for fire management in the ACT, inclusive of natural areas, while the Heritage Act 2004 provides a localised system for the identification, registration, and preservation of place of natural and cultural heritage. Finally, the Human Rights Act 2004 recognises and acknowledges the distinct cultural rights and obligations of Aboriginal and Torres Strait Islander peoples to maintain, protect and develop their culture in relationship with land and water and prohibits the denial of this right.

A central facet of biodiversity protection is the allocation of areas for nature conservation and rehabilitation through land planning frameworks. Within the ACT, the Planning and Development Act 2007 is the instrument governing land use in the ACT and establishes the Territory Plan; providing for identification of Public Land and reservation for specific purpose; defining the objectives for the reserve management plans of all categories of Public Land and legislating environmental impact assessments. Management of conservation spaces within the ACT can be inclusive of multiple parties. For example, the Lower Cotter Catchment, a conservation area part of the National Capital Open Spaces System (NCOSS), are the combined responsibility of the ACT Parks Conservation Service (as the contemporary custodians responsible for environmental protection, water supply and public use), the ACT Emergency Services Agency and Rural Fire Service (regarding fire suppression and management, including access maintenance), the Environmental Protection Authority (regulating water extraction and environmental flows), Icon Water Limited (who maintain and operate water supply infrastructure for the Cotter Reservoir) and the Directors-General Water group (who provide strategic oversight for the management of the Lower Cotter Catchment.

Description of biodiversity policy in the ACT

Nature Conservation Act (2014)

The Act replaces the former Nature Conservation Act (1980) and aims to protect, conserve, and enhance the biodiversity of the ACT. It is the legislation underpinning policy for biodiversity management in the ACT and covers the listing of at-risk species and ecological communities, development of the Nature Conservation Strategy (2013-23), Threatened Species Action Plans and Reserve Management Plans (e.g., the Molonglo River Reserve Management Plan 2019).

Nature Conservation Strategy (2013 – 2023)

The Strategy's vision for nature conservation in the ACT is '*biodiversity rich, resilient landscapes stretching from the inner city to the mountains, where well-functioning ecosystems can meet the needs of people and the environment*'. It aims to strengthen connectivity, resilience, and community capacities to provide a long-term approach to build the adaptive capacity of natural ecosystems and people to a changing climate. Reporting against Milestones in the Strategy implementation plan in 2019 demonstrated strong progress. For example, a draft Migratory Species action plan has been out for consultation (this is one of the actions under the strategy aiming to develop information to help enhance habitat connectivity and ecosystem function).

Water Resources Act 2007

The Water Resources Act aims to ensure that management and use of the water resources of the Territory sustain the physical, economic, and social wellbeing of the people of the ACT while protecting the ecosystems that depend on those resources. It also aims to protect aquatic ecosystems and aquifers from damage and if practicable to reverse existing damage; as well as meeting the water resource needs of future generations. The Act enables both the environmental flow guidelines and the Water Resource Plan.

Water Resource Plan 2019

The Water Resource Plan enables implementation of the ACT governments obligations under the Murray Darling-Basin Plan 2012. It lays out water management arrangements for both surface and groundwater to achieve sharing of water to meet both consumptive use and environmental and water quality objectives. It complements other ACT water related policy including the ACT Water Strategy 2014-2044 and the ACT and Region Catchment Strategy 2016-2046.

Aquatic and Riparian Conservation Strategy and Action Plans (2018)

The Strategy provides guidance on the conservation of aquatic and riparian areas and component species. It focuses on reserved areas, particularly where threatened species occur and therefore does not apply to urban waterways. The strategy includes recommendations to address a range of key threats to aquatic and riparian species and ecosystems as well as action plans for threatened aquatic species. The management and enhancement strategies identified aim to increase the resilience of aquatic and riparian areas to threats such as climate change.

ACT Weeds Strategy (2009 – 2019)

Provides a framework to guide the reduction of social, economic, and environmental impacts of weeds in the ACT. The strategy aimed to prevent new weed problems; reduce the damage by established pest species; enhance capacity and commitment to solve weed problems. It has been superseded by the Invasive Plants Control Plan 2020-25.

ACT Pest Animal Management Strategy (2012 – 2022)

Set the framework and approach for managing the undesirable social, environmental, and economic impacts of pest animals across conservation, rural and urban lands in the ACT. The strategy aims to: prevent incursions by new animal species; reduce impact on native animals; and ensure the community is engaged in pest animal management.

Eastern Grey Kangaroo: Controlled Native Species Management Plan (2017)

The Plan sets out the approach for maintaining wild populations of eastern grey kangaroos in the ACT while managing their environmental, economic, and social impacts and ensuring their welfare. The plan is required because the eastern grey kangaroo has been declared as a Controlled Native Species under the *Nature Conservation Act 2014.* This means it must be managed using best practice consistent with relevant codes of practice such as those under the *Animal Welfare Act 1992*.

Policy development since the 2019 State of Environment Report

The Canberra Nature Park Reserve Management Plan (2021)

Reserve management plans are prepared for reserves in the ACT under the Nature Conservation Act 2014. The Canberra Nature Park Reserve Management Plan encompasses management for the 39 nature reserves within Canberra which contain distinctive threatened ecosystems and species, landscapes, and cultural heritage. The Plan highlights the significant values present in the reserves and provides guidance on appropriate reserve use for various activities as well as the goals, objectives, policies and actions for management over 10 years. The Plan's vision is '*Canberra Nature Park's natural and cultural heritage is conserved forever in partnership with Ngunnawal Traditional Custodians, enriching the lives of a vibrant and healthy community*'.

Invasive Plants Control Plan (2020-25)

Since the expiry of the ACT Weeds Strategy (2009 – 2019), the management of invasive plants is now implemented through the Invasive Plants Control Plan (2020-25). This Plan is the implementation plan for managing invasive plants in the ACT, which is required under: the ACT Biodiversity Strategy 2016-26, Reserve Management Plans, and also threatened species Action Plans. Overall, the goals are to prevent invasive plant entry into the ACT; quickly find, contain, and eradicate any new incursions; and effectively minimise the impacts of widespread invasive plants.

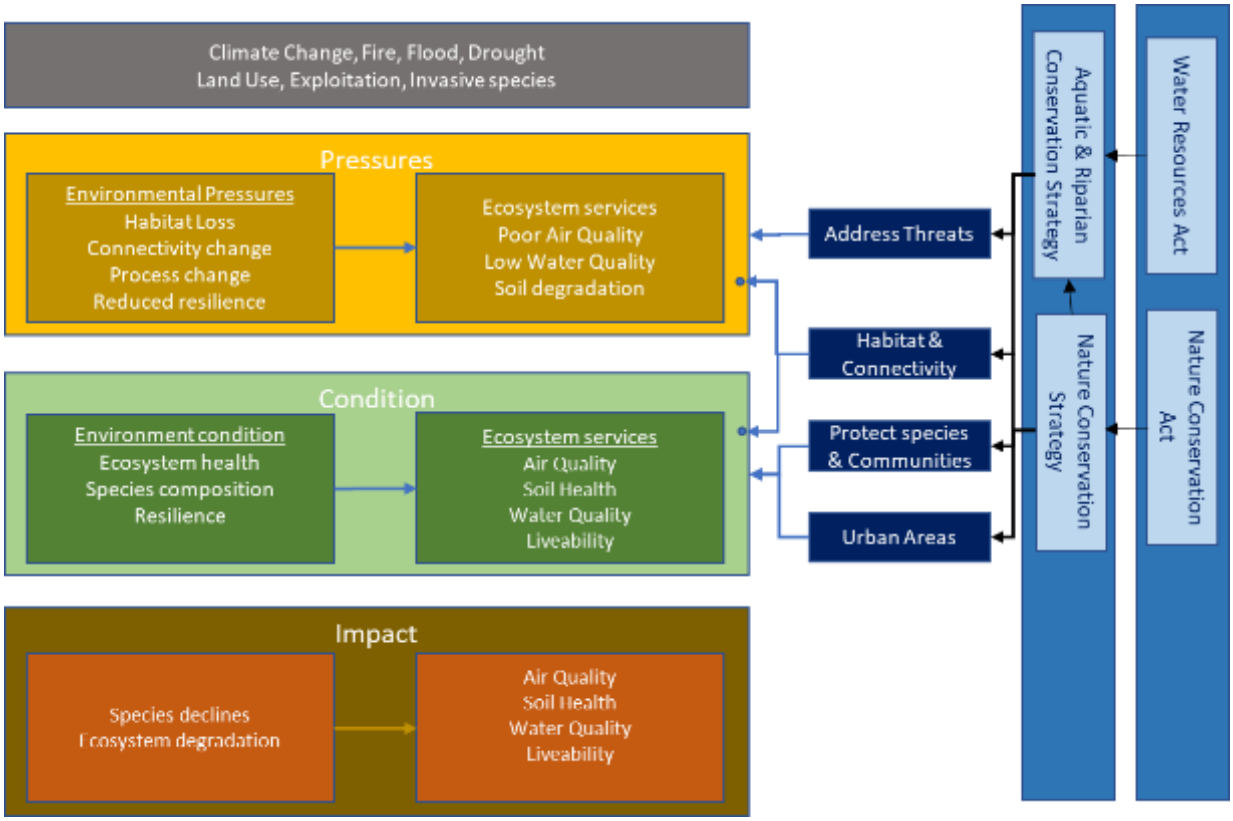

Figure *24.* *Illustration of the areas of focus for biodiversity policy in the ACT*

Biodiversity policy analysis

The overview of Nature Conservation Strategy emphasises reserves, stating that "Given the most significant conservation gains in the ACT can be achieved in lowland areas, the Strategy will focus on better managing threats to lowland reserves and connecting these areas with well-managed native vegetation remnants outside these areas". This approach does not incorporate well modified landscapes such as those in urban and agricultural settings, with the latter considered only as places through which corridors must be opened. The focus on reserves may derive from defining conservation as the act of conserving or keeping from change (HarperCollins Publishers 2022). It is not clear whether this is the case, but it may help if assumptions about what Nature Conservation means are examined and considered from the perspective of the Strategy and Vision.

Within the context of the Overview, there are several incongruous elements to the Strategy. The first is Strategy 4: Enhance biodiversity value of urban areas. The SoE (2019) lists diversity values of urban trees as the fourth of six objectives behind spiritual wellbeing and recreational opportunities. This raises the question of why this is included in the Nature Conservation strategy rather than Planning where the objective is a Liveable and Compact city.

A similar anomaly is located within the Outcomes where community health and wellbeing (Outcome 3) is one of three Outcomes sought. The implied rationale is that Enhancing biodiversity value of urban areas (Strategy 4) and Strengthening community engagement (Strategy 5) could both contribute to wellbeing. There are important questions about whether changes in the wellbeing of all people actively engaged in NRM would be significant or detectable within the population of the ACT. It appears likely the numbers will be around 1% of the population, but even 5% which would be a very impressive 25,000 people, but a 100% improvement in their wellbeing would still only translate to a 2.5% community improvement.

The nature of the relationship between biodiversity and the liveability of urban areas is not clear, and it is likely that some elements of biodiversity (pest invertebrates, poisonous snakes) are considered to impair liveability by some people. What is the vision for biodiversity in urban areas? What would success look like? Are there species that can be more easily conserved in urban areas than in agricultural or reserve dominated landscape? Given

the widespread changes we have made to the landscape, are there species for whom urban areas are their last hope?

A larger scale question is the objectives of engagement. If the objective is biodiversity conservation with wellbeing arising as a beneficial side-effect, then the causal chain between community engagement and effective conservation is weak and tenuous. If the objective is community wellbeing with biodiversity being the side effect, then (reservations about achieving whole of community outcomes aside), the Nature Conservation Strategy (NCS) approach is appropriate.

The relationship among outcomes and strategies is not well established across ACT biodiversity policy. The focus on human use has the potential to engender poor management of areas or values that require no human access, or which are not appreciated by people. Within the maze of subsidiary plans, the trade-offs among the 3 outcomes need to be described and the risks of trying to balance competing objectives discussed, so that if the balance isn't achieved, then monitoring can initiate a rebalancing of management.

If the scope of the strategy seeks to address more than reserves, as suggested by the inclusion of urban areas, then there needs to be some consideration of agricultural or rural landscapes. As with urban landscapes, there may be species for whom rural landscapes could represent an opportunity, if not on an ongoing basis, but as a supplementary source of food or refuge.

This raises the issue of boundaries between one landscape and another. As noted in the strategy *Activity along the urban/bush interface is critical for managing the impacts on natural areas from domestic animals, invasive plants, waste dumping, recreational use and fire management. Managing this interface appropriately will also provide increased opportunity for native animals to move in response to environmental stress (e.g., droughts, fires)*. This is also true of land along the rural/reserve interface where grazing enterprises do not always appreciate increases in biodiversity that compete for forage. Edges have been found to be important in natural systems both because of the species they support, but also due to the flow of materials and biota that move between systems. This is critically important in freshwater systems where surface and groundwater flows represent important landscape linkages.

With the development of the focal landscape management plans, consideration needs to be given to the matrix within which the remnants of focal landscapes are imbedded. For example, in the Native Woodland Conservation Strategy, there is a strong focus on the need to improve connectivity between woodland patches, but the management of woodland margins is overlooked.

International Comparison

It is worth reflecting on the ACT NCS and the approach taken in two countries that have distinctly contrasting approaches, Japan and Bhutan. Bhutan's environmental law emphasises the public's role in sustaining the future environment and an explicit commitment to intergenerational equity:

> "*Every Bhutanese is a trustee of the Kingdom's natural resources and environment for the benefit of the present and future generations and it is the fundamental duty of every citizen to contribute to the protection of the natural environment, conservation of the rich biodiversity of Bhutan and prevention of all forms of ecological degradation*."

In some ways this reflects the approach taken in the Fire strategy where all property owners are allocated a role. Another key difference with Bhutan's approach are a series of Principles, including the precautionary principle, equal consideration of environmental protection and economic development, a traditional knowledge protection system to recognise Indigenous and local community's rights and maintaining at least 60% of Bhutan's total land forest cover in perpetuity.

Another interesting feature of environmental policy in Bhutan is the direct link made between human wellbeing and biodiversity. The 2008 adoption of the Gross National Happiness Index sets benchmarks and measures policy progress towards greater wellbeing and includes ecological diversity and resilience as one of its 9 principles. In Australia, there is ongoing research to try and quantify and value ecosystem services, but managers rarely have the capacity to include consideration of ecosystem services when engaging communities

on issues of sustainability. The ACT is in the early stages of developing a wellbeing framework with the intention of including targets linked to the environment and biodiversity. The Bhutanese example may provide insights into the development of this approach.

In Japan the Biodiversity Act:

- Adopts a primarily preventative approach and mainstreams biodiversity into all other policy
- Clearly defines responsibilities of national and local businesses, citizens and private groups
- Integrates local efforts with those at regional and national levels

Japan's ambitious 2010 Biodiversity Strategy integrates a long-term perspective (100-year centennial plan) with both mid and short-term targets (10 and 20 years). The strategy includes an action plan that identifies specific measures that need to be implemented in order to meet biodiversity targets, as well as this the action plan recognises the need to revise biodiversity related legislation.

While there are clearly some similarities between the Japanese and ACT approaches, there are also some key lessons. The Japanese have identified the importance of integration to increase effectiveness. This is manifest in both links between local actions and those at larger scales, but also the inclusion of biodiversity in other policies the way that climate change is now integrated into a broad range of policy areas.

A brief review of conservation effectiveness revealed that most published literature came from the US where the endangered species act focusses on species through development and implementation of recovery plans. One of the consistent findings is that success is dependent on funding (Kerkvliet 2007, Gerber 2016). Interestingly, it is not just the amount of funding, but also the way it is invested. It was found that charisma had a strong influence on funding allocations (Bellon 2019), but that charisma is not always associated with the feasibility of conservation (Kerkvliet 2007). It was also found that half the resources allocated to conservation were for research and monitoring and that there was a negative relationship between knowledge investment and successful recovery (Buxton 2020).

A country's commitment to reserves will be important to the success of its conservation efforts. Australia is ranked 77th in the world with 20.3% of its land area committed to reserves. The Seychelles occupy the top ranking with 61.5% and if the ACT were a country in would be ranked 7th. Reserves on their own provide a poor guide to a country's conservation effectiveness as Australia has 1,828 threatened species (7th worst), behind the USA (1,877 species, 13% reserves) and Brazil (2.040 species, 30.3% reserves). In many countries, reserves have been effective, for example, India has a strong legislative commitment to reserves that has meant they have not lost any species in the last 70 years (Ghosh-Harihar, 2019). Several African nations (e.g., Zambia 41%, Zimbabwe 27%) have also successfully committed to reserves within broader programs to conserve wildlife.

Out of this emerge three risks.

1. Historical and ongoing development means that there will be areas that cannot be reserved for biodiversity conservation, thwarting attempts to ensure that reserves provide adequate and representative examples of the range of ecosystems.

2. There will be threats that penetrate the reserves

3. The world has changed and will keep changing

In developed countries, reserves that can be created without significant impacts on economic or social values are already in existence. For example, between 2010 and 2020 Australia added over 17% more land to its reserves. For this reason, even though there has been growth in the area committed to reserves, the effectiveness of these reserves has been limited (Maxwell et al 2020). There is no simple answer to this, however, one opportunity is the creation of Other Effective Conservation Measures (OECMs). These include using other land uses to achieve conservation outcomes, including public utility forests, riverine corridors (Rodriguez-Rodriguez 2021) or agricultural land. Managers also tend to dismiss small habitat patches; however, these have been found to support conservation objectives (Fisher et al 2002, Peintinger et al. 2003).

In Africa and Asia, long-term settlement by people means that the creation of reserves with the support of local communities effectively protects species. This is not the case in Australia where European settlement has been accompanied by a range of invasive animals and plants that significantly corrupt the protection offered by a reserve. In addition to this, climate change in Australia is associated with changes in vegetation and disturbance regimes (fire, drought, and flood). These two issues mean that to be effective, reserves need to deal with remaining threats once a reserve is established. In the U.S. the Fish and Wildlife Service amended their advice on developing recovery plans after a review by the Society for Conservation Biology (SCB) found that focussing on threats was far more effective (Troyer et al 2015). This is complicated by manager's limited capacity to control all but a few species of pest or weed.

As already noted, climate change and lags between changes in land management and their impacts becoming manifest, the threats faced by threatened species, even those within reserves, will change though time which will require management strategies that are both aware of and able to respond to changes. The variability of Australian ecosystems also means that there will be opportunities to undertake effective interventions and risks to implementation as decadal climate cycles influence the magnitude of threats and in all likelihood the way that they interact. One of the solutions proposed to deal with climate change is to ensure that reserves are connected to support both landscape adaptation and resilience. It is likely, however, that no two species have identical connectivity requirements. It is important therefore to understand species requirements and the risks associated with investing in connectivity if only a subset of species benefit. A 2009 review concluded that effective adaptation required improved regional institutional coordination, expanded spatial and temporal perspective, incorporation of climate change scenarios into all planning and action, and greater effort to address multiple threats (Heller and Zavaletta (2009)). The review concluded that successful adaptation required:

(1) more specific, operational examples of adaptation principles;

(2) a practical adaptation planning process; and

(3) greater integration of social science as conservation expands into human-occupied landscapes.

A key component of achieving successful adaptation will be understanding species requirements. The Commonwealth Environment Protection and Biodiversity Conservation Act and ACT Biodiversity conservation Act both focus on threatened species and yet there are advocates for the ecosystem approach to conservation. Likens and Lindenmeyer (2012) advocated for more integrated approaches to conservation giving the example of efforts to conserve Leadbeater's Possum in Victoria that required both an understanding of the species' life history and needs as well as the way that the wet forest ecosystems that support them provided nesting hollows and food. Taking this a step further, we need to have some understanding of species, ecosystems and the landscapes that support ecosystems. This does not mean that action should be deferred, rather uncertainties need to be identified at each scale and plans developed that acknowledge the uncertainty (Wiens 2007).

Drivers

The Nature Conservation Strategy does not seek to reduce human activities as some of the key activities, including land use changes, waste, climate change and its effects on fire and water regimes are the focus of other policies. It is interesting to note that there is no mention of the environment's capacity to sequester carbon and that there may be opportunities to both improve environmental sustainability while also helping to reduce greenhouse gas concentrations.

Pressures

The NCS seeks to reduce pressures through Threat management (Strategy 2) and Protection of species and ecosystems (Strategy 3). Threats identified include weeds, pest animals, fire regimes, grazing and catchment management. Protection Actions include protecting key environmental assets and maintaining populations through translocation or captive breeding programs.

A draft Migratory Species action plan has been out for consultation, but a final version has not been published. There remains a commitment to develop an ACT soils strategy, but there is no further accessible information.

There has been some progress on Integrated Catchment Management with the formation of ACT and Region Catchment Management Coordination Group which seeks to, among other roles:

- Advise the ACT Minister for the Environment and Heritage
- Improve coordination, cooperation and direction of effort in catchment management across the ACT and region.
- Facilitate collaborative problem solving for interjurisdiction and interagency issues.

The Group is currently focused on its Implementation Plan which prioritises developing an inter-jurisdictional investment and resourcing framework and supporting the role and work undertaken by peak stakeholder groups, volunteers, landowners and managers. It is likely that any tangible environmental outcomes of this initiative are reported in the annual reports of the key collaborators. As such we considered them outside the scope of this assessment.

There has been work on developing appropriate Fire regimes, but this will be discussed under the Fire policy assessment. Grazing management has been ongoing with annual kangaroo culls; however, deer, horses and rabbits remain ongoing and significant threats. The management of invasive weeds and animals is effective in treated areas, however, without ongoing control, populations rapidly re-establish. Weeds are in some ways a role model for other environmental management actions because the ACT Weeds Strategy provides a framework for prioritising species and areas. There is also good information on the activities undertaken, for example, in 2019-20, over 7,000Ha of weeds were sprayed.

From an environmental perspective there are, however, some risks. First, the weed strategy prioritises the prevention of new weeds entering the ACT or becoming established once they arrive. Second, the risk assessment considers the social, economic and environmental impacts of weeds in the ACT. The risk here is that the weeds and areas where control would provide the greatest environmental benefit may not be the same as the weeds that are trying to establish or the associated economic and social benefits. This is a challenge when any initiative is seeking to achieve more than one objective. It does not mean the approach should change, but managers need to be aware of the risk that reducing the environmental Pressures associated with weeds may be subjugated to achieving other objectives within the weed strategy framework. This may be dealt with in operational processes, but from the information available it is not clear that this risk is recognised or managed.

It is not currently possible to determine the condition of conservation areas in the ACT. The development of Conservation Effectiveness Monitoring Program will address this gap by providing information on ecosystem condition and change over time. The condition assessments will integrate the influence of a range of environmental drivers, pressures and the combined effects of management actions. For effective adaptive management and the capacity to evaluate management effectiveness requires intervention monitoring.

Condition

The Nature Conservation Strategy (NCS) seeks to sustain condition through restoration of habitat and connectivity (Strategy 1), protection of species and ecological communities (elements of Strategy 3) and enhancing urban environments (Strategy 4).

Strategy 1 includes the 5 actions: information, planning, assess investment opportunities, enhancing connectivity and fund priority landscape actions. The first three would not be expected to be associated with any environmental outcomes. Enhancing connectivity may lead to environmental outcomes through initial (but gradual changes in vegetation) followed by changes in faunal diversity in the connected habitats. For Indicator B4: Extent and condition of native vegetation the SoE (2019) found “Any recent native vegetation losses are estimated to be small and mainly due to changes in land use from urban development.”. This suggests there is no information being collected to assess this part of Strategy 1. In addition to this deficiency, corridors are included as if they are inevitably a good thing rather than something that needs to be customised to a species needs. It is also important that the risks of establishing corridors are assessed to ensure that the overall outcomes will contribute to the Vision. From a communication perspective, inclusion of this level of detail may be counter-productive, but to ensure outcomes are achieved it is important that these issues are addressed and documented.

Funding priority landscape actions would also be expected to lead to, at the very least, some short-term environmental changes, even if these need to mature into successful restoration. The lack of reporting on implementation or intervention monitoring mean there is no way to assess whether these investments would be expected to contribute to Strategy 1.

The Nature Conservation Strategy 3 seeks to sustain condition through 2 actions: managing the protected area estate and priority landscapes. There is an assumption that these actions will contribute to achievement of the Strategy objectives and that there will be an (unspecified) measurable outcome. The SoE (2019) found that "At the time of reporting, it was not possible to determine the condition of conservation areas in the ACT". As a result, it is not possible to assess whether these actions are being effective. Through no fault of the personnel involved, the lack of information may well be hiding a punctuated but ongoing decline in condition. The SoE (2019) makes it clear that there are a range of threats that are not being addressed and that among these cats and foxes are acknowledged as being key threats to biodiversity (DAWE Threatened species strategy). A potential outcome of this will be ongoing decline unless something is done to redress the balance, and yet there is nothing in the strategy to address this risk.

The gaps in condition and intervention monitoring are serious deficiencies within the management program that compromise its integrity. It just isn't possible to design effective interventions without robust information on the condition of the system and the success (or otherwise) of management actions.

Impact

The Nature Conservation Strategy seeks to address Impacts through protection of species and ecological communities (Strategy 3), through the following management actions:

- Identify biodiversity refugia under drought and climate change
- Implement captive breeding programs and translocation programs
- Propagate and translocate threatened plants
- Establish seed banks and seed orchards

Table 21. List of species being maintained in captive breeding programs

Species	Location
Eastern Quoll	Mulligans Flat Nature Reserve
New Holland Mouse	Mulligans Flat Nature Reserve
Eastern Bettong	Tidbinbilla and Mulligans Flat Nature Reserve
Southern Brown Bandicoot	Tidbinbilla
Brush-tailed Rock-wallaby	Tidbinbilla
Koala	Tidbinbilla
Grassland Earless Dragon	Melbourne Zoo, University of Canberra

The SoE (2019) does not report on the status of seed banks but does report on the identification of critical communities such as High-Country bogs and fens and Natural Temperate grassland. Refuge habitats are also identified and managed for plants such as Tarengo Leek Orchid, Canberra Spider Orchid, Small Purple Pea and Murrumbidgee Bossiaea.

The maintenance of fauna in captive breeding programs and identification of remnant populations of plants will both contribute to protecting species, however, it is a risky approach due to genetic issues in captive populations and changes to disturbance regimes in ecosystems affected by changes in land use and climate.

The SoE (2019) report focusses on the proportion of vegetation classes, potential habitat or known distribution within reserves. This suggests that there is a focus on adequate and representative as a framework for determining whether reserves will meet conservation objectives. Interestingly, the concept is not discussed in the NCS raising the question of whether this is tacit knowledge or whether reporting is based on available data. From a planning and prioritisation perspective, it would be useful to know which ecosystem types are furthest from adequate and of those, and which ones have a feasible pathway by which the objective could be achieved. If not; what is the fall-back strategy?

Table 22. List of the Policy Responses, actions or Instruments, their Target (e.g., Impact), and the stakeholders affected or engaged.

Instrument	Objectives	Comment
Nature Conservation Act (1980)	To protect, conserve and enhance the biodiversity of the ACT	The Act covers the listing of at-risk species and communities, development of the Conservation Strategy, Threatened Species Action Plans and Reserve Management Plans.
Nature Conservation Strategy (2013 - 23)	To strengthen the key foundational elements—connectivity, resilience, community capacities—of a long-term approach to build the adaptive capacity of natural ecosystems and people to a changing climate	The Strategy includes 5 elements: 1. Habitat, connectivity and ecosystem function 2. Manage Threats 3. Protect 4. Enhance urban biodiversity 5. Community engagement
Water Resources Act 2007	To ensure that management and use of the water resources of the Territory sustain the physical, economic and social wellbeing of the people of the ACT while protecting the ecosystems that depend on those resources	Within the context of the National Water Initiative the Act provides the framework for sustainable water management. The Act defines access rights to surface and groundwater resources, environmental flow provisions, water licensing requirements, resource management and monitoring responsibilities and penalties for breaches.
Aquatic Species and Riparian Zones Strategy	Provides guidance on the conservation of aquatic and riparian areas and component species	Aquatic Species and Riparian Zones are one of the focal communities listed in the Conservation Strategy. The strategy focuses on systems within the reserve system, particularly where threatened species occur. The strategy includes managing threats; ecological connectivity, ecosystem function and biodiversity; undertaking monitoring and research programs; and partnering with the community to support aquatic and riparian conservation.
Water Resource Plans	Set rules on how much water can be taken from the system, identifies risks and the management of environmental flows.	Plan provides an overview of water resources in the ACT, and the approach to water planning and management. It sets out the government's plan for the management of the Territory's surface water and groundwater resources, including managing water use under the 'sustainable diversion limits' set for the

Instrument	Objectives	Comment
		ACT, long-term environmental flow arrangements and water quality management.
Planning and Development Act 2007	To provide a planning and land system that contributes to the orderly and sustainable development of the ACT— • consistent with the social, environmental, and economic aspirations of the people of the ACT; and • in accordance with sound financial principles	Implemented through the planning assessment and approval process.
ACT Planning Strategy 2018	To guide Land-use planning that supports development of the economic, social and environmental development.	Includes 5 Themes: • Compact and efficient • Diverse • Sustainable and resilient • Liveable • Accessible
ACT Planning Regulation 2008	Regulations covering applications for development and associated environmental assessments.	Provides appropriate checks and balances for development proposals.
ACT Climate Change Adaption Strategy	To help community and the natural environment adapt to climate change and become more resilient to the projected impacts.	Provides sectoral assessments and actions for the following sectors: • Disaster and emergency planning • Community health and wellbeing • Settlement and infrastructure • Water • Natural resources and ecosystems
ACT Climate Change Strategy 2019-25	To lay foundations for achieving net zero emissions by 2045 and to achieve its 2025 interim emission Targets. The strategy is focused on building resilience to climate change impacts.	Key actions and priorities of the strategy are about the following: • Community leadership and just transitions • ACT Government Leadership • Waste avoidance and management • Energy, buildings, and urban development • Transport • Land use and biodiversity
Environment Protection Act 1997	To protect, restore and enhance the quality of environment and prevent environmental degradation and risk of harm to human health by promoting pollution prevention, clean production technology, reuse	The Environmental Protection Authority is established per the Act and is responsible for the administration of the subordinate regulations and policies, including environmental authorisations and environmental protection agreements, enforces reporting and notification of environmental harm,

Instrument	Objectives	Comment
	and recycle of material and waste minimisation programs.	operates the ACT pollution hotline, provides environmental protection guidelines and guidelines for the preparation of environment management plans.
Environment Protection Regulation 2005	Regulation sets provisions on emissions into the air, noise, water, controlled waste, sampling and analysis of pollutants and other topics related to environment protection.	The regulation is made under the Environment Protection Act 1997. The provisions laid out are focused on individual activities.
Strategic Bushfire Management Plan 2019-24	Provides a strategic framework to protect the ACT community from bushfires and reduce resulting harm to the physical, social, cultural and economic environment of the Territory.	Use planned burning to reduce fuel loads and reduce bushfire risks. The planning of hazard reduction burns may conflict with air quality outcomes i.e., often must be conducted under poor air dispersion conditions.
Bushfire Smoke and Air Quality Strategy 2021-25	Provides high level direction to guide the development of the action plans to effectively prevent, prepare for, respond to and recover from significant bushfire smoke events in the future.	The strategy identifies eight objectives to direct the ACT Government actions over the next four years under: • Prevention • Preparedness • Response • Recovery
ACT Weeds Strategy 2009-2019	Provides a framework to guide the reduction of social, economic and environmental impacts of weeds in the ACT.	Objectives: 1. Prevent new weed problems 2. Reduce the damage by established animal species 3. Enhance capacity and commitment to solve weed problems
ACT Pest Animal Strategy 2012-2022	Sets the framework and approach for managing the undesirable social, environmental and economic impacts of pest animals across conservation, rural and urban lands in the ACT.	Tactics 1. Prevent incursions by new animal species 2. Reduce the impact of priority weeds 3. Reduce impact on native animals 4. Community engagement
Kangaroo Management Plan 2017	Sets out the approach to be adopted in maintaining wild populations of eastern grey kangaroos in the ACT while managing their environmental, economic and social impacts and ensuring their welfare.	
Community programs and information	ACT NRM sets out biodiversity conservation plan to improve knowledge and appreciation of	Implemented through various community programs and information factsheets.

Instrument	Objectives	Comment
	landscape resilience and adaptation, engaging community through investment plans, Aboriginal NRM, grants and support packages.	Community-led action to achieve outcomes and drive NRM priorities with multiple participation

Engagement

The Nature Conservation Strategy includes engagement as one of its five strategies with seven subsidiary objectives:

1. Greater community engagement
2. Promote citizen science
3. Community education
4. Build indigenous engagement
5. Encourage youth involvement
6. Support appropriate recreational and tourism use of natural areas
7. Enhancing key partnerships

Two of these (2 and 7) overlap with the values the OCSE identified in their assessment of community, while the rest could be seen as paths to increasing the value of work, the range of skills available and the health and wellbeing of the engaged. On the surface all of these could contribute to nature conservation, but the critical question is; how much impact would meeting these objectives contribute to the Nature Conservation's other strategies and objectives.

As an example, it is worth considering citizen science which was the focus of Recommendation 9 in the 2019 State of the Environment report. The recommendation was that the ACT Government should specifically provide for the recognition of citizen science and community environmental action with a targeted awards program. Citizen science in the ACT collects large amounts of environmental data every year, including water quality, plants and birds. There are many opportunities for citizen science ranging from government-facilitated community programs such as Waterwatch and the Canberra Ornithologists Group, to the volunteer-run online services such Canberra Nature Map. In addition, there are organisations such as Landcare and ParkCare that focus on citizen science. It is estimated that there are well over 3000 citizen science volunteers active in the ACT.

The Nature conservation policy seeks to expand community science through increasing the number of groups and individuals involved, the hours committed, and area managed. There are a number of evaluative questions that need to be addressed before resources, particularly volunteers time and effort, should be committed to this target.

Conclusions

The Nature Conservation Strategy has identified five strategies that are appropriate for achieving the three outcomes. The NCS has also done a good job of identifying both key environmental values and the major threats they are facing. Finally, the approach of having a Strategy and then implementation plans is an effective way of ensuring ongoing adaptation. Within these areas of strength, we would make the following observations.

1. The suite of Strategies lacks a coherent program logic. Strategy 1, habitat, connectivity, and landscape function is subsidiary to protecting species and ecological communities, you do the former to achieve the latter. Strategy 2 is a mix of threats (weeds, grazing, fire), a threatened group (migratory species) and an environmental asset (soil). The overview highlights the proportion of the ACT protected within the environmental estate and yet Strategy 2 includes land management, soils, and catchment management as key threats. Are these really threats within the reserve system? Then Strategy 4 focuses on biodiversity of urban areas. It is not clear why one area should be included at the strategy

level and not agricultural land, focal landscapes, or priority ecosystems. The problems with a disjointed suite of strategies are that the issues are propagated through the strategy.

2. The NCS provides an overview of each of the Actions within each of the five strategies. As an overarching document with strong linkages to Planning, Climate Change, Waste, Fire, Climate Change, Air and Water and guiding influence on a broad range of strategies and plans, there remains a gap in the environmental policy suite that should be occupied by a framework for identifying key systems and their role in achieving the vision. There should also be guidance for managers on how they make critical decisions about whether to protect, enhance or manage.
3. The NCS is pivotal to achieving the ACTs sustainability objectives and represents, at least part of the motivation for climate change abatement, minimising waste and Canberra's footprint. Given this, it is important that the NCS consider other policies as, in some ways, subsidiary strategies. This does not mean that NCS should specify actions or areas of focus, rather that it provides a framework, guidance or advice that will influence decisions undertaken in the development or adaptation of the other strategies.
4. The Implementation Plans include many priorities (no.1: >80, No. 2 =99). This strongly suggests a bottom-up build. The risk here is that limited resources are smeared too thinly over the range of activities that could be done meaning that nothing is done well, and many actions won't be completed, undermining overall program effectiveness. What is needed is top-down guidance to inform the development of the priority actions. Somewhere in the process, there also needs to be a vigorous (inadequate word) contest of ideas about where investments can be made to make the greatest contribution to the Vision and Outcomes.
5. Adaptive management is critical when considering restoration of degraded systems subject to multiple threats. The development of the Conservation Effectiveness Monitoring Program (CEMP) program is important and will ultimately prove invaluable, however, it will take time to develop the capacity to detect anything but the most dramatic changes (fire, drought, flood). Condition monitoring is, however, only one step in adaptive management. The key is to plan the evaluation to ensure that there is information on the management activities undertaken, their outputs and contribution to objectives. An example is the Basin Plan that included the high-level evaluation questions. It would be good if high level evaluation questions were included in the NCS as a prompt that the information will be needed and should be collected and managed.
6. The NCS has a large number of subsidiary strategies and plans with more proposed within the Implementation Plan. It is not clear that there is a plan for the plans. What is needed is some overarching framework that would specify the relationships between the various program components and clarify the value that each makes to conservation management. Given that ecosystem management is preferred over species management, it would make sense to nest species recovery plans within ecosystem plans, while acknowledging that this won't be appropriate for all species. It is also worth noting that effective management needs to be undertaken at multiple scales which, in this instance requires consideration of species and ecosystem needs (Likens and Lindenmayer 2012).

Recommendations

1. Clearly define the scope of the Strategy and stratify assessments and actions with specified landscape or ecosystem types.
2. A framework needs to be developed for prioritisation and objective development that can be applied consistently across different landscapes.
3. Application of this framework should be used to produce a small number of high priority activities.
4. The implications of threats such as climate change, waste and fire should be documented and communicated to the custodians of relevant strategy areas.
5. A plan for ACT nature conservation strategies needs to be developed to ensure all values are addressed and, importantly, that interdependencies among daughter strategies are identified and managed appropriately as either opportunities or risks.

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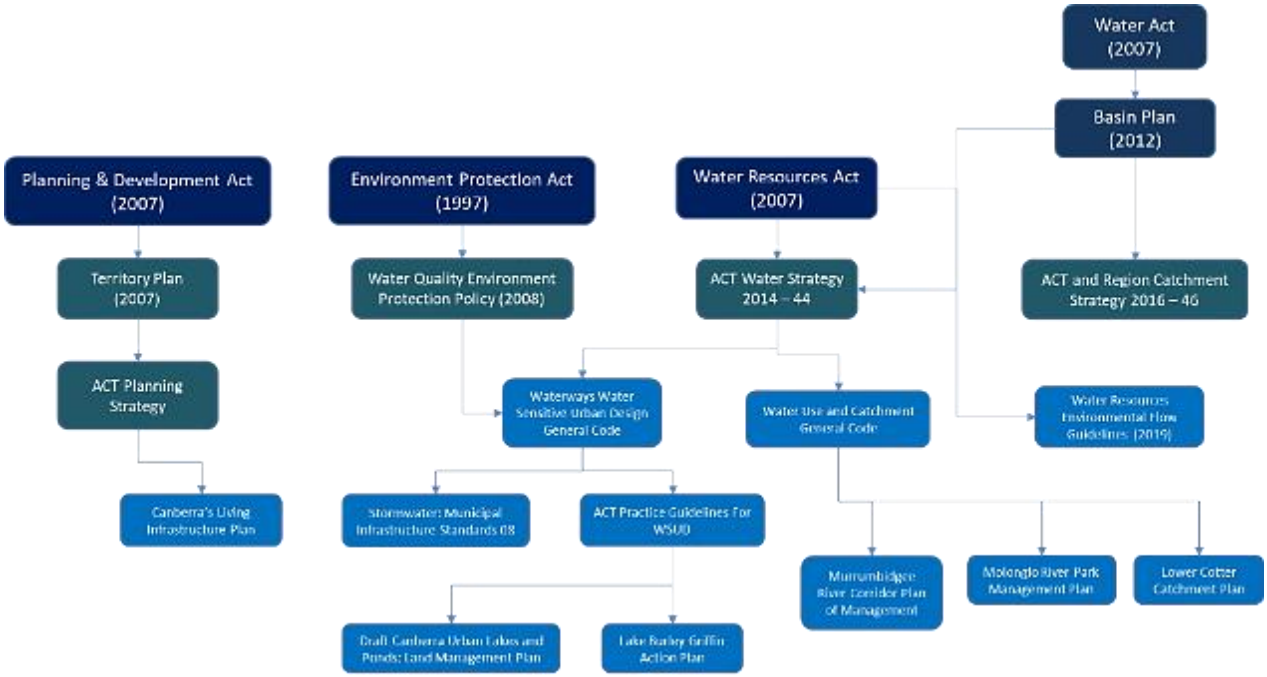
Attachment 9. Policy Assessment (Water resources and consumption)

Water Resources and Consumption Policy Assessment

Water resources and consumption policy summary

In addition to the supply of safe drinking water and the protection of people and property from flooding, urban water policy in the ACT focuses largely on three environment-related goals:

1. To conserve mains water supplies while retaining and enhancing blue and green infrastructure to improve sustainability and environmental conditions
2. To maintain or improve the long-term health of ACT waterways
3. To protect lakes and ponds from the impacts of the urban environment.



Progress snapshot

Implementation Plan 2 for the ACT Water Strategy was released in June 2019. Both the 2020 and 2021 ACT Water Strategy Report cards demonstrate ongoing implementation of actions to meet the targets of the strategy. The ACT Health waterways program has been extended through to June 2023. The stage of the program will focus on stopping pollutants at the source.

The Canberra Urban Lakes and Ponds Land Management Plan was legislated under the Planning and Development Act 2007 in 2022. The plan sets the vision of enriching local communities through the aesthetic, recreational, sporting, tourism, cultural and ecological values of lakes and ponds and providing opportunities for people to be involved in their use, care, and management.

Water resources and consumption policy context

The ACT is wholly situated within the Murrumbidgee River Catchment, which feeds into the Murray–Darling River system–Australia's biggest river system and also one of the world's driest. The ACT will continue to be an active and responsible participant in managing the precious and finite water resources of the Murray–Darling Basin (MDB). The ACT Water Strategy adheres to the Murray–Darling Basin Plan (Basin Plan) (MDBA, 2012), which placed additional requirements on the ACT and other jurisdictions in relation to water use (a limit on water diverted) and water quality.

The ACT is committed to meeting MDB-wide environmental objectives for water dependent ecosystems and water quality. The ACT seeks to manage water quality to ensure that water leaving the ACT is of the same quality or better than that entering the ACT. These environmental commitments place a strong onus on the ACT to manage water quality and ecosystem health within the Territory's borders.

Potable water savings

In response to climate change and a growing population, the ACT Government is committed to reducing potable water use, increasing water quality and controlling storm water flows. In response to this commitment, the ACT Government adopted a Water Sensitive Urban Design (WSUD) approach encompassing the following principles:

1. Reducing the demand for potable water through the proliferation of alternative water sources (rain, treated wastewater) and facilitating the use of water efficient fixtures and appliances
2. Minimising the generation of wastewater
3. Treating urban storm water and wastewater for re-use and/or release
4. Using stormwater to improve environmental aesthetics and recreation

WSUD addresses city planning to optimise water use, flows and capture to protect the environment, community and future. The 2004 "*Think Water Act Water" strategy* included an objective to "facilitate the incorporation of water sensitive urban design principles into the urban, commercial and industrial development" and targets included:

- A 12 percent reduction in mains water usage per capita by 2013, and a 25 per cent reduction by 2023 (compared with 2003), achieved through water efficiency, sustainable water recycling and use of stormwater.
- An increase in the use of treated wastewater (reclaimed water) from 5% to 20% by 2013.

Lake and waterway health

Minor tributaries of the Murrumbidgee and Molonglo rivers within the ACT, many of which flow through urban areas, are generally severely degraded and are noted to contribute poor water quality when they flow. A key aspect is their engineered nature, which has significantly reduced habitat and landscape values through physical modification of the waterway and removal of vegetation.

Water quality monitoring in Canberra's lakes has revealed an accumulation of common nutrients (nitrogen and phosphorus) in them, which has contributed to triggering and maintaining numerous algal blooms with nearly all lakes experiencing extended closures in the last decade. Waterwatch data shows the overall condition of urban waterways is generally fair (based on water quality surveys, macroinvertebrate surveys and riparian condition surveys) with high turbidity measurements noted in waterways adjacent to development sites including in developing suburbs in proximity of the Lower Molonglo River.

There is significant pressure placed by the urban environment on receiving waters, including within the urban catchments and also downstream, such as the Murrumbidgee River. Urban development, and unmitigated and untreated urban stormwater in particular, impacts waterways through the following processes:

1. Direct modification of existing waterways and drainage lines to facilitate development

2. Changes to the hydrologic regime in waterways including the magnitude of peak flows, volumes of runoff, reduced time to peak flow and changes to baseflow
3. Increased pollution to waterways including sediments, nutrients, pathogens, fuel, oil, heavy metals and microplastics
4. Spread of terrestrial and aquatic weeds along waterways.

In the 2000s, WSUD became an important concept in the ACT's policies and its principles were adopted as part of the ACT's strategic planning. In 2002, the ACT Legislative Assembly passed a motion about water management, including an agreement that the water leaving the ACT via the Murrumbidgee River should be of no less quality than the water flowing into the ACT and that the level of nutrients and sediments entering ACT waterways should be no greater than from a well-managed rural landscape.

The 2004 "*Think Water Act Water" strategy* included an objective to "facilitate the incorporation of water sensitive urban design principles into the urban, commercial and industrial development" and targets included a reduction in the intensity and volume of urban stormwater flows so that the runoff event that occurs on average once every 3 months, is no larger than it was prior to development.

The ACT WSUD Code was published in 2009 and requires new development (above a certain threshold scale) to meet mandatory stormwater pollutant load reduction targets. The code also includes "regional" targets recommended for the ACT as a whole. The WSUD code also encourages stormwater treatment closer to the source, with treatment systems distributed throughout an estate, as well as the inclusion of on-block stormwater treatment measures.

Description of water resources and consumption policies in the ACT

Water Resources Act 2007

The Water Resources Act aims to ensure that management and use of the water resources of the Territory sustain the physical, economic and social wellbeing of the people of the ACT while protecting the ecosystems that depend on those resources

The Territory Plan under the Planning and Development Act 2007

The object of the territory plan is to ensure, in a manner not inconsistent with the national capital plan, the planning and development of the ACT provide the people of ACT with an attractive, safe and efficient environment in which to live, work and have their recreation. It is currently being reviewed.

Water Use and Catchment General Code 2009

The purpose of this code is to identify waters of the Australian Capital Territory in terms of the permitted water uses and environmental values, and to identify the water quality and streamflow criteria related to the full protection of these uses and values.

Waterways Water Sensitive Urban Design General Code 2009

This code was reviewed and updated in 2020 and describes an approach to urban planning and design that aims to integrate the management of the water cycle including stormwater into the urban development process which considers integrated water cycle management. The WSUD general code aims to provide the necessary WSUD targets and strategies to be implemented to ensure improved environmental sustainability.

ACT Practice Guidelines for Water Sensitive Urban Design 2018

The Practice Guidelines for Water Sensitive Urban Design in the ACT support the General Code and provide developers, ACT Government officers and residents with support on introducing WSUD into their residential lot, streetscape, neighbourhood and estate.

ACT Water Strategy 2014-44: Striking the Balance

The ACT Water Strategy provides long term (30 year) strategic guidance to manage the Territory's water resources. The outcomes, strategies and actions incorporate the full breadth of water management activities in the ACT. The ACT Water Strategy is intended to guide the development, integration and implementation of activities undertaken by government agencies (and with ACTEW, Commonwealth, State and Territory agencies), developers, the ACT community, natural resource management groups and other stakeholders involved in planning and water management and water use.

ACT and Region Catchment Strategy 2016–46

This Strategy sets out the principles for governance, describes the key factors that will affect the catchment over the next 30 years and the actions that aim to optimise outcomes for the region. The strategy will:

- provide a vision to all agencies, organisations and individuals involved in catchment management
- offer a mechanism to resolve jurisdictional challenges and capitalise on the opportunities for improved catchment management outcomes to manage regional growth
- influence and connect to related planning processes
- provide a mechanism to develop joint funding bids and prioritise investment and effort for the benefit of the region
- reinforce the connections between land and water, rural and urban and interaction between humans and the environment.

Draft Canberra Urban Lakes and Ponds: Land Management Plan 2014

This Plan was reviewed and updated in 2019 and aims to:

- present the framework guiding the management of Canberra's urban waterbodies in a manner responsive to a range of environmental and community values
- communicate management intentions associated with managing Canberra's urban waterbodies
- document the management vision, core values and services for Canberra's urban waterbodies
- complement other associated plans and strategies
- provide performance indicators to monitor the implementation of the Plan.

Stormwater: Municipal Infrastructure Standards 08

These standards were reviewed and updated in 2019 and provide stormwater drainage system design standards and documentation to meet the following objectives:

- Contribute to a sustainable urban environment
- Provide safety for the public
- Minimise the impacts of flooding on life and property
- Stabilise the landform and control erosion
- Enhance the urban environment by providing assets of social, environmental, and economic value
- Protect and maximise the value of aquatic and terrestrial ecosystems within the stormwater system
- Enhance water security by minimising the need for irrigation with potable water
- Encourage community involvement and connection with country.

Lake Burley Griffin Action Plan 2012: A healthier, better functioning lake by 2030

The Action Plan proposes a coordinated program of short-, medium- and long-term actions in and around Lake Burley Griffin as well as in the ACT and adjoining NSW catchments. These actions are designed to address the health of the Lake in the context of continuing urban growth and climate variability, with the aspiration of achieving progressive and measurable improvements.

ACT Aquatic and Riparian Conservation Strategy and Action Plans 2018

The ACT Aquatic and Riparian Conservation Strategy provides guidance on the conservation of aquatic and riparian areas and component species in the ACT, consistent with the ACT Nature Conservation Strategy 2013–23. This includes managing threats, maintaining and improving ecological connectivity, ecosystem function and biodiversity, undertaking monitoring and research programs, and partnering with the community to support aquatic and riparian conservation.

Water Quality Environment Protection Policy 2008

This policy aims to maintain, and where appropriate enhance, the ACT's water quality (as measured by standards prescribed by regulation or, when not available, other appropriate standards) by minimising or eliminating water pollution. In accordance with general environmental duty outlined in Section 22 of the Environment Protection Act 1997 everyone whose activities might cause environmental harm must take practicable and reasonable steps to prevent or minimise that harm. The Act aims to protect aquatic environments by keeping stormwater as clean as possible. The Water Quality EPP provides advice on how to improve stormwater quality through the activities of residents, businesses, and industry.

Policy development since 2019 State of Environment Report

Policy-related documents developed since the 2019 ACT State of the Environment Report are described below.

Water Resources Environmental Flow Guidelines 2019

This is the second version of the Environmental Flow Guidelines, that are an instrument under the Water Resources Act 2007, that set out the flow requirements (quantity and timing) needed to maintain freshwater ecosystems.

ACT Water Strategy 2014-44: Striking the Balance – Implementation Plan Two (2019-23)

Implementation Plan 2 provides a further road map for continuing to address key actions required to implement the Strategy, to protect the health of ACT water catchments, ensure ongoing access to water resources, and to ensure the community enjoys the values of water as well as being engaged in the care and management of the resource.

Canberra's Living Infrastructure Plan: Cooling the City 2019

This Plan identifies challenges from climate change, urban growth and renewal, and the aging of the urban forest. The Plan provides a response to address these challenges and to enhance Canberra's urban environment.

Waterways Water Sensitive Urban Design General Code 2020

See above.

Draft Canberra Urban Lakes and Ponds: Land Management Plan 2019

See above.

Stormwater: Municipal Infrastructure Standards 08 (2019)

See above.

Urban Riparian Corridor Guidelines (being developed)

To protect and enhance riparian and other values within the urban drainage system of the ACT.

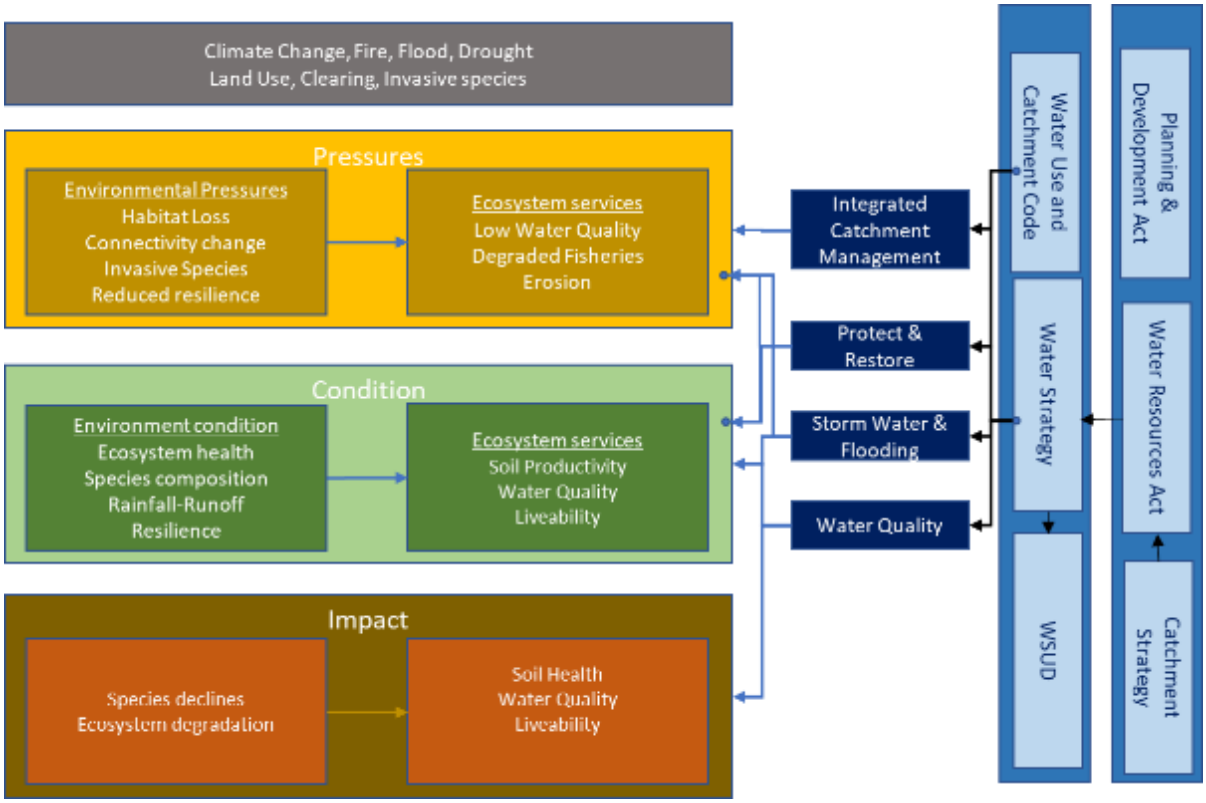


Figure 25. *Illustration of the areas of focus for water resources and consumption policy in the ACT*

Water resources and consumption policy analysis

Potable water savings

Policy goal or vision: Conserve mains water supplies while retaining and enhancing blue and green infrastructure to improve sustainability and environmental conditions

Key instruments: *ACT Water Strategy 2014-44 Striking the Balance; Waterways Water Sensitive Urban Design General Code 2020; ACT Practice Guidelines for Water Sensitive Urban Design 2018, Canberra's Living Infrastructure Plan: Cooling the City 2019*

Policy Objectives:

1. Increase water-use efficiency and water recycling
2. Promote stormwater harvesting and use, and passive irrigation
3. Have a sustainable water supply

Water Sensitive Urban Design

Water Sensitive Urban Design is defined in the *Waterways and WSUD General Code* as:

an approach to urban planning and design that aims to integrate the management of the water cycle including stormwater into the urban development process which considers integrated water cycle management.

The *Waterways WSUD General Code* makes provisions for implementation of WSUD in development and redevelopment on sites across all zones of the *Territory Plan*. It stipulates the outcomes sought in relation to water sensitive urban design primarily through a series of targets for mains water reduction, water quality and stormwater quantity as well as permeability requirements and endorsement of an operation and maintenance plan for assets that are handed over to ACT Government. It specifies a water use target for the ACT that comprises a reduction in mains water consumption of 25% by 2023.

To help maintain achievement of this target, the Waterways WSUD General Code requires that new developments show a minimum 40% reduction in potable water consumption compared to an equivalent development constructed in 2003. This target applies to commercial, institutional and industrial developments also. Typical solutions proposed in development applications for mains water reduction tend to focus on fixtures and fittings first, then rainwater tanks, then greywater. Estate-scale greywater solutions are basically not applied in the ACT owing to health concerns and licencing and operations and maintenance requirements.

Actual water consumption per household in the ACT fell by approximately 33% between 2003 and 2010 (Fyfe et al., 2011). In their 2018-19 annual report, Icon Water state that since November 2010, per capita water consumption in Canberra and Queanbeyan has consistently been 35 – 40 per cent below consumption levels experienced before the introduction of water restrictions in 2002.

While a minimum water efficiency rating for plumbing fixtures is not a requirement specified in the development codes (except Option A for compact blocks in the Single Dwelling Housing Development Code), the checklists to calculate mains water reduction requires a minimum 3-star rating to be included to achieve a 40% reduction. Most DA applications also include water efficient dishwashers and washing machines, but these appliances are mostly provided by the owners and there is no guarantee the appliances included in the checklist at development approval stage will be installed by the owners. There are currently no regulations in the ACT regarding the sale of water efficient fixtures (and appliances). However, there are few, if any, 2- or 1- star appliances on the market in the ACT.

There is currently no requirement in the ACT to separate washing machine and bathroom drainage from the remainder of the wastewater system in new houses. However, there is a requirement to separate water supply to toilets and washing machines. Certifiers are not required to check whether household plumbing, fixtures and appliances are compliant with the Waterways WSUD General Code (i.e., a 40% reduction in mains water use compared with an equivalent dwelling in 2003 is demonstrable).

Commercial and institutional developments don't appear to be proposing to use rainwater or greywater for indoor cooling purposes. However, large developments (e.g., estate developments) usually incorporate a 50% roof area connection to rainwater tanks as part of their plans.

Securing long term water supplies

The ACT Water Strategy states the ACT Government will optimise the mix of water supply options that can respond to water planning variables through a robust and transparent comparison of all demand and supply options. The aim is to optimise economic, social, health and environmental outcomes and reduce system reliability risks by spreading risk across the total water supply system and having access to a range of water supply options. This recognises that in most cases there is no one option that will provide a total solution. These water supply options would be drawn upon in different combinations depending on the local and regional climatic conditions, and the mix of sources selected would be those resulting in the most optimal environmental, social and economic outcomes over the long term.

In the strategy, the government commits to strengthening water trading arrangements, including internal water trading and external trading within the MDB, and investigating the benefits, in terms of water quality and efficiency of water delivery, from a range of different local water supply systems.

ACTEW and the ACT Government will also continue to look into ways to utilise or supplement existing infrastructure to achieve increased efficiencies. The ACT Government will review agreed levels of service for water utilities in the ACT and monitor their performance, including reviewing ACTEW's licence arrangements. Agreement on levels of service will allow the community to understand how seasonal variability and climate change will impact on supply into the future and how different levels of service relate to costs. Measures undertaken to minimise risk and maximise efficiency in supplying water should be in accordance with agreed levels of service.

Table 23. Summary of approaches to achieving potable water savings policy objectives

Policy objective	Strategy / Action / Target / Outcome	Approach
1. Increase water-use efficiency and water recycling	Mains Water-Use Reduction Target – Development achieves a minimum 40% reduction in mains water consumption compared to an equivalent development constructed in 2003	Commit, act and influence
	Encourage water users to conserve and use water wisely	Influence
2. Promote stormwater harvesting and use, and passive irrigation	On-site stormwater retention – Retained stormwater is used on site	Act and influence
	Green/living infrastructure – Development achieves all of the following: a) Increases permeable surfaces and living infrastructure through green spaces (development achieves a minimum of 20% of the site area to be permeable) b) Plants that require irrigation are supported by sustainable water systems such as onsite stormwater harvesting to achieve microclimate benefits c) Promotes evapotranspiration to mitigate extreme temperatures, improve air humidity and overall human comfort.	Commit, act and influence
	Integrate water cycle management and green infrastructure into the planning and design of urban environments	Learn and act
3. Have a sustainable water supply	Plan for long term water security	Plan
	Strengthen water trading arrangements	Partner
	Investigate the benefits and costs of more diverse water supply options	Learn
	Improve and monitor provision of water services	Learn

Lake and waterway health

Policy goal or vision: Maintain or improve the long-term health of ACT waterways

Key instruments: *Water Use and Catchment General Code 2009; ACT Water Strategy 2014-44 Striking the Balance; ACT and Region Catchment Strategy 2016–46*

Policy Objectives:

1. Protect and conserve the water quality and aquatic habitats of highly valued lakes, rivers, and streams

2. Ensure that water and catchment land use in conservation, water supply and open space and drainage catchments are consistent with the values and objectives of those catchments
3. Make provision for a range of water uses and environmental values that are compatible with the values and objectives of catchments
4. Ensure that streamflow and quality of discharges from catchments are consistent with protection of the environmental values of downstream waters
5. Protect and conserve the water quality of groundwater resources of the Territory
6. Have a community that values and enjoys clean, healthy catchments and waterways

Policy goal or vision: Protect lakes and ponds from the impacts of the urban environment

Key instruments: *Water Use and Catchment General Code 2009; ACT Water Strategy 2014-44 Striking the Balance; ACT and Region Catchment Strategy 2016–46; Waterways Water Sensitive Urban Design General Code 2020; ACT Practice Guidelines for Water Sensitive Urban Design 2018*

Policy Objectives:

1. Manage and mitigate the impacts of development on stormwater quantities and quality
2. Ensure that streamflow and quality of discharges from catchments are consistent with protection of the environmental values of downstream waters

Urban catchment management

The *ACT Water Strategy 2014-44* provides strategic guidance for the management of the Territory's water supply over the next 30 years. Whilst it is not a catchment strategy, the ten actions forming its first outcome are related to the health of catchments and water bodies (Table 24). The water quality target outlined for the ACT is that it will *maintain or improve* the quality of water across all ACT managed sub-catchments (30-year target). This includes ACT managed urban catchments entering the Murrumbidgee River. Flow targets are also outlined for urban creeks, natural and modified ecosystems. Modified ecosystems are those that have been modified by catchment activities and changes to flow regime, and include the Murrumbidgee River, Molonglo River and Lake Burley Griffin.

Table 24. Strategies and actions under Outcome 1 (ACT Government 2014a)

OUTCOME 1: Healthy catchments and waterbodies *Well-managed, functioning aquatic ecosystems that protect ecological values and contribute to the liveability of the ACT community.*		
STRATEGY 1: Achieve integrated catchment management across the ACT and region		
Actions	1	Strengthen coordination and collaboration for catchment management across the ACT and region
	2	Enhance knowledge and spatial planning for water and catchment management
	3	Integrate water cycle management and green infrastructure into the planning and design of urban environments
	4	Improve water monitoring and analysis across the ACT and region
STRATEGY 2: Protect and restore aquatic ecosystems in urban and non-urban areas		
Actions	5	Improve water quality and ecosystem health in the ACT and region's rivers, lakes, aquifers, ponds and wetlands
	6	Ensure appropriate management (volume, timing, and quality) of environmental flows
	7	Strengthen compliance and enforcement for water resource management
STRATEGY 3: Manage stormwater and flooding		
Actions	8	Manage stormwater infrastructure sustainably
	9	Improve planning, monitoring and compliance for stormwater management
	10	Improve planning, information and regulation for flood management

The *ACT and Regional Catchment Strategy 2016-46* on the other hand is explicitly a catchment strategy and operates at a regional scale spanning most areas of the Murrumbidgee River catchment upstream of Burrinjuck Dam and additional lands in the Queanbeyan–Palerang and Yass Valley areas. It is focused on improving high level governance and cross-jurisdictional relationships through the activities of the "ACT and Region Catchment Management Coordination Group". The strategy also does not contain specific biophysical and social catchment targets but recognises that these need to be developed. There are no specific objectives for urban catchments; however, there are actions to provide an integrated catchment management planning approach for growth and settlement patterns in the ACT and Region, and for educating community on catchment health.

A key driver for the need for integrated catchment management in the ACT is that there is no overall strategic catchment management setting, plan or policy for agencies to operate against. As outlined in the *ACT Water Strategy*, one of the foundational actions is to establish catchment management arrangements to better integrate water and land management for improved water quality and catchment health in the ACT and region. Related to this, but at an urban scale, is the lack of a strategic approach to stormwater management through a strategy or framework (such as a catchment management strategy). As identified in the *Water Sensitive Urban Design Review* (ACT Government 2014b), both the Environment, Planning and Sustainable Development Directorate and Transport Canberra and City Services state that they have not undertaken catchment-wide planning for stormwater in the ACT. This is despite stormwater being one of the key pressures on the health of urban lakes and waterways in the ACT.

The importance and need for integrated catchment management is well recognised from our review of the key strategies in the ACT and the need for strategic decision making for the lakes, ponds and waterways has also been well recognised. However, while the *ACT Water Strategy* is implementing actions around integrated catchment management, these generally relate to the high-level coordination of water matters at an ACT and regional scale. To address the pressures on urban lakes and waterways, catchment management and planning is required at an urban catchment scale. A focus on urban catchments is important because there is significant pressure placed by the urban environment on receiving waters including within the urban catchment and also downstream such as the Murrumbidgee River. The impacts on receiving waters are ongoing and will not improve without a concerted and planned effort over time. There is a lot of social value to be gained from improving the condition of urban lakes and waterways as they contribute to community wellbeing.

The need for strategic decision making to address current and future challenges to the lakes is recognised in the Report on the *State of Watercourses and Catchments for Lake Burley Griffin* (Commissioner for Sustainability and the Environment 2012). However, there is currently no governance structure to guide strategic decision making for the lakes. The *Draft Canberra Urban Lakes and Ponds Land Management Plan* (ACT Government 2019c) outlines responsibilities for a range of ACT Government agencies for managing different aspects of the lakes and ponds. However, it does not present a strategic plan by the different agencies to address current and future challenges to water quality, aquatic and riparian health.

Strategic decision-making for the lakes and ponds needs to recognise the multiple roles that they perform and be based on a full understanding of the range of environmental, social, and economic values that they provide. For instance, large regional ponds such as Yerrabi Pond and Point Hut Pond which serve to treat stormwater have also become important community assets, and there is an expectation by the community that they will be protected from the impacts of future development in their catchments. It appears that in some contexts they are considered as treatment systems but in others they are considered as receiving waters.

Our review more broadly identifies that there is no entity responsible and accountable for catchment-wide planning and management at an urban scale and for making strategic decisions for the lakes, ponds and waterways as part of a connected system. They are not well integrated into strategies and policies. There also appears to be no coordinated management of urban waterways, with reliance on community-based volunteer efforts such as Waterwatch for monitoring and local catchment groups for revegetation.

In light of the above, there is also an opportunity to review the *Water Use and Catchment General Code* (ACT Planning and Land Authority 2009). The purpose of the code is to identify permitted water uses and environmental values in the waters of the ACT and to identify the water quality and streamflow criteria for protection of these uses and values. There is an opportunity to better articulate the environmental and social values and roles of urban lakes, ponds and waterways in this Code, including requirements for water quality and

flows, and to better link this Code with the *Waterways WSUD Code*. This was also outlined in the *Water Sensitive Urban Design Review* (ACT Government 2014b).

Aquatic and riparian ecosystems

The *ACT Aquatic and Riparian Conservation Strategy and Action Plans* (ACT Government 2018a) provides guidance on the conservation of aquatic and riparian areas and component species in the ACT, consistent with the *ACT Nature Conservation Strategy 2013–23* (ACT Government 2013). The objectives of the strategy include the provision of conservation management guidelines for the protection and enhancement of aquatic and riparian areas primarily in natural water bodies; and the identification of threats to aquatic and riparian ecosystems, providing guidelines for their management.

However, urban lakes, ponds and waterways are not specifically covered in *ACT Aquatic and Riparian Conservation Strategy*. Whilst it covers the Molonglo and Murrumbidgee Rivers, it does not cover wetlands nor urban waterways such as the Queanbeyan River, Tuggeranong, Weston, Yarralumla, Sullivans, Woolshed, Jerrabomberra and Ginninderra creeks. Riparian zones surrounding artificial lakes, large floodplain areas or substantially modified urban water courses are also excluded. A key feature of urban waterways in the ACT is the engineered nature of the system which has virtually eliminated any habitat values and reduced the landscape value. In general, the physical form of urban waterways in the ACT tend to transition from highly modified concrete channels in highly urbanised areas, to concrete swales with grassy banks in mid-reaches, to more "natural" but disturbed sections in upper reaches. Rehabilitation of urban waterways is an opportunity to not only improve aquatic and riparian ecosystems, but also improve amenity, reduce bed and bank erosion and sediment loads downstream, and incorporate stormwater treatment and retention features. Waterway restoration will need to take different forms in different parts of the catchment to reflect the opportunities and constraints. This strategy is highly relevant to urban waterways and water bodies because these urban parts of the catchment are the source of a range of threats and impacts on highly valued downstream waterways.

The *ACT Aquatic and Riparian Conservation Strategy* recognises that urbanisation has led to reduced water quality and modified flows, creation of barriers, increased pest animals and weed invasion, increased fishing pressure, removal of in-stream large woody debris and modification of riparian zones to meet recreational and urban expectations. The strategy provides high-level guidance on managing a range of interacting threats relevant to the health and function of both urban and non-urban waterways, including:

- Urban land use impacts
- River regulation and water extraction
- Water quality, turbidity and in-stream sedimentation
- Thermal pollution
- Riparian zone modification
- Weeds, pest animals, parasites and diseases
- Barriers to connectivity for aquatic populations
- Inappropriate fish harvesting
- Climate change

Guidance from across a number of these interacting threats (urban land use impacts, sedimentation, turbidity, and water quality) is important to manage the effects of urban areas and urban development on aquatic and riparian health. Key guidance includes:

- Plan and design urban areas to minimise urban edge impacts on adjacent riparian and aquatic areas
- Use best practice WSUD, including sediment ponds, building phase sediment and erosion controls and adequate buffer width between urban and riparian zones
- Manage sites adjacent to aquatic and riparian areas to reduce weed invasion and pest animals

- Manage recreational activities in the riparian zone to minimise impact using measures such as providing non-erodible walking paths where high intensity recreation occurs
- Educate residents about waterway health, including stormwater run-off, recreational fishing and illegal flora and fauna introductions
- Ensure a vegetated buffer strip between urban and riparian zones to filter and trap sediment
- Use sediment and erosion control measures in urban areas and during construction activities
- Carry out catchment and riparian revegetation where necessary.

However, it appears that the high-level guidance is not being applied in relation to urban development planning and construction. This was highlighted in Alluvium's preliminary investigation of future development opportunities and constraints in the Western Edge (Alluvium 2020). This showed that stormwater management needs to consider erosion from the transfer of excess flow volumes from urban areas above the Murrumbidgee and Molonglo Rivers down the escarpments and into these receiving waters. In the Lower Molonglo River, many stormwater discharge points from the Coombs, Denman and Molonglo developments stop at the Molonglo River reserve boundary resulting in flow transmission issues inside the Reserve that typically include erosion and sedimentation. Water quality and weed infestation issues may also arise over time. These discharge points now require treatment, potentially including options such as level-spreaders, rock-lined waterways, engineering drainage structures and the use of appropriate vegetation to stabilise discharge areas and manage flows.

To avoid or minimise impact, stormwater management principles should consider minimising impervious areas and enhancing permeability elsewhere; reducing the hydraulic connectivity of the stormwater system by the use of swales, vegetated waterways, wetlands and ponds rather than pipes and lined channels; and incorporating detention and retention capacity (e.g., reuse, infiltration and evaporation/evapotranspiration, retarding basin measures). These principles need to be translated into policy that informs urban development construction.

Water quality and flow

The *ACT Water Strategy* provides a target to maintain or improve water quality across all water sources, and within all catchments and sub-catchments. The indicator related to this target is outlined below:

> *AUSRIVAS performance classifications for select reaches of major rivers are maintained or improved. The level of nutrients, organic material and sediment loads entering the ACT reach of the Murrumbidgee River is no greater than from a well-managed rural catchment.*

The strategy also has an interim target for a measurable improvement in catchment health in areas (sub-catchments) that receive funding for on-ground works from the ACT Basin Priority Project (Commonwealth funded, 2014-2019). The indicators related to this interim target are outlined below:

- Median Total Phosphorus load from urban catchments less than 20 kg/km^2/yr.
- Median Organic material (measured as TOC) load from urban catchments less than 500kg/km^2/yr.
- Median Suspended Solids load from urban catchments less than 10,000 kg/km^2/yr.

Assessment by Alluvium Consulting of future development opportunities and constraints in the Western Edge Investigation Area (Alluvium 2020) showed that if the mandated "development targets" for stormwater treatment in the *Waterways WSUD code* are applied at a site changing from a "well-managed rural catchment" to a predominantly urban catchment, there is an increase in pollutant loads (TSS, TP and TN) leaving the site compared to pre-developed condition. This is based on MUSIC[51] modelling undertaken for the project with underlying assumptions on pollutant load generation in urban and rural catchments. Export loads from the site

[51] MUSIC is short for Model for Urban Stormwater Improvement Conceptualisation. It is a software designed to simulate rainfall and pollution generation to enable strategies to be developed for managing hydrology and pollution impacts arising from urban stormwater runoff.

also do not meet *ACT Water Strategy* interim targets for urban catchments for Total Phosphorus and Total Suspended solids.

The implication of this is that there will be an increase in pollutant loads entering receiving waters, including the Murrumbidgee River, if regional projects for stormwater treatment are not undertaken in addition to development site projects. Interim targets can be met if "regional targets" under the *Waterways WSUD code* are applied. However, even when regional targets are applied, there remains an increase in loads compared to pre-developed condition (i.e., a well-managed rural catchment). Depending on the downstream pond or lake, this can be an issue if the objective is to improve water quality.

This example highlights that it is important to develop an urban catchment strategy that outlines how the "development" and "regional' targets will be applied in practice to meet objectives for urban lakes, ponds and waterways and, ultimately, the Murrumbidgee River. To mitigate against untreated stormwater entering receiving waters, it may be prudent to mandate stormwater quality treatment in all catchments within which urban development is planned, irrespective of whether water quality targets can be met by treating only a subset of catchments.

In addition, current policy under the *ACT Waterways: Water Sensitive Urban Design (WSUD) General Code* (ACT Government 2020) requires stormwater detention measures are provided in new residential developments and that the peak rate of stormwater runoff from the estate does not exceed the peak rate of runoff from an unmitigated (rural) site of the same area for minor and major (1% AEP) storms. This Code does not fully consider the potential for erosion under different flow management scenarios. A range of flow metrics are often used to assess changes in flow regime as a result of development and urbanisation, which often increases the erosion potential within waterways. One method is the Erosion Potential Index (EPI).

The EPI explicitly considers the magnitude and duration of flows above a threshold to estimate the time-integrated sediment transport and scour characteristics across a range of flows and time periods for different flow management scenarios, rather than peak flows predicted to occur with a particular frequency. The continuous simulation EPI approach therefore provides a more realistic estimate of the effective work carried out on a channel by flow, especially when the hydrologic model is calibrated to recorded flows.

Scenario modelling and mitigation measures to ensure that any development results in an EPI of unity would mean there is unlikely to be a major change in channel trajectory as a result of the development. A good understanding of the actual critical shear stress in the channel is still required, as well as an understanding of the active geomorphic processes within the area of study.

The *ACT Water Strategy* provides flow targets and indicators as follows:

- In the case of urban creeks, aim for reduction in the intensity and volume of urban stormwater flows so that the runoff event that occurs on average once every three months, is no larger than it was prior to development.
- In the case of natural ecosystems and modified ecosystems, protect base flow, riffle and channel maintenance flows, and special purpose flows in accordance with the ACT Environmental Flow Guidelines (ACT Government 2019b).

The *ACT Waterways: WSUD General Code* has a stormwater retention objective. However, the drivers for this objective appear to be more for mains water use reduction and pollutant load reduction rather than meeting a flow objective in receiving waters. For instance, the stormwater retention requirement in the Code is expressed as a storage capacity and reuse requirement (1.4 KL per 100 m^2 of total impervious area) which if implemented to meet household internal end-uses only (and no infiltration) does not contribute to protecting baseflow in waterways. The "reuse" term should be defined so that it can be applied to meet a range of objectives.

Water monitoring

We have identified that a reasonable amount of data is being or proposed to be collected in terms of water quality and waterway condition indicators including:

6. Macroinvertebrate monitoring undertaken using the AUSRIVAS protocol. It involves collecting samples of stream invertebrates from stream edge sites in the ACT region during spring and autumn, including in urban waterways (ACT Government 2016b)
7. Water quality surveys, macroinvertebrate surveys and riparian condition surveys by Waterwatch as part of the Catchment Health Indicator Program 2020 report (Upper Murrumbidgee Waterwatch 2020) which include urban waterways and ponds.
8. Via the Integrated Water Quality Monitoring program, which is understood to be proposing monitoring activities to fill identified gaps.

As identified in the *ACT Water Strategy*, there is a need for a more integrated and coordinated approach to water monitoring in the ACT. In urban catchments, we also identify that a more coordinated approach to monitoring environmental values, flows and water quality is required including in identifying gaps and undertaking additional monitoring. We also observe that the ACT Government is relying heavily on community-based volunteer efforts such as Waterwatch for this monitoring. Interviews with water professionals in the ACT indicate the longitudinal based flow monitoring system currently implemented by the Waterwatch program needs to be complemented by event-based monitoring (Thukten 2019).

Our recommendation is to consider prioritising the following sub-actions under the *ACT Water Strategy* Action 4 – Improve water monitoring and analysis across the ACT and region – in urban catchments:

9. Better integration of Waterwatch and AUSRIVAS activities into a broader monitoring program.
10. Identify priority gaps in monitoring and undertake additional monitoring.
11. Monitor existing infrastructure for performance and establish monitoring and design guidelines for future infrastructure, e.g., ponds and wetlands.
12. Improve access to water monitoring data, including by stakeholders.

Table 25. Summary of approaches to achieving waterway health policy objectives

Policy objective	Strategy / Action / Target / Outcome	Approach
1. Protect and conserve the water quality and aquatic habitats of highly valued lakes, rivers and streams	Improve water quality and ecosystem health in the ACT and region's rivers, lakes, aquifers, ponds and wetlands.	Act
	Ensure appropriate management (volume, timing, and quality) of environmental flows.	Act
	Strengthen compliance and enforcement for water resource management.	Act and influence
2. Ensure that water and catchment land uses in conservation, water supply and open space and drainage catchments are consistent with the values and objectives of those catchments	Land use and protection measures shall be consistent with maintaining the water quality appropriate to prescribed water uses and environmental values.	Act
	Land use and management provisions shall be consistent with land use capability.	Act
	Strengthen coordination and collaboration for catchment management across the ACT and region.	Partner
	Enhance knowledge and spatial planning for water and catchment management.	Learn
	Improve water monitoring and analysis across the ACT and region.	Learn and act

Policy objective	Strategy / Action / Target / Outcome	Approach
3. Make provision for a range of water uses and environmental values that are compatible with the values and objectives of catchments	Water-based and related recreation areas shall be located in zones in which the water quality is consistent with the water quality criteria for prescribed water use.	Act
	Where required, recreation activities shall be controlled to minimise the potential of pollution of waters.	Act
4. Ensure that streamflow and quality of discharges from catchments are consistent with protection of the environmental values of downstream waters	Water within conservation, supply and drainage catchments may be used only for prescribed purposes in accordance with the location of water uses or prescribed environmental values.	Commit
	Lake releases shall be consistent with the protection of downstream ecology and water uses.	Act
5. Protect and conserve the water quality of groundwater resources of the Territory	Abstraction of groundwater shall be consistent with authorised abstractions.	Commit
	Develop a better understanding of groundwater resources (quantity and quality) within the region.	Learn
6. Have a community that values and enjoys clean, healthy catchments and waterways	Improve management of rivers, lakes and public space to promote recreational use and reduce risks to public health.	Plan and act
	Promote community involvement in management of ACT water resources.	Learn and influence
	Ensure that indigenous and other cultural values are recognised in managing water planning and use.	Learn and influence

Table 26. Summary of approaches to achieving lake and pond protection policy objectives

Policy objective	Strategy / Action / Target / Outcome	Approach
1. Manage and mitigate the impacts of development on stormwater quantities and quality	On-site stormwater detention – ensure that the peak rate of stormwater runoff from sites does not exceed the peak rate of runoff from an unmitigated (rural) site of the same area for the 1 Exceedance per Year (1EY). The detained stormwater is designed to be released over a period of 6 hours after the storm event.	Commit and act
	Stormwater Quality Target – The average annual stormwater pollutant export is reduced when compared with an urban catchment of the same area with no water quality management controls for all of the following: a) gross pollutants by at least 90% b) suspended solids by at least 60% c) total phosphorous by at least 45% d) total nitrogen by at least 40%.	Commit and act

Policy objective	Strategy / Action / Target / Outcome	Approach
	Manage stormwater infrastructure sustainably	Learn and act
	Improve planning, monitoring and compliance for stormwater management	Plan, act and learn
	Improve planning, information and regulation for flood management	Learn and act
	Retardation measures shall be provided where appropriate to limit peak flows to levels within the capacity of downstream channels	Act
2. **Ensure that streamflow and quality of discharges from catchments are consistent with protection of the environmental values of downstream waters**	Land development and construction activities shall be consistent with minimising erosion and discharge of sediments.	Act
	Provisions shall be made for the collection and treatment of domestic and industrial wastewater.	Act
	Provision shall be made for the collection and treatment of urban stormwater pollutants and the protection of associated open space corridors.	Act
	Total discharge (loading) of various streamflow constituents emanating from the catchments shall not exceed the sustainable loading on receiving waters.	Act
	Discharge of wastewater shall not be permitted to groundwater resources.	Act

Conclusions

Potable water savings

We have made the following observations regarding the *ACT Waterways and WSUD General Code* and the practice guidelines:

13. With regards to the mains water use reduction target, an increase in the mains water use reduction target from 40% to 50% of pre-2003 levels in all new developments and redevelopments is considered feasible. An intermediary target, such as 45%, may be appropriate also. This is due to improvements in recent years in the efficiency ratings of household plumbing fixtures and appliances, the potential for inclusion of flow restrictors on outdoor plumbing fixtures, and the potential to increase roof water collection area requirements.
14. We note that in the guidelines, the objective for redevelopment and infill projects is to achieve a net improvement in water quality outcomes by application of identical targets as greenfield developments, with the idea that this will progressively improve water quality discharged from existing urban areas as part of the urban renewal process. The code makes provision for a stormwater management offset scheme when works are technically unfeasible or prohibitive in cost. However, it is acknowledged in the guidelines that the ACT Government does not currently have a stormwater management offset scheme and that developers must consult the ACT Government about any offset proposal.
15. There is an action in the ACT Water Strategy to integrate water cycle management and green infrastructure into the planning and design of urban environments. It is important the WSUD code and guidelines are updated over time to align with the recommendations from the ACT Living Infrastructure Plan and the "holistic water cycle management plan" which is scheduled to be developed in 2020-21 as per the Implementation Plan Two (ACT Government 2019a) of the ACT Water Strategy.
16. For green/living infrastructure elements, the rules require a minimum 20% of the site to be permeable. This target is likely being achieved under business-as-usual practices. It does not align with the Living Infrastructure Plan's target of 30% permeable surfaces in Canberra's urban footprint by 2045.

Lake and waterway health

There is currently no clear governance structure to guide strategic decision-making for protecting and improving the health of urban lakes and waterways. Current ACT Government strategies (the *ACT Water Strategy 2014-44* and the *ACT and Regional Catchment Strategy 2016-46*) also do not address integrated catchment planning and management across existing and potential future urban catchments.

There is a need for stakeholders to recognise the multiple roles that urban lakes and ponds perform and fully understand their objectives and the range of environmental, social and economic values that they provide.

There is no clear strategy for protecting and enhancing aquatic and riparian health of urban lakes and waterways with the *ACT Aquatic and Riparian Conservation Strategy* focused primarily on natural water bodies.

Land development is having a direct impact on waterway aquatic and riparian health including in the Molonglo and Murrumbidgee Rivers. This is arising from a lack of compliance with erosion and sediment controls during land development and limited guidance (and lack of application of existing guidance) on design of stormwater discharges at the urban edges.

There is a need for a more coordinated approach to monitoring environmental values, flows and water quality in urban lakes, ponds and waterways with the ACT Government appearing to be relying heavily on community-based volunteer efforts such as Waterwatch.

Flow and water quality objectives in urban lakes, ponds and waterways are not well defined for the range of social and environmental values that they provide.

Stormwater quality targets and stormwater retention targets in the Waterways WSUD code are not tied to environmental outcomes in the receiving waters. In particular, the current stormwater quality targets in the Waterways WSUD code may not be sufficient to avoid an increase in pollutant loads from greenfield developments entering urban lakes and ponds.

There is no catchment strategy that outlines how "development targets" and "regional targets" for stormwater treatment will be applied in practice to meet the objectives for the Murrumbidgee River as outlined in the *ACT Water Strategy* and to improve the condition in urban lakes and waterways.

There are a number of weaknesses in the planning, design, delivery and operation of WSUD infrastructure including:

- The agency-focused negotiation process at the planning and design stage is not necessarily tied to stormwater management objectives and environmental outcomes.
- Consultation during development application and design review stages does not always engage with all relevant entities in the ACT Government (or teams within the relevant entities).
- Sometimes, a lack of capacity or capability hinders ACT Government staff from undertaking meaningful review at development application and design review stages.
- Limited capacity in industry means WSUD assets are sometimes poorly designed and fail to provide the level of service required once constructed. There can also be poor integration of ecological, hydrological, and geomorphological disciplines, which means stormwater, landscape and ecological outcomes may suffer.
- There can be insufficient coordination between teams planning estate WSUD infrastructure and teams planning regional WSUD infrastructure, resulting in sub-optimal outcomes for stormwater treatment.
- There is a need for existing urban lakes and ponds to be redesigned and retrofitted with appropriate structures to meet the water management zone requirements of the *Canberra Urban Lakes and Ponds: Land Management Plan* (ACT Government 2019c).
- Excessive sediment loads into, and damage to, WSUD assets at the home construction stage.
- Little attention to the establishment of a vegetated stormwater treatment system.
- There is a likelihood of deficiencies in rainwater tank plumbing connections and in the quality of products, including pumps and diverters.
- The ACT Government is under-resourced for optimal operation and maintenance of WSUD assets.

A shared vision for the urban lakes, ponds and waterways of the ACT is needed, recognising the multiple roles that they perform, including water quality management, as well as the range of environmental, social and economic values that they provide. The *Canberra Urban Lakes and Ponds: Land Management Plan* describes the management objectives of Canberra's urban lakes and ponds. These are to:

- Prevent and control floods by providing a reservoir to receive flows from rivers, creeks and urban run-off.
- Prevent and control pollution of waterways.
- Provide for public use of the lake or pond for recreation.
- Provide habitat for fauna and flora.

However, these objectives are not necessarily aligned or complementary, and all of these objectives are applied to all urban lakes and ponds in the ACT, so the primary objective (or objectives) of each individual water body is unclear.

In addition, in accordance with section 317 of the *Planning and Development Act 2007*, if there is an inconsistency between the application of two management objectives, the objective appearing later in the schedule is to be read subject to the earlier objective, thus creating a hierarchy of management objectives. As

such, a lake may be managed to control floods and mitigate the pollution of downstream waterways ahead of any public use or ecological objectives. Problems with community expectations and satisfaction are exacerbated if the primary objective(s) of each waterbody is not clearly stated and understood.

The objectives and desired outcomes associated with urban lakes, ponds and waterways should be the context for assessing the costs and benefits of any waterway investment decisions and prioritising effort and investment. Sub-catchment strategies should also be developed for each key lake, pond and waterway, with specific visions, goals and placed-based objectives, action plans and targets (including water quality, flow, ecological and biophysical targets) in the short, medium and long-term covering both existing and greenfield urban areas.

Recommendations

General

The productivity Commission report "*Integrated Urban Water Management — Why a good idea seems hard to implement*" (Productivity Commission 2020) describes how the urban water sector in Australia is facing major challenges over the coming decades and states that integrated water cycle management (IWCM) is a way to meet these challenges more efficiently and effectively. IWCM is a whole of system, multidisciplinary approach that aims to manage the entire urban water cycle by integrating the delivery of water, wastewater and stormwater services to contribute to the full suite of water security, public health, and environmental and urban amenity outcomes that the community seeks. Using an integrated approach as the 'business as usual' approach to planning and managing urban water services allows a greater range of options to be identified and evaluated at the outset, which can then be designed to provide a broader suite of community outcomes, including enhanced urban amenity. This should lead to better decisions and lower cost solutions.

However, IWCM cannot be delivered by the water sector alone. Implementing IWCM will require significant, ongoing collaboration between land use planning and local government sectors and the water sector, in both policy and planning development at a range of different scales.

The report prescribes the following actions in response to common policy impediments to IWCM, which are largely apparent in the ACT:

1. Create clear objectives for water-related aspects of enhanced urban amenity
2. Create clear roles and responsibilities for providing enhanced amenity
3. Better link statutory land planning with water planning, and integrate stormwater planning and management into general water planning
4. Ensure restrictions or mandates do not prevent all options being put on the table
5. Remove barriers to effective collaboration between agencies
6. Ensure water project selection is always based on rigorous and transparent assessment of options
7. Integrate local scale and system wide water planning
8. Require environmental regulators focus on outcomes rather than actions
9. Ensure the cumulative effects of regulation don not impede integration

Potable water savings

Policies and practices that the ACT should explore ways to continue to improve water use efficiency include:

1. Application of enhanced water efficiency modelling tools – The ACT Government could undertake further investigations to ensure local environmental conditions are appropriately reflected in modelling tools used for the assessment of urban development on water use and water quality.

2. Applying industry best practice to WSUD application technologies – Investigating new technology in anthropogenic and natural hydrological flow harvesting, new architectural design in land-use planning, and wastewater recycling and other sustainable technologies.
3. Amending and Expanding the ACT's Permeant Water Conservation Measures to Reflect Industry Best Practice – Permanent water conservation measures that apply to the use of potable water were brought in to replace water restrictions. The intention of these measures is to avoid unnecessary water waste and save water for the future by encouraging a 'common sense' approach to water use. The measures primarily address how residents and business in the ACT can use water with respect to their gardens, lawns, pools, cars and cleaning. The ACT Government could work with the community to ascertain the best approach to conserving water.
4. Exploring policy and financial incentives to promote WSUD – To increase potable water saved in the ACT region, it is important to maximise the ability of developers to contribute to water saving initiatives. In 2014, the ACT Government undertook community consultation regarding the Water Sensitive Urban Design Codes and received comment suggesting an offset scheme be in place to increase flexibility in how water sensitive urban design could be achieved in the region. For example, Melbourne Water's offset scheme allows developers that cannot meet water quality/flow targets (on site) to pay the equivalent of the unmet targets into a fund used to construct WSUD assets at a catchment scale. The lack of economic reward may act as a disincentive for those encouraged to install water saving technologies and, as such, the ACT Government could investigate the role of market-based incentives to drive the uptake of innovative solutions.

Mains water saving option proposals and associated recommended changes to the existing WSUD code are summarised in Table 27. To help drive the uptake of any and all the options proposed in Table 27, we recommend the ACT Government increase the mains water use reduction target and make water saving calculations mandatory for all new developments or redevelopments. Under the current ACT Waterways WSUD General Code, for single residential blocks, options relating to rainwater use and greywater use are provided in the code that, if installed, are deemed to be equivalent to achieving the target. If one of these options is selected, there is no requirement to demonstrate via a water savings calculator that the water savings target is being met.

Given improvements in recent years in the efficiency ratings of household plumbing fixtures and appliances, the potential for inclusion of flow restrictors on outdoor plumbing fixtures, and the potential to increase roof water collection area requirements, an increase in the mains water use reduction target from 40% to 50% of pre-2003 levels in all new developments and redevelopments is considered feasible. An intermediary target, such as 45%, may be appropriate also.

For residential developments, we recommend also considering whether the new target should be stated in L/pp/day or KL/pp/year in new dwellings, based on the number of bedrooms, e.g., 1 bedroom = 1 people, 2 bedrooms = 2 people, 3 bedrooms = 2 people, 4 bedrooms = 3 people etc, or similar assumptions). A 50% reduction from pre-2003 use levels, for example, would be 124L/pp/day or 45KL/pp/year. This, however, would require restructuring the water savings calculator into a water use calculator, and would require new data and/or assumptions on actual water use in modern homes.

For commercial and institutional developments and redevelopments, any new target should remain stated as a percentage reduction in mains water use from pre-2003 levels (or some other appropriate period).

Table 27. Summary of water saving options and recommended changes to the existing WSUD code and other documents

	Water saving option	Recommended changes to existing Code(s) / Territory Plan
1	Change the minimum roof area connected to rainwater tanks from 50% to 75%	In the ACT Waterways WSUD General Code, amend the references in Section 2.4 to minimum roof area connected to rainwater tanks from 50% to 75% and remove references to roof areas in square metres. Also amend Appendix A to the WSUD General Code as required.

Water saving option		Recommended changes to existing Code(s) / Territory Plan
2	Include rainwater harvesting for compact residential blocks (<250 m^2)	In the ACT Waterways WSUD General Code, amend the references in Section 2.4 to include rainwater harvesting for compact residential blocks (<250 m^2) Also amend Appendix A to the WSUD General Code as required.
3	Rainwater tank installation – Certified plumbing connections, pumps and diverters	In the ACT Waterways WSUD General Code, include in Section 2.4 a requirement that all measures undertaken to meet the mains water use reduction target (indoor and outdoor plumbing fixtures and appliances, rainwater tanks and greywater systems) must be certified by a building inspector. In the Draft Variation to the Territory Plan No 354, include a note to this effect under Elements 1.1, 2.1 and 2.2. Include a note to this effect in the ACT Practice Guidelines for Water Sensitive Urban Design. Include this requirement where necessary in other ACT planning documents and building regulations.
4	Rainwater tank maintenance – Pumps and diverters replacement program	In the ACT Waterways WSUD General Code, include in Section 2.4 that rainwater tank installations will be inspected by ACT government employees on an ad-hoc, ongoing basis, and that pumps and diverters can be replaced free of charge by government approved plumbing contractors, if the property owner is happy for this to occur. The code should indicate also that the property owner can have the equipment replaced by a plumber of their choice and claim the expense from the government.
5	Include a maximum 12L/min flow requirement for outdoor plumbing fixtures	In the ACT Waterways WSUD General Code, under Section 2.4 (p.24), **replace** *"Measures that can be considered for meeting these targets include:* • *mandatory 3-star rated (or better) plumbing fixtures.* • *use of rainwater tanks for garden watering, toilet flushing, and laundry uses; and* • *on-site greywater recycling."* **with** *"Measures that can be considered for meeting these targets include:* • *mandatory 3-star rated (or better) indoor plumbing fixtures.* • *mandatory 12L/min flow (or less) for outdoor plumbing fixtures.* • *use of rainwater tanks for garden watering, toilet flushing, and laundry uses; and* • *on-site greywater recycling"* Also amend Appendix A to the WSUD General Code as required. Amend the ACT water savings calculator to include outdoor taps.
6	Mandatory minimum 4-star WELS ratings required for plumbing fixtures (shower heads remain at 3-star)	In the ACT Waterways WSUD General Code, change Section 2.4 to state the mandatory requirement for 4-star rated (or better) plumbing fixtures. Also amend Appendix A to the WSUD General Code as required and the ACT water savings calculators.
7	Demand Management (combination of options 5 and 6 plus mandatory minimum 4-star WELS ratings for appliances in apartments)	As outlined in Option 5 and 6 above. In addition, in the ACT Waterways WSUD General Code, change Section 2.4 to state the mandatory requirement for 4-star rated (or better) appliances (dishwasher and washing machine) for apartments. Also amend Appendix A to the WSUD General Code as required and the ACT water savings calculators.

Water saving option		Recommended changes to existing Code(s) / Territory Plan
8	Source substitution (combination of options 1, 2, 3 and 4)	As outlined in Options 1, 2, 3 and 4 above. In the ACT Waterways WSUD General Code, amend the references in Section 2.4 to include minimum roof area connected to rainwater tanks of 75% for compact blocks WSUD General Code.
9	Plumbing certification (combination of options 3, 5 and 6)	As outlined in Options 3, 5 and 6
10	Combination of all options including mandatory minimum 4-star WELS ratings for appliances in apartments	As outlined above

Water saving options identified above should be implemented in conjunction with a rainwater tank operation and maintenance public education campaign.

It is also recommended that with respect to properties constructed prior to the implementation of the ACT Waterways WSUD General Code, the ACT water savings calculator be used as a means of applying for a rebate to retrofit homes in order to be compliant with the ACT Waterways WSUD General Code. Property owners should be eligible for a rebate where they can demonstrate, using the calculator, that their renovation / retrofit will reduce mains water consumption in their home to below target levels.

Lake and waterway health

Consideration should be given to the following:

- Establishing an entity that is responsible and accountable for integrated catchment management at the urban and peri-urban scale and for making strategic decisions for the urban lakes, ponds and waterways including stormwater management in the ACT.
- Developing a long-term funding strategy to support the activities of the proposed entity based on revenue collected from the ACT Water Abstraction Charge (WAC).
- Aligning the activities of the proposed entity to the 10 actions under the "*ACT Water Strategy* Outcome 1 – Healthy catchments and waterbodies".
- Reviewing the *Water Use and Catchment General Code* to reflect environmental and community values of urban lakes, ponds and waterways including requirements for water quality and flows.
- Better linkage between the *Water Use and Catchment General Code*, the *Waterway WSUD code* and the *Canberra Urban Lakes and Ponds: Land Management Plan*.
- Developing an urban aquatic and riparian strategy as part of the urban catchment management strategy to protect and enhance the condition of aquatic and riparian environments in existing urban and urbanising areas. Guidance from the non-urban *ACT Aquatic and Riparian Conservation Strategy* could be used to inform an urban aquatic and riparian strategy with a view to improving water quality from urban areas.
- Developing an urban buffer Land Use Zone adjacent to the Molonglo and Murrumbidgee River corridor zones that allows sufficient space to mitigate high stormwater flows that avoids any requirement for engineered structures within the river corridor reserves themselves.
- Developing a program to rehabilitate urban waterways including:
    - Naturalisation of concrete channels in the lower reaches

    - Naturalisation of concrete swale and grassy banks in the mid reaches
    - Rehabilitation of disturbed reaches in the upper catchment where greenfield developments are proposed.
- Developing flow and water quality objectives for urban lakes, ponds and waterways. The objectives should build on previous scientific studies, the Environmental Flow Guidelines, and the Canberra Urban Lakes and Ponds: Land Management Plan. Where knowledge gaps on environmental values exist, detailed field assessment should be undertaken to improve the state of knowledge (in addition to the data collected by Waterwatch).
- To mitigate against the possibility that assumptions in MUSIC around the homogeneity of pollutant loads within a land use class fail, it may be prudent to mandate stormwater quality treatment in all catchments within which urban development is planned, irrespective of whether water quality targets have already, notionally, been met.
- Scenario modelling and mitigation measures to ensure that any development results in an EPI of unity would mean there is unlikely to be a major change in channel trajectory as a result of the development. A good understanding of the actual critical shear stress in the channel is still required, as well as an understanding of the active geomorphic processes within the area of study.
- Prioritising Action 4 of the ACT Water Strategy – Improve water monitoring and analysis across the ACT and region – in urban catchments including:
    - Better integration of Waterwatch and AUSRIVAS activities
    - Identifying priority gaps in monitoring and undertake additional monitoring for urban catchments
        - Monitoring performance of existing WSUD, including ponds and wetlands, with the aim of improving design guidelines for future infrastructure.
- We understand that an Integrated Water Quality Monitoring Program is proposed in the ACT Water Strategy Implementation Plan Two (ACT Government 2019a) and that it will be proposing monitoring activities to fill identified gaps. We recommend that it considers:
    - Identifying monitoring gaps in urban catchments
    - Undertaking additional water quality and flow monitoring in urban lakes, ponds and waterways
    - Undertaking assessment of water treatment performance of WSUD assets such as constructed wetlands.
    - Providing improved access to monitoring data, including collected as part of the Program.

ACT Government policies and strategies do not adequately address integrated catchment management at an urban scale. There is currently no clear governance structure to guide strategic decision-making for protecting and improving the health of urban lakes and waterways in the ACT. An entity or agency that is responsible and accountable for integrated catchment management at an urban scale and for making strategic decisions for the urban lakes, ponds and waterways, including stormwater management in the ACT, is needed, or these responsibilities and accountabilities need to be explicitly assigned to an existing group or agency.

The entity should aim to develop a catchment management strategy for urban areas through collaboration with key stakeholders and based on understanding of processes and interactions at the local and broader catchment scale. It should also have the capacity to operationalise and implement the strategy. The proposed entity should align its activities, within an urban context, to the actions under outcome 1 of the *ACT Water Strategy* – Healthy catchments and waterbodies: Well-managed, functioning aquatic ecosystems that protect ecological values and contribute to the liveability of the ACT community. The catchment management strategy should guide application of the *WSUD Code,* including how "development targets" and "regional targets" for stormwater treatment will be applied to meet the *ACT Water Strategy*.

Facilitating legislation would be required to provide sufficient authority for the effective undertaking of this role. This role should specifically include working collaboratively with other agencies within the ACT Government, ICON water, National Capital Authority, NSW Government and local governments in NSW within the catchments

relevant to the ACT. It should also collaborate with entities/agencies responsible for implementing the *ACT Living Infrastructure Plan* and for developing/implementing the "holistic water cycle management plan" which is scheduled to be developed 2020-21 as per the Implementation Plan Two (ACT Government 2019a) of the *ACT Water Strategy*. This entity should work with the ACT and Region Catchment Management Coordination Group (CMCG) where cross-jurisdictional matters are concerned e.g., for management of Lake Burley Griffin.

Whilst the proposed entity will provide a technocratic "top-down" approach to catchment planning and management, it is also critical in the ACT that consideration is given to a "bottom-up" approach where diverse forms of knowledge and the community are involved in deliberative decision making. This is because there is significant community interest in the management of water and land resources in urban areas (e.g., Waterwatch, Landcare, Catchment Groups). Many ponds and lakes are viewed by the community as important community assets. The ACT government has already begun to explore using deliberative democracy for environmental issues and continuing this was recommended in the most recent ACT State of the Environment report (CSE 2019, recommendation 8). Deliberative decision making has been emerging as an aspect of best practice to improve stormwater management in Sydney (Brown, Ryan & Ball 2004). The Marrickville Council Waterevolution is a recent case study of an urban area in Sydney using this approach to move towards being a Water Sensitive City (Marrickville Council 2012; 2014). The new approach addresses three identified problems in conventional urban water management:

- Technical experts, particularly engineers, have traditionally been responsible for developing solutions to complex urban water problems. It is now recognised that we need to take a more holistic approach and include other thinkers, such as social scientists and ecologists.

  Solution: Integrate the many disciplines, e.g., sociology, ecology, urban planning and engineering.

- The people affected by urban water problems, including residents, businesses, community groups and government departments have usually not been involved enough in planning discussions.

  Solution: Involve the community of interest in the decision making and implementation.

- In the past, plans have been designed for whole river catchments rather than one appropriate and practical 'locally grown' solution to urban water problems.

  Solution: Reduce the planning unit to the local level, e.g., sub-catchments

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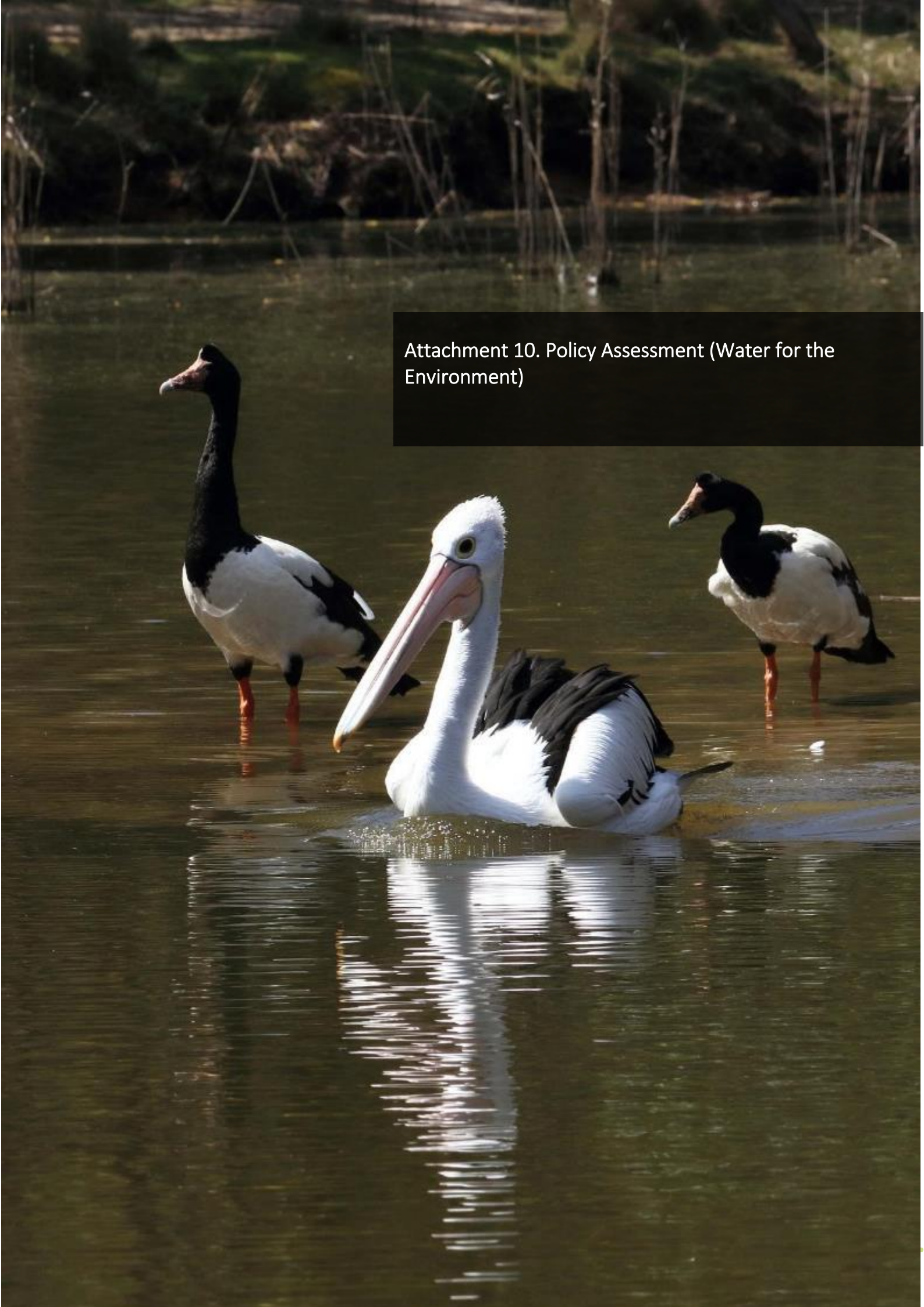


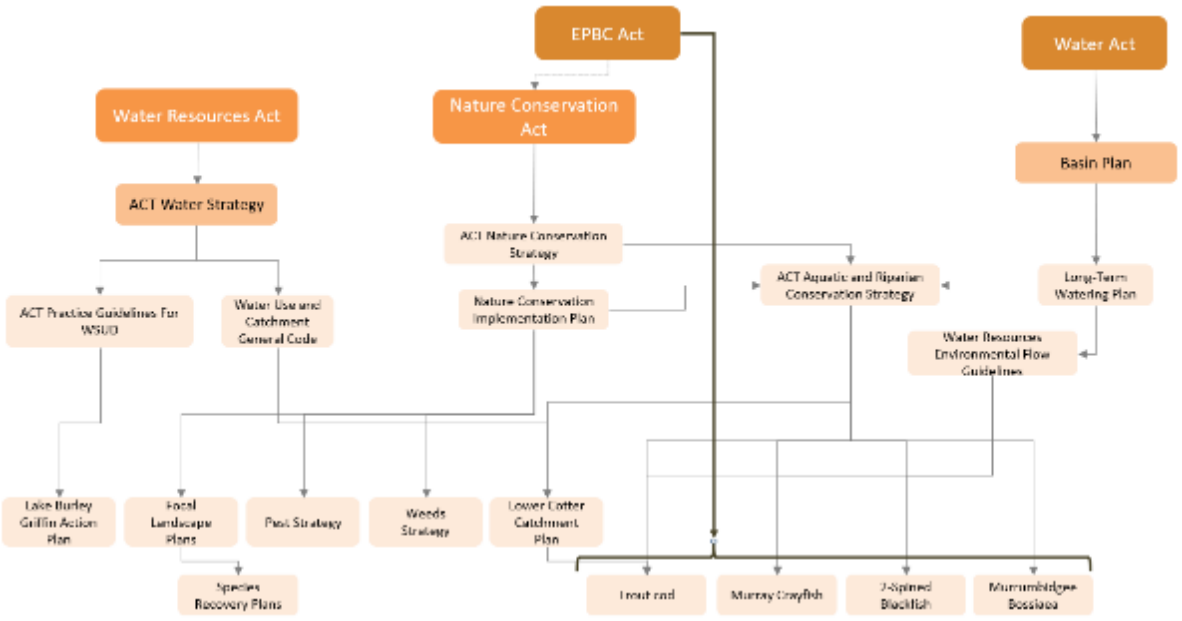
Attachment 10. Policy Assessment (Water for the Environment)

Water for the Environment Policy Assessment

Water for the environment policy summary

The water for the environment policy vision is that healthy waterways supporting diverse aquatic and riparian flora and fauna and providing high quality ecosystem services. The over-arching policy objectives are to:

1. provide conservation management guidelines for the protection and enhancement of aquatic and riparian areas
2. identify threats to aquatic and riparian ecosystems and provide guidelines for their management
3. provide monitoring and research objectives for aquatic and riparian areas in the ACT
4. outline strategies to increase engagement of the community in aquatic and riparian activities and projects
5. set the strategic context for action plans for threatened aquatic and riparian flora and fauna.



Progress snapshot

The ACT Government is undertaking a review of water governance as part of achieving the water management vision set in the ACT Water Strategy 2014-2044: Striking the Balance. The review is considering the best way to support an efficient, effective, and coordinated approach to water management in the ACT and surrounding region. The review will examine the activities of all agencies responsible for water resource management including regulation, demand management and supply, planning and policy, intergovernmental relations and program delivery. It will have a broad scope, and include surface and groundwater, drinking and non-drinking water, environmental flows and catchment management, water recycling and wastewater treatment, stormwater management and urban run-off/reuse.

Water for the environment policy context

There are exceptional aquatic and riparian values in the Molonglo and Murrumbidgee rivers in the ACT that are nationally significant, including Macquarie perch, Murray River crayfish and Platypus amongst others. Riparian zones in the Murrumbidgee and Molonglo River corridors in the ACT are noted for their high bird diversity and regional connectivity. Many waterbirds and land birds rely on aquatic and riparian habitats for breeding, feeding and resting.

Several International agreements ratified by the Australian Government exist that are associated with sustainable management obligations. The most relevant in this context is United Nations Convention on Biological Diversity that seeks to ensure the conservation and sustainable use of biological diversity. In addition to this agreement, Australia is also a signatory to the Ramsar convention that seeks to ensure the wise use of wetlands and several treaties designed to protect migratory birds (e.g., Japan-Australia Migratory Bird Agreement).

The Federal Environment Protection and Biodiversity Conservation Act 1999 (the EPBC Act), provides a legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities, and heritage places. The ACT Government has a responsibility to ensure no significant impacts occur on matters of national environmental significance in the ACT.

The EPBC Act informs the National Strategy which sets the direction for biodiversity conservation across Australia over the next decade. In addition, the Threatened Species Commissioner has recently released a Threatened Species Strategy (2021 – 2031) which provides a vision to guide on-ground action; identifies key action areas that are fundamental to the recovery of threatened species and ecological communities; and establishes principles for identifying priority threatened species and places to focus Australian Government effort. Implementation of the TSS will be supported by two sequential action plans; the first five-year plan sets practical actions and targets to focus efforts on improving the trajectories of 100 priority threatened species and a preliminary group of 6 priority places, alongside other fundamental threatened species recovery activities. The remaining 14 priority places are being finalised.

The EPBC Act also empowers the Federal Minister to adopt and implement recovery plans for listed threatened species and ecological communities. Recovery plans set out the research and management actions necessary to stop the decline of, and support the recovery of, listed threatened species and communities. The aim of a recovery plan is to maximise the long-term survival in the wild of a threatened species or ecological community.

Recovery plans describe the actions required to protect and restore important populations of threatened species and habitat, as well as how to manage and reduce threatening processes. Recovery plans achieve this

aim by providing a planned and logical framework to coordinate work to improve the condition of threatened species and/or ecological communities.

The ACT Nature Conservation Strategy reflects the intention of the National Strategy to ensure our biodiversity is healthy, resilient to climate change and valued for its essential contribution to our existence.

The Strategy links to several important and complementary strategies and plans at the national level. These include the Australian Native Vegetation Framework 2012 which seeks to guide and coordinate legislation, policies, programs, and activities related to native vegetation management throughout the country. The National Wildlife Corridors Plan will create a national framework to allow recognition of corridors at different scales, facilitating cooperation and attracting strategic investment.

Description of water for the environment policy in the ACT

The key ACT legislation is the Nature Conservation Act 1980 (NCA); however, several other Acts are also relevant (Table). The NCA that seeks to protect, conserve, and enhance the biodiversity of the ACT by protecting, conserving, enhancing, restoring, and improving nature conservation. The Act provides for:

- Administration
- Nature Conservation Strategy
- Threatened Species and Communities
- Conservation Plans
- Regulations
- Reserves and their Plans

The Nature Conservation Strategy outlines a vision for nature conservation in the ACT over the next decade for 'biodiversity rich, resilient landscapes stretching from the inner city to the mountains, where well-functioning ecosystems can meet the needs of people and the environment. guide a coordinated and integrated approach to nature conservation. The Strategy seeks to guide future management of open spaces, rural areas, urban areas, riverine corridors and nature reserves, and guide investment of funding and resources Plans – for relevant species, relevant ecological community or key threatening process. The Nature Conservation Strategy also requires development of strategies to protect focal landscapes.

Aquatic and Riparian Conservation Strategy

The *ACT Aquatic and Riparian Conservation Strategy and Action Plans* (ACT Government 2018a) provides guidance on the conservation of aquatic and riparian areas and component species in the ACT, consistent with the *ACT Nature Conservation Strategy 2013–23* (ACT Government 2013). The objectives of the strategy include the provision of conservation management guidelines for the protection and enhancement of aquatic and riparian areas primarily in natural water bodies; and the identification of threats to aquatic and riparian ecosystems, providing guidelines for their management.

Species Action Plans

The ACT ARCS provides the context for Species Action plans. The content of the Action plans reflects the major content of the ARCS (Table 28). If this were to conform with an Adaptive Management framework, the Species action plans would provide an expression of the ARCS principles framed as a suite of actions that would be expected to achieve a Target that can be measured. The detail should be sufficient to:

- Enable an evaluation
- Identify areas that may complement or conflict with actions implemented to achieve other policy objectives

Table 28. Annotated table of contents for ACT species recovery plans.

Section	Possible inclusions
Conservation Status	Listings according by source (e.g.,, jurisdiction)
Species description	Description, Distribution, Habitat and Ecology
Current Management	e.g., Habitat restoration
Threats	Up to 19 Threats
Conservation and Intended Management	Protection, Management, Offsets, MERI, Engagement
Objectives, Actions and Indicators	Objective, Action, Indicator
References	Stuff no one reads

Draft Environmental Flow Guidelines

Regulation of the major watercourses has meant that flow regimes have been impacted along much of their length (Figure 26). The national water reform (Water Act, Basin Plan) is therefore important in the ACT to sustain environmental values. The Environmental Flow guidelines follow the same structure as the ARCS with sections on protection, reducing threats, management and MERI, which are then applied to four different types of systems: water supply catchments, natural ecosystems, modified ecosystems and urban ecosystems. One key difference is that the Draft Guidelines describe the process for determining environmental flows and determining the flows required. The objectives included in the Draft Guidelines are well aligned with those in the ARCS and Species Action plans.

Figure 26. *Key elements of the ACT and Queanbeyan's water supply system (ACTEW 2014)*

Policy Analysis

Aquatic and Riparian Conservation Strategy

Large areas of aquatic and riparian ecosystems in the ACT are protected within reserves. The emphasis of the ARCS is on management of systems within the reserves, and to a lesser extent rural landscapes. The ARCS is clear that it does not apply to urban systems. The ARCS seeks to provide guidelines, identify threats, MERI objectives, and increase engagement. This is not consistent with the scope of the Environmental Flow Guidelines that includes reference to urban streams. This may be due to the context for flow management being more closely aligned with the Basin Plan than the ACT conservation Strategy.

The ARCS provides an appropriate complement to the Water Strategy and the Long-Term watering plans developed as part of the implementation of the Basin Plan. The ARCS provides clear guidance on the values that the ACT is seeking to protect and guidelines on issues that need to be considered in achieving objectives. There is also a comprehensive list of Threats known to affect aquatic ecosystems.

In terms of adaptive management, the ARCS makes commitments to ongoing condition monitoring including the CEMP. While it is clear that some intervention monitoring is undertaken through follow-up monitoring of rehabilitation activities. An example is the assessment of the Tharwa rehabilitation project (2013), however, the extent of intervention monitoring is not clear. There is also a clear commitment to evaluation of management actions based on the monitoring data. This is to be applauded, however, there is no schedule provided and no evaluation report could be found online.

While the ARCS provides a good complement to higher level strategies, there are some risks in the relationship between the ARCS and subsidiary instruments: species action plans and Environmental Flow Guidelines. The first risk is that best practice focusses on ecosystem level management which acknowledges that species are critically dependent on their supporting ecosystems. This does not mean that Species Action plans are not required, rather that they need to be imbedded within an Ecosystem management plan.

A second risk is that while the ARCS provides advice on the values and principles to be applied when prioritising management actions, there is no framework for considering and then prioritising the principles that would then inform the design of priority interventions. For example, the nineteen identified threats will not affect all areas equally nor will they all be addressed at the same time. From a transparency and accountability perspective it would be preferable that the rationale and information on which decisions are based were consistent and robust.

Table 29. List of the Policy Responses, actions or Instruments, their Target (e.g.,, Impact), and the stakeholders affected or engaged.

Instrument	Objective	Comment
Environment Protection Act 1997 **Environment Protection Regulation 2005**	Regulate and manage contaminants entering waterways in the ACT	The EPA is established per the Act and is responsible for the administration of the subordinate regulations and policies, including environmental authorisations and environmental protection agreements, enforces reporting and notification of environmental harm, operates the ACT pollution hotline, provides environmental protection guidelines and guidelines for the preparation of environment management plans. These instruments focus on individual activities.
Nature Conservation Act (1980)	To protect, conserve and enhance the biodiversity of the ACT	The Act covers the listing of at-risk species and communities, development of the Conservation Strategy, Threatened Species Action Plans and Reserve Management Plans.

Instrument	Objective	Comment
Nature Conservation Strategy (2013 - 23)	to strengthen the key foundational elements—connectivity, resilience, community capacities—of a long-term approach to build the adaptive capacity of natural ecosystems and people to a changing climate	The Strategy includes 5 elements: 1. Habitat, connectivity and ecosystem function 2. Manage Threats 3. Protect 4. Enhance urban biodiversity 5. Community engagement
Aquatic Species and Riparian Zones Strategy	Provides guidance on the conservation of aquatic and riparian areas and component species	Aquatic Species and Riparian Zones are one of the focal communities listed in the Conservation Strategy. The strategy focuses on systems within the reserve system, particularly where threatened species occur. The strategy includes managing threats; ecological connectivity, ecosystem function and biodiversity; undertaking monitoring and research programs; and partnering with the community to support aquatic and riparian conservation.
Water Resources Act 2007	To ensure that management and use of the water resources of the Territory sustain the physical, economic and social wellbeing of the people of the ACT while protecting the ecosystems that depend on those resources	Within the context of the National Water Initiative the Act provides the framework for sustainable water management. The Act defines access rights to surface and groundwater resources, environmental flow provisions, water licensing requirements, resource management and monitoring responsibilities and penalties for breaches.
Water Resource Plans	Set rules on how much water can be taken from the system, identifies risks and the management of environmental flows.	Plan provides an overview of water resources in the ACT, and the approach to water planning and management. It sets out the government's plan for the management of the Territory's surface water and groundwater resources, including managing water use under the 'sustainable diversion limits' set for the ACT, long-term environmental flow arrangements and water quality management.
State of the Environment	Environmental assessments based on 26 core indicators across seven themes (climate change, human settlements, air, land, biodiversity, water and fire).	Includes assessment of flow, water quality, recreational water quality (bacteria and blue-green algae), and freshwater biota (fish and bugs).
Planning and Development Act	To provide a planning and land system that contributes to the orderly and sustainable development of the ACT— • consistent with the social, environmental, and economic aspirations of the people of the ACT; and	Implemented through the planning assessment and approval process

Instrument	Objective	Comment
	• (b) in accordance with sound financial principles	
ACT Planning Strategy 2018	To guide Land-use planning that supports development of the economic, social and environmental development.	Includes 5 Themes: • Compact and efficient • Diverse • Sustainable and resilient • Liveable • Accessible
ACT Planning Regulation 2008	Regulations covering applications for development and associated environmental assessments.	Provides appropriate checks and balances for development proposals.
Strategic Bushfire Management Plan 2019-24 **Bushfire Smoke and Air Quality Strategy 2021-25**	Reduce air quality impacts from bushfires	Use planned burning to reduce fuel loads and reduce bushfire risks The planning of hazard reduction burns may conflict with air quality outcomes i.e.,, often must be conducted under poor air dispersion conditions
Various guidelines for industry and construction	Minimise air pollution from industry and construction activities	Guidance documents provided on minimising air pollution from industry and construction
Community programs and information	Community informed and engaged with air quality issues	Implemented through various community programs and information factsheets

Human Activities

Policy initiatives to reduce the consumption and re-use of water are included in the ACT Water policy. This includes implementation of the Basin Plan that requires that the environment is considered a legitimate water user and is allocated water resources that are protected through implementation of a sustainable diversion limit.

The ACT Water strategy includes Integrated Catchment Management and Water Sensitive Urban Design both of which seek to reduce the impact of human activities including urban development and land use.

The scope of the ACT Aquatic and Riparian conservation strategy (ARCS) provides a good complement to the ACT Water Policy both of which are nested within the Basin Plan and the ACT Water Strategy and so does not consider reducing Human activities.

Pressures

The ACT ARCS seeks to prevent or manage Pressures in order to maintain or improve the ecological condition. Nineteen threats are identified, illustrating the breadth of Pressures applied to aquatic ecosystems (although this list could be rationalised). The extensive list of threats provides some indication of the complexity of protecting diversity in aquatic ecosystems. It also underscores the importance of condition monitoring that would inform managers of the priority threats in specific catchments to ensure that management actions address the threats that are having the biggest impact on the system.

Condition

Consistent with the requirements of the Nature Conservation Act, the ÀCT ARCS seeks to maintain condition through:

1. Protection of threatened species and surrounding native communities. This will be achieved through protection and management of aquatic and riparian areas and the wild populations they support. These actions are undertaken within the context of regional (NSW) and national initiatives, including the Federal EPBC Act and the Basin Plan.
2. Conservation of species and communities through application of a suite of principles, including consideration of connectivity, patterns of natural variation, climate change risks and habitat requirements.

The previous Water Strategy: Think Water Act Water (2004-2014) achieved significant improvements in securing essential human needs, protecting water quality and the implementation of WSUD. Implementation of the Basin Plan has seen the identification of the environmental water requirements and management of environmental flows to protect and restore aquatic ecosystems. The ACT ARCS seeks to build on this foundation by identifying, in general terms, the values to be protected (threatened species and communities) and principles by which they can be sustained.

There are two potential areas for improvement. The first is that having identified values and principles, the next tier down in the hierarchy needs to provide far more specific and quantitative information on how the species of community will be sustained. As an example, the Silver perch Action Plan states that habitat rehabilitation and research is being undertaken, without any rationale about why the habitat principle is being prioritised. The Action plan then lists many of the same threats that are included in the ACT ARCS with additional detail about their impact on Silver perch. What is required is Targets for what is being sought in terms of the Silver perch abundance and distribution and the actions required to achieve that target. The Action plan acknowledges that:

- Silver perch are no longer self-sustaining in the ACT,
- the population is dependent on the Lake Burrinjuck population
- The L. Burrinjuck population is only sustained by stocking

The highest priority is then to re-establish Silver perch in the upper Murrumbidgee by providing suitable habitat. In complete ignorance of the ecology of Silver perch and using only the information in the Action plan there is a question of why the focus isn't on establishing Silver perch in lakes that are similar to L. Burrinjuck. There is bound to be a reason, but it is not provided in the Action plan.

The Silver perch Action plan emphasises research which we assume is due to the uncertainty around Silver perch habitat, connectivity, and flow requirements. While uncertainty is associated with some risk, it should not represent an impediment to action. This is what adaptive management has been developed to address. The other observation is that if there is uncertainty, spawning all of one's eggs into the same log increases the risks. This would suggest that multiple outcomes should be sought so that the cost of failure for any specific action does not cause irreparable damage.

In general, trends in condition are not reported in SoE (2019), however, Aquatic ecosystem health is reported as being Fair over the reporting period. Flows were also reported as being Fair due, at least in part, due to drought conditions prevailing. It is possible that the two indicators are linked and that drought conditions contributed to poor health. The main factor identified, however, was land use which is explicitly listed in three of the 19 threats (Land Use, Land Use Impacts), but is likely a major driver of a further six. Land Use and its impacts on sedimentation is mentioned in several Action plans, but this appears to emerge from the concentration of sampling sites in the un-reserved areas. All sampling sites within reserves were rated as Good for both overall Health and Chip macroinvertebrate indicator.

For Threatened fish the SoE (2019) found that while two threatened species had shown positive trends (two-spined blackfish, Macquarie perch), two others (Trout cod, Golden perch) had declined. One of the indicators that had trend data was invasive fish species. While the proportion of invasive species both in terms of biomass

and abundance can vary by over 10% from year to year, there are no clear trends in the proportion of invasive species.

Impact

The ACT ARCS mentions the use of off-sets as a way of avoiding impacts of development. This is relevant for wetland ecosystems, but we are not aware of the extent to which this has occurred in the ACT. It is not feasible to use off-sets for flowing systems due to their connections along the stream, laterally with riparian zone and floodplains and vertically with groundwater.

Fisheries also release juvenile fish for at least Murray cod, Golden perch and Silver perch, thereby reducing the impacts of the threats that have led to declines in their condition. The effectiveness of re-stocking can be highly variable, and we are not aware of any evaluation of the effectiveness of stocking within the ACT.

The SoE (2019) reports that over 270,000 native fish were stocked into lakes and ponds. As noted earlier, there is little evidence that this is having long-term impacts on the adult population, although it is believed that cessation of stocking of Trout cod has been associated with population declines.

Conclusions

The ARCS is one of the best examples in terms of commitment to adaptive management and monitoring. Within this framework, however, we believe the condition monitoring needs to be adapted. Currently the assessment is focussed on sites in the northern, developed region of the ACT with relatively few sites within the reserve network. If, as implied in the NCS, the reserve system is critical to efforts to protect species and ecosystems, then understanding what is going on in these systems is more important than what is happening in highly degraded systems where there may be limited capacity to undertake restoration.

The Program logic linking the objectives to the management actions needs to be clarified. There are a number of questions, including:

- Why have efforts been invested in habitat restoration and fish stocking when there are 20 threats listed?
- Is there clear evidence that these are the main threats?
- Are we confident that sedimentation acts primarily through habitat availability or is it through effects on other life stages of fish or food web effects in which case fish habitat may not improve condition?

The Threats section ends with a “Guidelines to manage” subsection which makes the strategy more of a guide than a strategy. It is not clear who the guidance is for whether riparian landholders, water managers, anglers. It is hard to envisage guidance in this form translating into progress toward objectives.

The Management for Conservation of communities and species follows a similar format, providing a goal, some key principles and then guidance on how to achieve these principles. We have recommended in other areas that high-level strategies like the ARCS focus on frameworks and advice to inform subsidiary policies. In this case, perhaps the intention is that people implementing the species recovery plans should follow the advice. If this is the case, then insufficient attention has been paid to the audience, nor to the process by which one would prioritise protecting species, managing threats, or conserving communities. There needs to be some modifications to make it clear who the audience is and what the path to implementation looks like, including who will be responsible.

The Vision for the Strategy is “Healthy waterways supporting diverse aquatic and riparian flora and fauna and providing high quality ecosystem services.” This is appropriate given that the ARCS is the daughter of the NCS and Water Strategies. There is one other mention of ecosystem services in the text, with content focusing on conserving species and communities. If the Vision is to remain, there needs to be a section that either conceptually links fish populations to ecosystem services other than provision of fish or addresses major threats to ecosystem services and how the services can be protected or restored.

Recommendations

- Develop a structure of all subsidiary strategies and the relationships among them. Refine the scope of each strategy or plan in line with the structure as each is due for updating.
- The current condition assessment needs to be adapted to meet the needs of the NCS, ARCS and daughter strategies.
- Convert the ARCS into a document that provides a framework and processes for achieving objectives. These can then be used to inform Area and Species plan development
- Ensure that area and species plans include specific actions with numerical outputs and outcomes within an adaptive management framework
- Include specific details about ecosystem services in the ARCS framework. This will provide a better focus for engaging stakeholders in prioritisation of actions and measurable outcomes