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RESTORATION OF THE LOWER COTTER CATCHMENT

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AUDITOR-GENERAL AN OFFICER OF THE ACT LEGISLATIVE ASSEMBLY

PA 14/07

The Speaker
ACT Legislative Assembly
Civic Square, London Circuit
CANBERRA ACT 2601

Dear Madam Speaker

I am pleased to forward to you a Performance Audit Report titled 'Restoration of the Lower Cotter Catchment' for tabling in the Legislative Assembly pursuant to Subsection 17(5) of the *Auditor-General Act 1996*.

Yours sincerely

M. Cooper.

Dr Maxine Cooper
Auditor-General
20 May 2015

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SUMMARY

Conclusion

The *Planning and Development Act 2007* provides an overarching legislative framework to protect the ACT's potable water catchments. The Act satisfied the requirements of the *Australian Drinking Water Guidelines*, as it makes the protection of 'existing and future domestic water supply' the highest objective for the Lower Cotter Catchment (LCC). The 2003 fires adversely affected the water quality in the LCC. This is being addressed through the implementation of a major restoration project. The importance of the LCC increased with the construction of the Enlarged Cotter Dam (completed August 2013) which contains twenty-five per cent of the ACT's potable water supply and represents an investment of approximately $410.5 million.

Since the 2003 fires, the natural regeneration of the vegetation cover and the management efforts and resources expended by Icon Water, the Territory and Municipal Services Directorate and the Environment Protection Authority, have been effective in steadily improving water quality and reducing turbidity and sedimentation. However, turbidity problems still occur following heavy rainfall events because of the unstable soils and erosion sites in particular parts of the catchment.

Progress in restoring the LCC has been such that we are now entering the consolidation and maintenance phases of the restoration. The management actions from 2006 to 2009 were under a Deed of Agreement whereby a strong decision-making Management Group, supported by ACT Government funds and an additional $11 million supplied by Icon Water, enabled the completion of major sediment control engineering works and the revision of the road network. This in conjunction with the natural regeneration of the vegetation has reduced the rate of sediment movement into the Enlarged Cotter Dam. The vegetation recovery in the LCC has been better than anticipated and has assisted in the stabilisation of the erosion-prone soils.

Coordination of the efforts within the LCC has been important because of the number of different agencies involved in the delivery of a large, complex, restoration project with multiple facets and resourcing implications. However, high-level coordination of activities in the LCC has been reduced since the Deed of Agreement ceased in October 2009. The subsequent consultative committee which was intended to continue the LCC coordination role did not include senior staff with decision-making authority and ceased in 2013. As a result, there is no effective high-level coordination for the implementation of the LCC Strategic Management Plan. Because of the inherent risks in this situation, a review of the catchment management and coordination arrangements for the LCC by the ACT Government would assist in identifying a new management, coordination and decision-making structure for the LCC.

The Strategic Management Plan set out twenty-nine management actions to be achieved. Seventeen of the management actions (58.5 per cent) in the Strategic Plan were achieved; a further eight were partly achieved (27.5 per cent). Only four (14 per cent) of the management actions were not achieved, in what has been, and continues to be, a major land restoration project for a fire-damaged and erosion-degraded potable water catchment. This is a significant achievement for a cooperative approach across several agencies and community volunteers in the restoration of the catchment.

Some of the management actions were rated as 'achieved and ongoing' or 'partly achieved and ongoing.' This indicates that there is still further work required over time in order to achieve the ultimate goal of resilient native woodland and grasslands in the LCC Strategic Management Plan.

Despite the improvements in water quality the LCC is exposed to significant risks which are interrelated and which, under adverse conditions, could accumulate and lead to a catastrophic failure of the water catchment. The ultimate risk is of the movement of large volumes of unmanaged sediment from unstable soils into the reservoir. Wildfire is a significant risk which will increase with climate change and requires persistent and effective management efforts. The controls which regulate public access to the LCC are inadequate; increasing the risk of fire, landscape damage and erosion. If a fire were to occur and if it was followed by a heavy rainfall event(s), then there is a significant risk that the sediment control structures would be overwhelmed culminating in high levels of turbidity in the catchment leading to a loss of water quality and consequently increased cost of water treatment. It is of concern that examples have been found in the audit that illustrate neglected or damaged erosion control structures.

It was not evident that the four agencies: the Environment and Planning Directorate, the Environment Protection Authority, Icon Water (ACTEW Water, ACTEW AGL) and the Territory and Municipal Services Directorate who shape the plans for or undertake management actions in the LCC, had a shared knowledge of the cascading effect of risks and their potential consequences. This is because there is no shared overarching risk identification process and risk management plan. The development of a shared risk plan is important so that identified risks can be used to effectively and efficiently determine financial resources needed for risk mitigation strategies including: fire management, maintenance of sediment control structures and public access controls for the LCC. These are high risks to water quality protection.

Priority needs to be given to important and ongoing work such as: the inspection and maintenance of erosion control structures in the LCC; a review of the LCC road and fire trail network to facilitate safe fire management; review of three areas of pine plantation that have been intentionally unmanaged and now present a fire risk, including in particular the Blue Range; controlling the major weeds (pine wildings and blackberry); completing a statutory plan of management for the LCC; finalising controls on public access to the catchment; and making the community aware of the importance of access restriction in protecting our water supply.

Twelve recommendations are made, of which three are high priority. These are aimed at integrating the management of the LCC and accelerating the implementation of the Strategic Management Plan to protect the LCC which supports the Enlarged Cotter Dam that is an important component of the ACT's water security.

Key findings

CATCHMENT GOVERNANCE AND COORDINATION OF RESTORATION	Paragraph
The *Planning and Development Act 2007* provides an effective overarching legislative schema which provides a framework to protect the ACT's potable water catchments, making the protection of 'existing and future domestic water supply' the Act's highest objective for the LCC—thereby satisfying the requirement of the Australian Drinking Water Guidelines.	2.64
The primacy of the Management Objective—to protect the existing and future water supply—was not understood by all major agencies when interviewed for this audit. When it was explained that the priority in the legislation was protecting the water supply, two agencies expressed satisfaction that it provided a needed clarity for when they were negotiating with other parties to determine management activities related to the catchment.	2.70
The Explanatory Statement for the Nature Conservation Bill 2014 states that the primary purpose of catchment reserves is not conservation, and that catchment reserves are to be managed appropriately for their primary purpose – protection of the water catchment. The *Nature Conservation Act 2014* is therefore aligned with the *Planning and Development Act 2007*, reinforcing the primary management objective for the LCC—the protection of the water supply—and enhancing the alignment of ACT legislation with the requirements of the Australian Drinking Water Guidelines.[1]	2.73
In October 2014, following policy development by the EPD, the ACT Government approved a set of arrangements for integrated catchment management within the ACT and cross-border to integrate the management of the ACT's catchments and the Murrumbidgee River [and tributaries] with NSW and NSW local councils. The decision includes the establishment of an ACT and Region Catchment Management Coordination Group which will advise the Minster for the Environment.	2.85
The commencement in February 2015 of the (interim) ACT and Region Catchment Management Coordination Group represents a significant investment of resources, both financial and managerial, into improving coordination and outcomes across the ACT's and NSW's catchments.	2.89
The LCC and its issues may not attract adequate priority or attention from the ACT and Region Catchment Management Coordination Group (and an associated working group) for several reasons, these are: • the significant investment in the Basin Priority Project • that the two coordination groups are large and will involve cross-border issues necessitating complex coordination • the LCC is perceived by the EPD to be well managed for water quality	2.90

[1] Legislative Assembly ACT, Nature Conservation Bill 2014, Explanatory Statement, pp. 3, 56.

- that the latent and significant LCC risks with potential major consequences are not immediately apparent and pressing.

For this reason an over-arching risk management plan for the protection of the Lower Cotter Catchment is needed. A risk plan would assist with prioritisation of issues and decisions. The EPD advised that, as a priority, the ACT and Region Catchment Management Coordination Group would develop a high-level integrated catchment management strategy which would include a risk plan. 2.91

EPD advised the Audit Office that: 2.92

> A whole of Government approach will be considered for the LCC and its issues so that it can attract adequate priority or attention (i.e. budget allocation and implementation effort) in terms of competing ACT Government budget priorities. The roles and activities of the Catchment Management Coordination Group are closely aligned with the needs of the LCC. The issues of catchment management and water supply protection are fundamental issues for consideration by Government and in any new Coordination Group.

EPD also advised that, the Directors-General Water Group met on 12 May 2015 and agreed to the prioritisation of the LCC as core and ongoing business. 2.93

The *Water Resources Act 2007* gives the EPA a central role in the management of water resources in the ACT.[2]This role includes: to coordinate policies in relation to water resource management; confer with similar Commonwealth or State water management bodies; to implement national or intergovernmental agreements relating to water resource management; and to promote an integrated approach to water resource management and water catchment management. 2.95

Despite this legislated schema, the statutory water policy coordination role of the EPA has not been implemented. The EPA has no line responsibility within EPD for: water policy coordination or cross-government agreements for water resource management; or for integrated catchment management. The EPA is a statutory authority and has no line authority for policy to EPD's Catchment Management and Water Policy group, or vice versa. Additionally, the EPA is not a member of the newly established high-level (interim) ACT and Region Catchment Management Coordination Group. 2.96

To achieve compliance with the *Water Resources Act 2007 t*here is a need to align the functional arrangements in directorates with EPA's central role and EPA's responsibilities in water policy and water management—as set out in the *Water Resources Act 2007,* or amend the legislation to reflect practices. 2.99

[2] Legislative Assembly ACT, *Water Resources Act 2007*, s 64.

The arrangements in the 2006 Deed of Agreement for the LCC including the establishment of the Management and Program Management Groups were effective in bringing together the relevant agencies at both the decision maker and operational levels; they ensured improved coordination and facilitated considerable investment by Icon Water in the restoration of the LCC. 2.108

The Minutes for the Source Water Protection Program Consultative Committee were examined. This committee continued to meet and provided a communication forum between Icon Water, PCS, TAMS and other local and regional stakeholders. Despite the intention in late 2009 that the Source Water Protection Program Consultative Committee would take over the role of the LCC Management Group, it did not include high-level decision makers from agencies and was therefore unable to replicate the LCC Management Group's coordination and decision-making role. The SWPP Consultative Committee ceased in June 2013. 2.112

Coordination of activities in the LCC at a high-level has been reduced since the Deed of Agreement ceased in October 2009. The high-level coordination and decision making Management Group and its supporting Program Management Group, which had been responsible for progressing the implementation of the Strategic Management Plan, were replaced by a lower-level consultative group which did not include senior staff with decision-making authority. Other ACT-wide, high-level water coordination groups did not take on the role of coordinating the implementation of the Strategic Management Plan. Activities to manage the LCC have continued in both TAMS and Icon Water. The Source Water Protection Program Consultative Committee has performed a communication role at a lower level, however, there has been no integrated catchment management structure in place for the LCC from October 2009 to the present time. 2.116

To illustrate this, TAMS was not able to provide evidence of high-level formal reporting against the management actions in the Strategic Management Plan. This indicates that there has been no formal high-level review of progress against the strategies and the management actions in the Strategic Management Plan. In general, PCS coordination has been in response to operational needs and from relevant managers in PCS—commencing with the Murrumbidgee River Corridor Area Manager—informally reporting up through the PCS management structure. Management has been driven in response to operational needs, and has lacked the high-level support and awareness that is needed to address strategic risks and to enable coordination at higher levels with the various involved ACT Government agencies. 2.117

There is a risk that the management of the Cotter Catchment and the LCC will not receive the coordinated inter-agency attention that is appropriate, given the potential risks to the catchment, and adequate to protect the potable water catchment commensurate with the ACT's considerable investment in the Cotter Dam. 2.118

The *Planning and Development Act 2007* required TAMS to produce a Plan of Management 'as soon as practical'. TAMS commenced the process to develop an LCC Plan of Management in February 2013, and envisaged that it could take three to four years before the plan is completed. 2.123

Now, seven years after the LCC became public land, there is still no statutory LCC Plan of Management and TAMS is significantly overdue for the completion of this important coordinating policy document. TAMS explained that: it has commenced the process to produce the plan, it has the Strategic Management Plan for guidance, it has developed a Draft 2010 LCC Recreation Strategy which is available on the TAMS website and involved community consultation, and stated that the developments of: Uriarra Village on the border of the LCC; and of the Enlarged Cotter Dam from 2009 to 2012 meant that any plan would have needed to be revised to address the effects of their completion on the LCC. 2.128

The development of a LCC Plan of Management and its completion should become a high priority. It is important to consider that the significant policy decisions regarding land and water use have already been completed in the planning legislation. Therefore, the community consultation process should be aimed at defining 'low-impact recreation', informing the community, and developing awareness of the values of the catchment. Access for low-impact recreation is only suitable and permitted where it is not detrimental to protecting the water supply. Given this approach, the consultation process could be conducted within this context thereby expediting the implementation of the plan. 2.129

The *ACT Code of Forest Practice 2005* has not been updated as was required by the Strategic Management Plan in 2007. This task was not assigned as a specific Management action in the Strategic Management Plan. Its development was a joint responsibility of TAMS, EPD and the EPA. It is important because the EPA uses it as a control or standard for works done under an Environmental Authorisation. The parties need to review the policy as a priority, taking the most appropriate sections and developing a new potable water catchment management code to guide land management in the LCC. 2.139

The *Nature Conservation Act 1980*, s 99(1) (2), provides that the Conservator of Flora and Fauna may propose a management agreement to an agency (utility) if: 2.145

- the activities of the agency affect, or may affect, controlled land, and
- in the opinion of the Conservator, those activities may conflict with the land management objectives for the land.

The management objectives for the LCC are: firstly, 'to protect existing and future domestic water supply', and secondly, 'to conserve the natural environment', and thirdly, 'to provide for public use of the area for education, research and low-impact recreation'—the dominant objective is to manage the LCC catchment to protect the water supply. There is no Plan of Management to guide the achievement of that objective. The Conservator has not determined any objectives, in the form of a disallowable instrument [s 317 (2), (3)], which are considered 2.148

secondary objectives.

2.149 Under s 99 of the *Nature Conservation Act 1980*, before proposing a Management Agreement, the Conservator is required to form an opinion that the utility's (Icon Water's) activities may conflict with the land management objectives for the LCC. The basis of the Conservator's opinion, that Icon Water's activities in the LCC may conflict with the land management objective of protecting the water supply, was considered. The Conservator advised that there was no written opinion. Similarly, the Management Agreement does not refer to, or record the Conservator's opinion which is a precondition for that management agreement.

2.150 There have been many instances where Icon Water has sought to positively influence activities in the LCC and provided funds and assistance to ensure the protection of the catchment. Icon Water's Source Water Protection Program is aimed at protecting the catchment by positively influencing the actions of other parties within the catchment, in order to protect the water supply and satisfy the Australian Drinking Water Guidelines. Icon Water's policies and actions with regard to the LCC have been aimed at protection of the water supply.

2.153 Reviewing the basis for the Management Agreement—as it relates to the LCC—is important because clarification of powers and roles in the LCC and streamlining of requirements or approvals will simplify processes and can facilitate effective, timely actions to maintain and protect the water supply.

2.155 If the Conservator remains of the opinion that the land in the LCC reserved as a catchment should be covered in the Management Agreement, it is important for the Conservator to state their reasons in the agreement. Regardless of any exclusion from the Management Agreement, the Conservator's general powers to protect fauna and flora would still apply in the LCC and would, of course, apply to those parts of the LCC which are listed in the *Territory Plan 2008* under s 315 (pb), and are within Namadgi National Park. If the Management Agreement is not continued, it would then be important to preserve the Code of Practice to guide maintenance activities. This could be retained under a MOU.

2.157 The Code of Practice for maintenance works requires that both Icon Water and PCS prepare an annual operations plan and submit it to the other party prior to each new financial year. Icon Water advised that this annual exchange does not occur. The Code of Practice for maintenance works also sets up arrangements for an exchange of 'works plans' which are to be submitted to the other party for approval at least fourteen days prior to the start of works. Under the Code of Practice for maintenance works, the works plans (including a risk assessment) are required for the following maintenance works: weed spraying, construction work, road works, vegetation clearing, all works requiring an Environmental Authorisation (including controlled burns in the fire season) or a Waterways Works Licence from the EPA, or that may impact upon declared threatened species. Icon Water advised that the exchange of works plans does not consistently occur for works in the LCC. Icon Water stated that TAMS does send one-day's notice before hazard reduction burning and TAMS sends notifications of applications yet to be approved to hold events on public land. However, it does not receive pesticide spraying notices

unless it enquires or generated the work request, this is important as pesticide residue is a source water risk.

The practice of developing and sharing annual operations plans and works plans, including obtaining approval from the other party, are set out in the Code of Practice for maintenance works which provides clear and relevant information. This has the potential to be an important coordinating document and process and is required by the Deed of Agreement. The processes set out in the Code of Practice for maintenance works are not being followed in the management of the LCC. There would be benefit in TAMS and Icon Water reviewing the information in the Code of Practice for maintenance works and in ensuring that the coordination and approval processes it contains are put into practice. 2.161

The ACT Government, in 2012, determined that the PCS Code of Sustainable Land Management was to be considered for funding and implementation. The document has not been finalised and remains in a draft form. The stated purpose of the Code of Sustainable Land Management was to inform and direct all of PCS land management activities. TAMS recently expressed ambivalence about the need for the Code. It is important for TAMS to review the purpose and utility of the Code and if it is a necessary policy, to support its development and completion. 2.166

EVALUATION OF THE IMPLEMENTATION OF THE STRATEGIC MANAGEMENT PLAN

Paragraph

The most important outcome in the LCC is that the water quality has steadily improved and turbidity has declined—indicating that the natural regeneration of the vegetation cover over time and the efforts and resources expended to reduce and control sediments have been successful. Dr Falconer reported that 'while rainfall in 2007 was roughly comparable to that in 2014, the peak turbidities in the Cotter Reservoir in 2007 ranged from 30 NTU to a spike of 70 NTU, with many about 20 NTU, whereas in 2014 the peaks were about 15 to 25 NTU with many of 5 NTU or less'.[3] 3.4

However, there are still turbidity problems following heavy rainfall events. Dr Falconer reported that: 'the main picture shown by the Cotter reservoir turbidity data is that the water quality of the overall catchment has steadily improved between 2006 and 2014. During the dry or average rainfall periods, the turbidity has substantially decreased. With heavy rainfall in the order of 100mm in a single day, there was both a significant discharge volume and significant (extreme) turbidity in the Condor Creek. This may well have heightened the overall increase in Cotter reservoir turbidity with peaks of 50 NTU or over during these events'.[4] 3.5

[3] NTUs are Nephelometric Turbidity Units and measure the amount of suspended material in a water column. The amounts above are for raw water before it is treated. Dr Falconer stated that 'target turbidity in drinking water is less than 0.2 NTU and not to exceed 0.5 NTU (Australian Drinking Water Guideline 6, 2011)'.

[4] Dr Falconer also stated: 'the proportion of Condor Creek water was small since the inflow to the Cotter reservoir at Vanitys Creek was 30,000ML/day and at the Condor Creek 2300ML/day on the day of peak flow', Falconer Report, p. 32.

The vegetation recovery has been much better than was expected; the ability of native vegetation to regenerate in areas that were devastated by fire has exceeded expectations and has demonstrated the resilience of native species. 3.10

The 2006 to 2014 community revegetation program by Greening Australia and supported by PCS, has revegetated sections of Uriarra Forest and Pierces Creek, and importantly has involved the community in restoring and caring for the catchment. This project supports the Australian Drinking Water Guidelines' goal for a water catchment of developing 'a community awareness program'. 3.12

Not all of the landscapes, ecosystems, sedimentation works and water quality outcomes examined by Dr Falconer demonstrated an improvement; some show the existence of significant risks for the LCC. For example, Dr Falconer concluded: 3.14

> The landscape organisation, a measure of stability, and the landscape function analysis, which includes stability, infiltration and nutrient recycling, show overall progressive improvement from [reports in] 2008, 2010 to 2014. The worst areas monitored, Lees Creek 2 and Pago Hill, still need considerable improvement, as do several areas which were not monitored in the lower Pierces Creek region.

Based upon analysis of relevant risk assessments, the strategic risks for the LCC are: fire and wildfire in the catchment exacerbated by the effects of climate change; the risk of erosion following heavy rainfall events; erosion from roads and unstable soils especially following a major fire; the need to manage public access to the catchment as access can increase the risks of erosion and water contamination and fire; weed proliferation—in particular pine wildlings and blackberries; and finally, following from fire or erosion the associated turbidity which is detrimental to water quality. 3.21

Icon Water's 2009 risk management plan rated bushfire and bushfire followed by a high rainfall event as the two highest risks in the LCC, and noted that the risks were increasing with climate change.[5] This plan rated recreational access to the LCC as presenting a moderate risk. Similarly, Dr Falconer noted the Strategic Management Plan's view that 'fire will become an increasingly important aspect of land management as the effects of climate change become more apparent'. He commented on the LCC's fire history and risk: 3.24

> The catchment is liable to both wildfires from lightning strikes in the mountains adjacent, as in 1983 and 2003 and from campfires/arson as in 1926 and 1939.

The recent Icon Water risk assessment ratings of 'moderate' and 'medium' for fire in the Cotter Catchment and the LCC are not consistent with other current assessments of the level of risk. Icon Water's assessment of the likelihood and consequence for fire do not align with the ACT territory-wide assessment, nor with ESA's statement in the SBMP. Dr Falconer's view is that the rating for fire in the LCC 3.29

[5] ActewAGL, Water Futures, *Cotter Catchment Water Quality Risk Management Plan,* December 2009, pp. 5, 6.

is 'high'. This difference illustrates the importance of Icon Water, TAMS, ESA and EPD being involved in a joint assessment and determination of the risks for the LCC, as was directed by the Strategic Management Plan's management action, 4.3.3.a.

In discussion in April and May 2015, Icon Water stated that the risk scenario being assessed was the impact of fire in the catchment on its ability to meet the Australian Drinking Water Guidelines. The risk rating was influenced by the controls available to Icon Water which included alternative drinking water sources. The ability to draw water from alternative drinking water sources had reduced the impact of potential problems in the LCC on Icon Water's overall ability to meet the Australian Drinking Water Guidelines. Icon Water welcomed and supported a cross-agency approach to a common LCC risk assessment. 3.30

Dr Falconer reported that water quality was generally improving. However, he also reported on peaks of turbidity in July, September and November 2013 as measured at Condor Creek by the University of Canberra. Dr Falconer concluded: 3.33

> Two heavy rainfall events since the remediation work was completed resulted in major gully formation and extension in both northern and southern parts of the catchment, at upper levels and on lower drainage slopes. It also exacerbated surface erosion. The data for turbidity clearly demonstrate sediment movement into the reservoir. Restoration work is urgently required, as further heavy rain will have more severe impacts on water quality.

The erosion risk is increased where there is an inadequate vegetation cover to protect and hold the soil. The TAMS *2014 LCC Vegetation Monitoring Program Report* showed that several areas in the LCC have experienced problems re-vegetating; these include parts of the Blue Range, Condor Creek, Lees Creek and Pago Hill. Some of the areas at risk are a result of pine windrow burning which further scorched the earth preventing regrowth. Pago Hill was considered to be at particular risk to lose landscape functionality as the original logs used to control erosion are now decaying: 'the rapid decomposition of the erosion control structures may also put some areas at risk and may require further intervention'.[6] Dr Falconer reported that logs had been used extensively as an erosion control structure, so there is now a developing risk that some of these logs will cease to be effective at controlling erosion. 3.36

Dr Falconer noted that sediment ponds he saw were operating effectively but needed regular inspection [and maintenance as required] due to the risk of heavy rains damaging the pondage. He identified several failed sediment control structures—gabions—damaged road culverts, and a sediment pond in Pierces Creek that was washed out and ineffective. 3.38

Dr Falconer inspected the LCC in October 2014 and noted, 'active gully and surface erosion in both sectors of the catchment, with no visible present attempt at control or remediation. Heavy rainfall in February and December 2010, November 2011 and February/March 2012 ... can be expected to be responsible for the damage. 3.39

[6] TAMS, *Lower Cotter Catchment Vegetation Monitoring Program Report*, 2014, pp. v, vii.

While road maintenance appears to be effective and current, erosion control appears to have been neglected from the report covering 2007–08 to the present'.

He also found gully formation in Pierces Creek and Upper Condor Creek. Dr Falconer reported that; 3.40

> In the very unstable soils of the lower Pierces Creek area, with deep igneous-derived sand, gully erosion is an intractable problem which requires continuing attention. The vegetation cover is sparse and any concentration of water flow can have disastrous results, whether from road runoff or natural depressions.
>
> On ground inspection in October 2014 as part of this report showed that the mid/lower portion of Pierces Creek land area also had extensively deteriorated, with surface erosion, gullying and loss of gabions into gullies.

Adequate attention has not consistently been given to the inspection and repair of the sediment control structures in the LCC. Additionally, some of the erosion gully work has exceeded the resources available under the MOU for Sediment Control Maintenance. For example, in October 2013 Icon Water identified a 'large erosion gully near East-West Break and Pipeline Road'—where costly and 'extensive repairs and remediation [were] required'. 3.41

Evidence of inappropriate recreational access in the LCC was found. A ranger reported to PCS significant motorbike activity over a long weekend, another ranger sought advice on the legal basis to prevent kayakers in the Corin Dam. Dr Falconer reported on the increased risk of deliberate and accidental fires consequent to recreational access. He cited examples of damage to the catchment and erosion caused by trail bike riding. 3.45

Dr Falconer concluded that: 'recreational management of the Lower Cotter catchment is a critical part of source water protection for drinking water supplies'. 3.46

Two matters have delayed the ability of TAMS to regulate public access to the LCC to manage this risk. Firstly, the enforcement power of PCS rangers, as provided by the *Nature Conservation Act 1980,* ceased in March 2008 with the establishment of the LCC as a reserve under the *Territory Plan 2008.* For example, the Explanatory Statement for the Nature Conservation Bill 2014 recognised this and stated, 'Conservation Officers have no effective powers in the LCC'.[7] This has been rectified with the new *Nature Conservation Act 2014* which will take effect by 11 June 2015. TAMS advised the Audit Office that its officers had continued to have other enforcement powers available to them under other Territory Acts, including the: *Trespass on Territory Land Act 1932*, *Domestic Animals Act 2000, Litter Act 2004, Pest Plants and Animals Act 2005, Public Unleased Land Act 2013,* and others. Notwithstanding these powers, the Explanatory Statement stated that 'day to day management is undertaken by the PCS, and there are insufficient regulatory provisions under other statutes to provide for adequate day to day management, 3.47

[7] Legislative Assembly ACT, Nature Conservation Bill 2014, Explanatory Statement, p. 57.

such as restricting access, managing recreational use etc.[8] Secondly, the LCC Plan of Management remains incomplete as there has been a major delay in developing a LCC Plan of Management. Completing the plan would be an important step towards regulating access and increasing the awareness of the community on catchment protection in order to mitigate these risks.

The installation of locked gates in 2009 has managed access to some areas and to an extent has mitigated the risk. Dr Falconer reported that: 3.48

> Regulations and legislation are only effective insofar as they are implemented. Control of illegal use of the Lower Cotter catchment will be problematic, due to the large area and topography.

TAMS and Dr Falconer both drew attention to the problem of the management of pine wildlings and to the un-managed regrowth pine forest within and surrounding the LCC and in areas to the LCC's northwest, east and south. One area in particular, the Blue Range is rated by TAMS as an extreme fire risk. 3.51

Dr Falconer concluded: 3.52

> Pine wildling control is the most crucial part of weed control in the catchment. Pines suppress native vegetation, and provide a high fire fuel load, which potentially can result in extensive fire damage as occurred in 2003. A consistent, continued program of wildling removal is essential, particularly following controlled burning. Blackberry control will continue to be needed, particularly in riparian zones.
>
> Pine wildling control will be essential after the controlled burns, or the risk will be ongoing and continuingly costly to manage.

Significant progress has been made in restoring the LLC over the last ten years; such that we are now entering the consolidation and maintenance phases of the restoration. In general, water quality has steadily improved along with improvements in landscape function. The completion of major sediment control engineering works and revision of the road network have contributed to reducing the rate of sediment movement into the Enlarged Cotter Dam. This is the outcome that has led the EPD to conclude that the potable water catchment is well managed. 3.54

Despite the improvements in water quality, the LCC is exposed to significant risks which are inter-related and which, under adverse conditions, could accumulate and lead to a catastrophic failure of the water catchment. The ultimate risk is of the movement of large volumes of unmanaged sediment from unstable soils into the reservoir. Wildfire is a significant risk which will increase with climate change and requires persistent and effective management efforts. The controls which regulate public access to the LCC are inadequate; increasing the risks of fire, landscape damage and erosion. If a fire were to occur and if it was followed by a heavy rainfall event(s), then there is a significant risk that the under-maintained, and the damaged, sediment control structures would be overwhelmed and ineffective, culminating in high levels of turbidity in the catchment leading to loss of water 3.55

[8] ibid., p. 56.

quality and consequently increased cost of water treatment.

It was not evident that the four agencies: the EPD, EPA, Icon Water and TAMS who shape the plans for, or undertake management actions in the LCC, had a shared knowledge of the cascading effect of risks and their potential consequences as there is no shared over-arching risk identification process and risk management plan. The development of a shared risk plan is important so that risks can be used to effectively and efficiently determine financial resources needed for risk mitigation strategies including: fire management, maintenance of sediment control structures, and public access controls for the LCC. 3.56

TAMS was not able to provide evidence of documented high-level reporting against the management actions, or of a high-level review of progress against the management actions in the Strategic Management Plan. This supports the finding that, since late 2009—with the cessation of the Management Group and the redirection of PCS staff to other roles—there has been a reduction in the capacity to coordinate the implementation of Strategic Management Plan in the LCC. 3.59

The Strategic Management Plan set out twenty-nine management actions and, including sub parts—forty-nine separate actions to be achieved. Seventeen of the management actions (58.5 percent) in the Strategic Management Plan were achieved; a further eight were partly achieved (27.5 percent). Only four (14 percent) of the management actions were not achieved, in what has been and continues to be a major land restoration project for a fire-damaged and erosion degraded potable water catchment. This is a significant achievement for a cooperative approach across several agencies, an important partner—Greening Australia, and community volunteers in the restoration of the catchment. 3.63

Three of the management actions in Strategy 1—a water resources approach, and one in Strategy 2—a landscape approach, were rated as Achieved and Ongoing or Partly Achieved and Ongoing. This indicates that there is still significant work required over time frames of twenty-to-fifty years in order to restore the landscape and vegetation to achieve the goal of resilient native woodland and grasslands. One management action in Strategy 1 and five in Strategy 3 were rated as Partly Achieved. 3.64

These management actions were in important areas such as: developing a risk management plan; regular review of the road network for safe fire management and to minimise sediment generation; regular assessment and maintenance of important sediment basins and control structures; the delay in adequately managing recreational access to the LCC; and inadequate progress in reviewing, completing and implementing policies which regulate maintenance and management activities in the catchment. 3.65

CURRENT ISSUES FOR THE LOWER COTTER CATCHMENT

Paragraph

The ACT Government is aware that water catchment management is complex and lacks a strong coordinated approach. The Government is taking steps to improve catchment coordination across and external to the ACT. However, as discussed in 4.5

the section on integrated catchment management in the ACT and region, there is a risk that these developing arrangements will give insufficient priority and inadequate attention to the LCC as they focus primarily on other important, non-potable water catchment matters.

The new ACT and Region Catchment Management Coordination Group may not be able to attend sufficiently to the LCC's high-level coordination and mid-level operational needs to ensure successful management of the maintenance and consolidation phases of the LCC's restoration. The reasons for this are: 4.6

- importantly, the Catchment Management Coordination Group is an advisory, communication and coordination group—as suits a cross-jurisdictional body—whereas the LCC needs a coordination group comprised of decision-makers from across the agencies in order to expedite and resolve issues. The LCC Management Group was successful as it brought together the senior decision makers and resources to complete the required engineering works
- funding and decision making priorities of the Commonwealth Basin Priority Project may dominate the group's agenda and discussion—as this is an important project with potential funding of $93.5 million over the next five years
- the membership of the group may be extensive, the reformed Senior Executive Water Group may have 14-18 members and address multiple cross-jurisdictional issues, and
- the issues in the LCC and Cotter Catchment may lack consideration due to the need to give priority and time to cross-border issues, and the lack of an over arching risk plan which emphasises the values of the LCC and enables the LCC's strategic risks—which are significant—to be recognised and prioritised accordingly.

Therefore, there would be benefit in the ACT Government developing a specific coordination and decision making body and processes for the LCC; as stated in Recommendation 5. 4.7

The coordination of the LCC at the higher, decision making levels has reduced since the Deed of Agreement ceased in October 2009—alongside the reduction in the role of the EPA. At the same time, TAMS and Icon Water have progressively redirected staff away from direct dedicated roles in the LCC—although this was recently rectified by TAMS to an extent. Icon Water's Source Water Protection Program Consultative Committee was intended to be the coordination forum to replace the role preformed by the original LCC Management Group. It has performed a useful mid-and-operational level coordinating function, but it has not had involvement of senior staff from across Icon Water, TAMS, the EPD and EPA which could have enabled it to replicate the functions of the successful inter-agency Management Group and Program Management Group under the Deed. The other extant ACT cross-government (including Icon Water) water coordinating committees—the Directors-General Water Group and the Senior Executive Water Group have not undertaken a coordinating role for the LCC. 4.8

The catchment management and coordination arrangements for the LCC need to be reviewed in concert with the major agencies: TAMS PCS, Icon Water, EPD (including ACT Planning and Land Authority) and the EPA. A new management—coordination and decision-making structure—specifically for the Lower Cotter Catchment needs to be given a high priority. The goal of this needs to be the development of effective, streamlined coordination and decision making arrangements at the high level, and the integration of these arrangements into the operational level, because catchment management can involve repeated and complex coordination tasks at the operational level. An important consideration is that the decision-makers must also have the authority to assign and commit the necessary resources to implement their decisions. 4.10

There is no overarching integrated risk-assessment process and plan for the LCC. It is important for a risk plan to be developed for the catchment as the plan is an important coordinating mechanism which can help align and set clear priorities for all agencies to understand and follow, even where their actions are independent. Icon Water's 2009 Cotter Catchment Risk Plan provides a sound basis for the development of an LCC risk plan.[9] 4.12

A cross-agency risk plan is important as the Enlarged Cotter Dam contains twenty-five percent of the ACT's potable water supply and represents an investment of approximately $410.5 million dollars. A process which jointly identifies the strategic risks can be used to determine the appropriate financial resources for allocation to ongoing risk mitigation strategies including: fire management, maintenance of roads and sediment control structures, and weed management. Based upon analysis of relevant risk assessments and expert opinion, the highest risks to manage are: fire and wildfire, turbidity due to erosion, recreational access, and management of pine wildlings. Development of a cross-agency risk management process and plan is a high priority. 4.13

The Plan of Management, as required by the *Planning and Development Act 2007* and similarly the new *Nature Conservation Act 2014,* which gives effect to the management objectives for the LCC is now overdue by seven years.[10] The plan needs to be completed and implemented as a priority to enable effective regulation of public access. The plan should incorporate the elements of a catchment management plan as articulated in the Australian Drinking Water Guidelines; especially—a clear statement of responsibilities of different agencies and agreed coordination processes. The plan needs to define appropriate low-impact recreational activities based upon a risk assessment. 4.14

Dr Falconer stressed the importance of hazard reduction burning in the LCC, stating: 4.18

> The program of fire fuel reduction by controlled burns is <u>the most important management action in the Lower Cotter catchment at the</u>

[9] ActewAGL & Water Futures, *Cotter Catchment Water Quality Risk Management Plan,* December 2009.

[10] As discussed, the plan was due to commence in 2008 and commenced in 2014, with an estimated time frame of several years before it is completed.

present time. The catchment is liable to both wildfires from lightning strikes in the mountains adjacent, as in 1983 and 2003 and from campfires/arson as in 1926 and 1939. High fuel loads need continuous reduction, to prevent serious erosion and fire debris deposition following fire with consequent unavoidable deterioration of reservoir water quality.

It is essential that the planned controlled burns are carried out as soon as feasible, and that a major program of physical pine removal is implemented.

Particular care will be needed to prevent the burns from continuing onto revegetated areas which have been planted to stabilise the erodible soils.

4.19 Dr Falconer recognised that fuel reduction burns in some areas of the LCC would require careful preparation of sediment and debris-control structures to minimise effects on the water quality post burns. He stated:

> While controlled burns are an essential part of the overall risk management in the Lower Cotter, the extent of the fire fuel accumulation, when burnt, can be expected to have adverse effects on water quality. Considerable burnt debris will be generated, and in hotter areas of the burn the soils will again be damaged with potential subsequent erosion. Any heavy rainfall shortly after the burns will carry fire debris down into the reservoir, with consequent loss of water quality. These issues are extensively discussed in White et al. (2006). Sediment retention ponds will need to be constructed or refurbished in the crucial gully lines to retain debris.
>
> Effective controlled burns of moderate intensity are necessary for fire risk management over many areas of the catchment, and can be undertaken with little subsequent erosion or degradation of the natural ecology.

4.20 The Strategic Management Plan required ESA, PCS and Icon Water to review the Fire Fuel Management Zones in the LCC and to prepare a fire management plan, see management action 4.3.3.b. As discussed in the section, 'Implementation of the management actions' these management actions have been achieved and as a result, some areas in the south and northwest of the LCC are now Strategic Fire-fighting Advantage Zones. The current high-level plan and policy is the *ACT Strategic Bushfire Management Plan 2014*.

4.23 The Icon Water 2009 Cotter Catchment Risk Plan identified that an important control for fire management in the Cotter Catchment was the monitoring of the success of burns in the BOPs. As reported in the section, Evaluation of the implementation of the Strategic Management Plan (Appendix A 4.3.3.c), the Cotter Dam Regional Fire Management Plan for 2009–19, and the revised draft Cotter Dam Regional Fire Management Plan 2013–19 were examined. It appears that not all interventions planned from 2009 onwards had occurred. The Regional Fire Management Plans' for the Cotter pre and post 2014: version 2 2013–19, and draft version 3 2013–19 showed that only three of either eight or ten planned controlled burns had occurred in the LCC, some of the planned burns were in or adjacent to

the Strategic Fire-fighting Advantage Zones, so they were of strategic importance.

4.24 The reason for the inability to conduct the planned burns was found in the reports on the Prescribed Burn Monitoring Program by Conservation Research (EPD). These describe the difficulties in conducting the BOP controlled-burn activities in the ACT during three of the last four years due to above average rainfall in the autumn burn seasons leaving the forest fuels wet and unable to be burnt: 2010–11, 2011–12, and 2013–14. The 2012–13 season allowed three small prescribed burns. March 2015 had five burns covering an extensive area.

4.25 ESA and the Rural Fire Service (RFS) were approached for confirmation of what burns had occurred and how effective this control was. For monitoring of BOPs to be fully effective as a control, an accumulation of BOPs over several years where prescribed burns where not able to occur should have raised a flag to direct senior management attention to a developing strategic fuel management issue in the LCC.

4.26 The RFS demonstrated that it has taken steps to make the review and audit process for the annual BOPs more rigorous following the Audit Office Report on Bushfire Preparedness in 2013. For example, commencing in 2014–15, the RFS receives TAMS Fire Management Unit data from a TAMS database. The RFS then checks the burns that were planned, conducts an audit including on-the-ground inspections of the outcomes of a sample of burns and reports upwards on burns which were not completed. High priority burns are identified and factored into planning for the next season's BOPs.

4.27 The process of developing the BOPs and the Regional Fire Management Plans requires extensive coordination and an iterative process between ESA, RFS, TAMS Fire Management Unit and Conservation Research (EPD). The review period for the Regional Fire Management plans is five years and this process involves the most concerted analysis of cumulative outcomes of burns in regions. The process of analysing the effects of an accumulation of uncompleted burns between five-yearly Regional Fire Management plans could be more developed as a control, however, the achievement of that level of control could be complex. The ESA Commissioner reported to TAMS in September 2014 that the Bushfire Council had indentified difficulties in obtaining 'known, firm and consistent information and late access to information' on the BOP process and recommended that ESA increase the monitoring of the planning and implementation of the [BOP] program.

4.30 The 2015 late summer/autumn burn season has provided favourable conditions for conducting of controlled burns. As at 31 March 2015, the Fire Management Unit had completed five of seven planned burns for the larger LCC, as described in the map entitled 'Lower Cotter Catchment 2014–15 BOP Works'.[11]

4.31 TAMS and Dr Falconer have both drawn attention to the problem of the management of pine wildlings and of the un-managed regrowth pine forests within and surrounding the LCC—in areas to the LCC's northwest, east and south. Dr Falconer's report highlighted the fire risk in an area called the Blue Range which

is partly within and partly adjacent to the LCC in the northwest. This is a steeper part of the LCC where twelve years regrowth of a mixture of dense pine and scattered eucalyptus stands presents a very high fuel load. Dr Falconer reported 'ignition here has the potential to burn the whole catchment, if the wind is from the northwest and crosses control lines'. He also stated:

> This region of the catchment has the most extreme risk from wildfire, with limited access, very high fuel loads, and no effective barrier from major fires arising to the north or west in the eucalypt forest in NSW.
>
> As it is located in the upper Condor Creek, fire debris from wild or planned fires will flow directly into the reservoir, unless adequate retention ponds are constructed.

The accumulation of thick pine and fuel in the Blue Range has been a PCS target for fuel reduction since early 2009 and different methods such a physical removal of the pine or controlled burning have been considered. However, the management of the Blue Range area has demonstrated difficulties in achieving planned prescribed burns due to autumns over the intervening years where it was too wet to burn, or a time when other fire management issues were considered a higher priority. The ACT Bushfire Council recognised the problem of the accumulation of fuel in the Blue Range in June 2013. 4.32

In December 2014 and January 2015, the TAMs Fire Management Unit and ESA were consulted about the risks and management strategies for the Blue Range. TAMS has rated the Blue Range as an 'extreme risk, especially to the Cotter Catchment and therefore Canberra's water security'. TAMS had consulted and developed the *Draft Blue Range Rehabilitation Plan 2014–2025.* This provided a systematic approach to the management and fuel reduction in the area, while also protecting the riparian zones and the water quality at Condor Creek, and managed by compartments the higher more erosion-prone slopes. The *Draft Blue Range Rehabilitation Plan* would take ten years to implement at an estimated cost of $5.8 million. A significant part of this plan is at present unfunded. Dr Falconer emphasised the importance of resolving the Blue Range and ESA was aware of and supported the Blue Range Plan. By late March 2015, the Fire Management Unit had completed a fuel reduction burn in one part of the Blue Range and several other key areas.[12] 4.33

The problem of the Blue Range is a more severe example of the problem of dealing with thick regrowth of pine wildlings; however it is one of several unmanaged pine regrowth forests in and around the LCC. TAMS, Dr Falconer and EPD all pointed out the importance of developing management plans and solutions for these areas as a priority for this stage of the restoration of the LCC. 4.34

The Emergency Services Commissioner supported the observations and conclusions contained in Dr Falconer's summary report on fire in the LCC. The Commissioner also commented positively on the willingness of TAMS to prepare and implement fuel reduction strategies, and that the solution was broader than fuel management. The Commissioner noted that effective fuel reduction in the LCC does not stop the 4.38

[12] This area of 282 hectares was called Condor Creek Hazard Reduction Burn FB079.

risk of bushfire burning the whole catchment.[13]

To improve access to the LCC to support a rapid response to unplanned fire,[14] the Commissioner intends to revisit (with TAMS and EPD) the extent of the fire trail access network in the LCC, with a key priority being to meet the goal of safe access for fire-fighting and management. ESA considers that better access would also allow fuel reduction burning in smaller blocks, which is a safer strategy. At the same time, the review would consider public access management for roads and fire trails[15] in the LCC to prevent unauthorised access and reduce the risk of deliberate or accidental fire in the catchment. As part of the review of the road and fire trail network, it will be important to balance appropriate access management sufficient to enable safe fire-fighting with the goal of minimising roads and fire trails to reduce the associated risk of generating sediment. EPD advised that a 2006 CSIRO report was of considerable value in informing the original revision of the LCC road network.[16] 4.39

Despite a MOU between TAMS and Icon Water which required the inspection and repair of roads and sediment control structures in the LCC, Dr Falconer's report identifies damaged and ineffective sediment control works which may have been in that state for some time. He also found problematic gully erosion and noted that erosion is an intractable problem in some of the areas of the LCC such as Pierces Creek with its unstable soils. 4.42

Dr Falconer recommended that restoration work is urgently required. He demonstrated that heavy rainfall events at times in the last several years have resulted in spikes in turbidity in feeder streams—indicating unstable soils and sediment movement at those times. Therefore, it is essential that the erosion control structures are inspected regularly and well maintained while the catchment is experiencing routine conditions; it is even more important if a fire, or a fire and a major rainfall event were to damage parts of the catchment, significantly increasing the risk of sediment movement and the possibility of overwhelming less functional, ageing, or under-maintained control structures. The MOU has now ceased. 4.45

Therefore, it is now time for a reassessment of the condition of the landscape; focusing on the eroded areas and formed gullies, on the damaged erosion control structures, the capacity of the sediment ponds, and the state of the logs which are decaying. This is a high priority action to protect the catchment. 4.46

[13] The SBMP supports this view: 'However, it should be noted that under elevated fire danger conditions, the advantage resulting from planned fire will be reduced' p. 40.

[14] Strategic Bushfire Management Plan, 'Objective 4 —Extinguish bushfires when they occur, a rapid, decisive and coordinated response', p. 3.

[15] The review is to be of unsealed mineral earth roads and fire trails.

[16] *Revegetation of water supply catchments following bushfire: A review of the scientific literature relevant to the Lower Cotter Catchment,* Paul K. Rustomji and Peter H. Hairsine, CSIRO Land and Water Science Report 9/06, April 2006.

The Strategic Management Plan proposed an evaluation of the success of the implementation against the plan's management goals, after ten years of implementation.[17] This audit report has reviewed the implementation of the management actions and has addressed the management issues identified in the plan. The report has identified current issues for the successful coordination and management of the restoration of the LCC. There would be merit in conducting an evaluation of the Strategic Management Plan, and reporting on that evaluation within two years of the publication of this audit report. The Commissioner for Sustainability and the Environment may be well placed to undertake such an evaluation. 4.49

Recommendations

RECOMMENDATION 1 DEVELOPING A CODE OF CATCHMENT MANAGEMENT

A Code of Potable Water Catchment Management, to direct land management activities in the LCC, should be developed, in consultation with: Territory and Municipal Services, Icon Water, the Environment and Planning Directorate and the Environment Protection Authority, by December 2016.

A lead agency has not been nominated as it may be affected by a decision in relation to Recommendation 5.

(The Code of Potable Water Catchment Management could be based on a review of the *ACT Code of Forest Practice 2005* and be used as a standard and a condition contained in environmental authorisations for the LCC. It should be consistent with the *Australian Drinking Water Guidelines* and consistent with provisions of the TAMS and ACTEWAGL, *Code of Practice: Practical guidelines and standards for co-operation for maintenance works*.)

RECOMMENDATION 2 REVIEW OF MANAGEMENT AGREEMENT

The purpose and intention of the Management Agreement between the Conservator of Flora and Fauna and Icon Water (ActewAGL Distribution)—as it relates to the Lower Cotter Catchment—should be reviewed by the Conservator to determine if the agreement should specifically exclude the Lower Cotter Catchment.

(There may be no substantial basis for the inclusion of the Lower Cotter Catchment, as its inclusion in the agreement is only needed if Icon Water's actions might conflict with the management objectives for the catchment, in particular, protecting the water supply. If the Conservator considers that an agreement is necessary, the reasoning for including the Lower Cotter Catchment should be documented in the agreement being developed.)

[17] *Lower Cotter Catchment Strategic Management Plan*, ACT Government, January 2007, p. 1.

RECOMMENDATION 3	IMPLEMENT THE TAMS AND ICON WATER CODE OF PRACTICE

The ACT Code of Practice which guides maintenance works on Controlled Land should be implemented by the Territory and Municipal Services Directorate and Icon Water, giving particular attention to the information-sharing and approval processes for annual operations plans and works plans.

(If the Conservator of Flora and Fauna specifically excludes the Lower Cotter Catchment from the Management Agreement (Recommendation 2) then Icon Water and Territory and Municipal Services Directorate should develop a Memorandum of Understanding to integrate their activities using the ACT Code of Practice.)

RECOMMENDATION 4	REVIEW AND FINALISE THE PARKS AND CONSERVATION SERVICE CODE OF SUSTAINABLE LAND MANAGEMENT

The status of the draft Parks and Conservation Service, Code of Sustainable Land Management should be reviewed and either finalised or rescinded by the Territory and Municipal Services Directorate. If finalised, this should occur by October 2016.

RECOMMENDATION 5	REVIEW THE MANAGEMENT AND COORDINATION ARRANGEMENTS FOR THE LOWER COTTER CATCHMENT

HIGH PRIORITY RECOMMENDATION

New catchment management coordination and decision-making arrangements specifically for the Lower Cotter Catchment should be developed by the ACT Government and involve consultation with Icon Water, Territory and Municipal Services, Environment Protection Authority, Environment and Planning Directorate and Emergency Services Agency.

(The aim is to develop effective, streamlined coordination and decision-making arrangements at the high level, and to integrate these arrangements into the operational level. An important consideration is that the decision-makers must also have the authority to assign and commit the necessary resources to implement their decisions.)

RECOMMENDATION 6	GIVING EFFECT TO THE WATER RESOURCES ACT: WATER POLICY COORDINATION

The Environment Protection Authority's role as articulated in section 64 of the *Water Resources Act 2007* should be implemented or reviewed.

(The Administrative Arrangements for water policy should align with section 64 of the *Water Resources Act 2007* or if existing arrangements are maintained in that water policy is in the Environment and Planning Directorate, the *Water Resources ACT 2007* should be amended.)

RECOMMENDATION 7 DEVELOPMENT OF A LOWER COTTER CATCHMENT RISK PLAN

HIGH PRIORITY RECOMMENDATION

A cross-agency risk management process and plan for the management of the Lower Cotter Catchment in reference to the land managed as a drinking water catchment should be developed by the Territory and Municipal Services Directorate, in consultation with key stakeholders, in particular Icon Water, Emergency Services Agency and the Environment and Planning Directorate, by June 2016.

(Territory and Municipal Services should therefore take carriage of the risk process and plan which should be reviewed every three years or sooner if the risk profile merits review.)

RECOMMENDATION 8 FINALISE THE PLAN OF MANAGEMENT FOR THE LOWER COTTER CATCHMENT

The Plan of Management for the Lower Cotter Catchment should be finalised, by the Territory and Municipal Services Directorate, by July 2017.

(Community consultation for the Plan of Management should be based on the knowledge that the key management objectives for the Lower Cotter Catchment have been decided and are contained in the *Planning and Development Act 2007* and the *Territory Plan 2008*.)

RECOMMENDATION 9 REGROWTH PINE FOREST IN AND ADJACENT TO THE LOWER COTTER CATCHMENT

An action plan for the removal of the regrowth and unmanaged remnant pine forests in, an adjacent to, the Lower Cotter Catchment should be developed and implemented by the Territory and Municipal Services Directorate. In the development of the plan and in implementing it consultation should occur with the Emergency Services Agency, the Environment and Planning Directorate, and Icon Water.

RECOMMENDATION 10 REVIEW OF LOWER COTTER CATCHMENT ROAD AND FIRE TRAIL NETWORK

The road and fire trail network in the Lower Cotter Catchment should be reviewed and a road network improvement plan should be developed by Territory and Municipal Services in consultation with Emergency Services Agency, Icon Water and the Environment and Planning Directorate. The review should be completed by July 2016.

(The review should define the minimum road and fire trail network that balances the goal of access for fire fighting with the goal of minimising roads and fire trails so as to minimise erosion and sediment movement into the reservoir; and examine gates and other control structures that effectively restrict or control public access but allow access for fire fighting and service needs.)

RECOMMENDATION 11	REMEDIATION OF SEDIMENT CONTROL STRUCTURES IN THE LOWER COTTER CATCHMENT

HIGH PRIORITY RECOMMENDATION

The effectiveness of sediment control structures in the Lower Cotter Catchment should be assessed to identify damaged and poorly functioning structures and pondage, and an action plan developed for implementing repairs by Territory and Municipal Services in collaboration with Icon Water.

RECOMMENDATION 12	REPORT ON RESTORATION AGAINST THE STRATEGIC MANAGEMENT PLAN

The Commissioner for Sustainability and the Environment should evaluate the restoration of the Lower Cotter Catchment against the Management Goals contained in the Strategic Management Plan, and report to the Minister for the Environment on priorities to be identified for the next decade, by December 2017.

(This aligns with the requirement in the Strategic Management Plan for it to be evaluated, Section 1.1)

Agencies' responses

The Territory and Municipal Services Directorate, Environment and Planning Directorate, the Environment Protection Authority, Icon Water, the Emergency Services Agency, Justice and Community Safety Directorate, and the Chief Minister, Treasury and Economic Development Directorate were provided with:

- a draft proposed report for comment. All comments were considered and required changes were reflected in the final proposed report, and
- a final proposed report for further comment. As part of this process the Territory and Municipal Services Directorate, Environment and Planning Directorate, the Environment Protection Authority, Icon Water, the Emergency Services Agency, Justice and Community Safety Directorate, and the Chief Minister, Treasury and Economic Development Directorate were also asked to provide comments for inclusion in the final report in the first summary chapter.

The Chief Minister, Treasury and Economic Development Directorate did not provide comments for inclusion. The Justice and Community Safety Directorate responded through the Emergency Services Agency.

Icon Water's comments

Icon Water appreciates the report on the performance audit of the Restoration of the Lower Cotter Catchment. The report recognises Icon Water's significant contribution to ensure the protection of water quality in our largest drinking water catchment. We welcome the recommendations for a shared risk management process and plan for the catchment, and the development of effective coordination, investment and decision making arrangements appropriate to the roles and responsibilities of agencies. We are committed to working with the Government to build on recent successes and address the challenges of a coordinated and collaborative approach to catchment management in the ACT.

Territory and Municipal Services and Emergency Services Agency's comments

Territory and Municipal Services and Emergency Services Agency provide a combined response stating that they 'note that corrections to maters of fact have been addressed' in the report.

Environment and Planning Directorate's and the Environment Protection Authority's comments

The Environment and Planning Directorate is satisfied with the modifications made by the Auditor-General in response to the comments we provided on the draft report.

1 INTRODUCTION

Background

1.1 This audit examines the management of the Lower Cotter Catchment (LCC) and therefore considers the implementation of the *Lower Cotter Catchment Strategic Management Plan 2007* (the Strategic Management Plan), with its vision and subtitle, *Clean water, healthy landscapes*—which was released in January 2007. The plan is the key document guiding the restoration of the LCC after the devastating bushfires in the ACT in 2003.

1.2 The Strategic Management Plan was designed to:

- define land use, strategic directions and management objectives for the LCC whereby water is recognised as the primary value of the catchment, and
- provide a sound management framework for long-term stability of landscapes and security of water quality and supply.[18]

1.3 The 2003 bushfires in the ACT caused the loss of four lives, destroyed over 500 homes, and damaged infrastructure.[19]The fires extensively damaged the Cotter Catchment and severely burnt ninety percent of Namadgi National Park. Most of the LCC experienced fires of 'very high severity' and all of the LCC's pine plantations were destroyed.[20]

1.4 Appendix C provides a list of abbreviations and glossary of key terms in this performance audit.

The rights to the ACT's water

1.5 The right to use and control the water in the ACT, including—rainwater, water that flows including in rivers or streams, and in dams—is given by the *Water Resources Act 2007* to the Territory, and the right is exercised by the relevant Minister.[21] The water management assets[22] are owned and managed by the water utility, Icon Water. Icon Water was formerly known as ACTEW Water, and before that ActewAGL (Water Division). Throughout the report, Icon Water will be used to refer to the water utility, except that

[18] *Lower Cotter Catchment Strategic Management Plan,* ACT Government, January 2007, p. 1.

[19] ACT Rural Fire Service, *History of bushfires,* < http://esa.act.gov.au/actrfs/learn-about-us/history-of-bushfires/> p. 4, accessed 25 February 2015.

[20] *Lower Cotter Catchment Strategic Management Plan*, ACT Government, January 2007, p. 4.

[21] *Water Resources Act 2007,* sections 6–8.

[22] Water management assets include the dams, pipes, pumping and water purification facilities.

direct quotations and document references in footnotes will retain the name used at the time of publication.[23]

1.6 At present, under the *Murray Darling Basin Agreement,* the Territory and each state in the basin agreed to a limit or 'cap' on the amount of water abstracted, or diverted for use, from the water resources available to it. Therefore, regardless of the volume of water flowing in the ACT's rivers, or impounded in the ACT's reservoirs, the ACT in 2008 accepted a net cap of forty gigalitres per annum. This included an annual population growth factor for water use from 2006–07.[24]

1.7 The ACT relies on four potable, or drinking water, reservoirs in two river catchment systems:

- the Cotter Catchment including the Corin Dam, Bendora Dam and the Enlarged Cotter Dam
- the Queanbeyan River catchment including the Googong Dam
- and pumping rights from the Murrumbidgee at Angle Crossing and the Cotter Pump Station.[25]

The area of the Lower Cotter Catchment

1.8 The Strategic Management Plan states that:

> The Cotter River Catchment extends over 481km^2 and includes three sub-catchments—the Upper Cotter (Corin Dam Catchment), Middle Cotter (Bendora Dam Catchment to Corin Dam) and the Lower Cotter (Cotter Dam Catchment to Bendora Dam). All of the upper and middle sub-catchments are protected in Namadgi National Park.
>
> The whole of the Lower Cotter Sub-Catchment covers an area of approximately 193 km^2. Sixty-five percent of the lower catchment lies within Namadgi National Park, six percent within NSW in the Brindabella National Park and the remaining 30 percent (approximately 64km^2 or 6000 ha) within the former ACT Forests estate.[26]

1.9 The Strategic Management Plan and the catchment restoration efforts are primarily concerned with a part of the LCC, the 6000 hectares (approximately) of former ACT Forests estate land, which is referred to as the LCC in both the Strategic Management Plan and in this report; (see Figure 1-1 Map of the ACT showing the Lower Cotter Catchment). The LCC is bounded to the north just below Uriarra Village; the eastern edge is near the

[23] During 2014–15 ACTEW Corporation and ACTEW Water has changed its name to Icon Water. In 2012, the former ACTEW Corporation (Water Division) commenced operation as ACTEW Water.

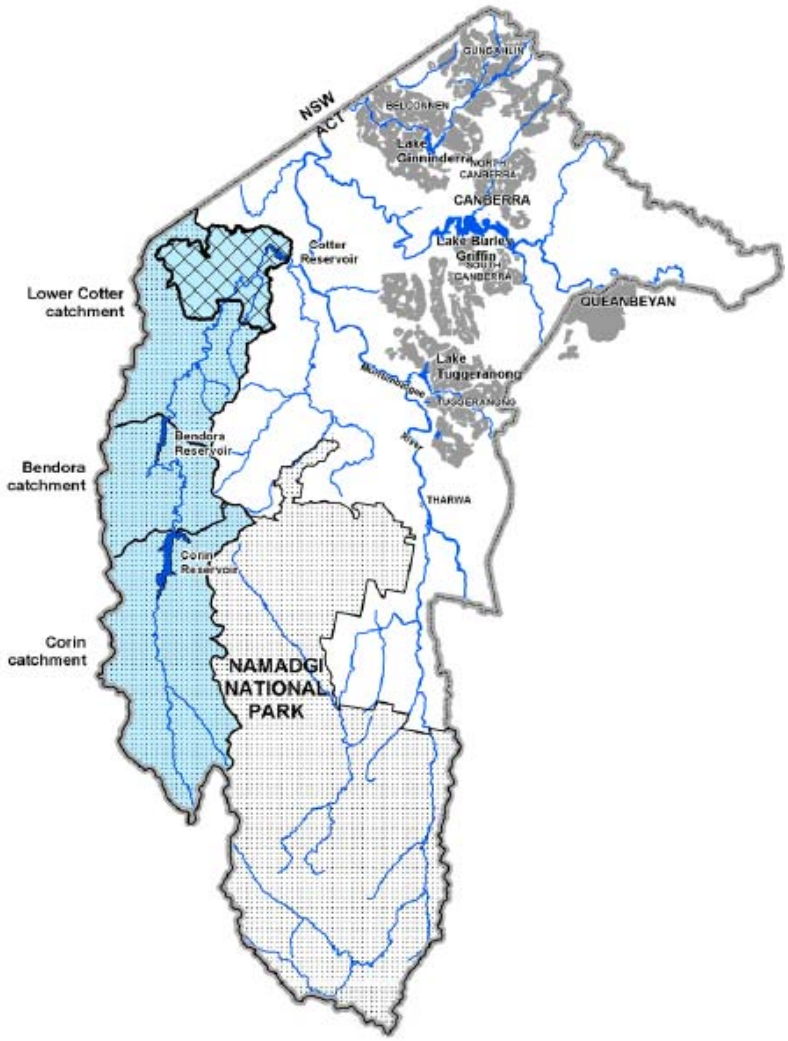
[24] ACT Government, *ACT Water Strategy 2014-44*, August 2014, pp. 10, 11.

[25] The ACT can also draw water from the Murrumbidgee River via the Murrumbidgee to Googong Water Transfer. Source: Icon Water, *ACT Water Supply Map*, < http://www.actew.com.au/Water-Supply-System/ACT-Water-Supply-Map.aspx> p. 1, accessed 25 February 2015.

[26] *Lower Cotter Catchment Strategic Management Plan*, ACT Government, January 2007, p. 2.

former Pierces Creek settlement; to the west and south, Namadgi National Park. A later section of the report will focus on the land management and zoning laws applying to this land.

Figure 1-1 Map of the ACT showing the Lower Cotter Catchment



Note: The cross-hatched area is the Lower Cotter Catchment

Source: Lower Cotter Catchment Strategic Management Plan, p. 2

Brief history of water supply, erosion and turbidity

1.10 When the ACT was established in 1913 its western boundary was set, based upon the watershed or catchment of the Cotter River. The Cotter and Molonglo Rivers are the major tributaries of the Murrumbidgee River within the ACT. The freehold grazing land in the LCC was then resumed. The Cotter Dam was completed in 1915 and provided the original water supply for the new city of Canberra. Approximately half of the LCC had been cleared and was overgrazed, leading to a reduction in vegetation cover which was exacerbated by rabbits. This, together with the unstable erosion-prone soils and the steeper slopes in parts of the area, resulted in a degraded landscape and serious soil erosion. By 1931, 3000 hectares of pines (*Pinus radiata)* were planted to stabilise the landscape. Overtime, more

pines were planted and an ACT forestry industry commenced. By 2003, prior to the bushfires, the LCC had 4200 hectares of pine plantation, with other pine plantations outside the borders of LCC.[27]

1.11 The turbidity of water is a product of sediments entering the water and has a detrimental effect on water quality. Erosion and associated turbidity have been a limitation of the Cotter Dam and its catchment since its early days. In 1961, the Teakle Report 'found that turbidity levels in the lower Cotter exceeded those in Bendora Dam almost three-fold. The report concluded that the major sources of sediment were roads and firebreaks'.[28]

1.12 The Cotter Dam provided the ACT's water until the completion of the Bendora Dam in 1961 and the Corin Dam in 1968. Their high montane catchments produced high quality water with the advantage of being gravity fed to Canberra, saving on costs of pumping and water treatment. They provided the majority of Canberra's water supply and the Cotter Dam became less important.[29]

1.13 The problem with bushfire in the catchment is that it can destroy the vegetation cover, thus exposing the soil to erosion—particularly if there are heavy rainfall events after the land has been burnt. The 2003 bushfires were followed by heavy rainfall and storms in March of that year. This resulted in scoured gullies and roads, which led to turbidity in streams at levels which exceeded the ACT water treatment facilities ability to process that water.[30]

> During the 60-year period when the Cotter Dam was used for Canberra's potable water supply, turbidity levels ranged between 1 and 4 NTU,[31] with occasional peaks of up to 20 NTU. Since the 2003 bushfires, turbidity levels have been in the range of 10-120 NTU with one peak level briefly reaching 200 NTU. By contrast, post bushfire turbidity in Bendora Dam has returned to around 2 NTU.[32]

1.14 The Cotter Dam was not used to supply water for over thirty years, only resuming in November 2004, after the new Mount Stromlo Water Treatment Plant came online.[33]

> The 2003 bushfire damage to the Cotter River catchment meant that the existing water treatment plant was not adequate to treat the turbid (cloudy) water drawn from the dams in the burnt-out catchment. A substantial upgrade of the water

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[27] *Lower Cotter Catchment Strategic Management Plan*, ACT Government, January 2007, p. 2, 3.

[28] *Lower Cotter Catchment Strategic Management Plan*, ACT Government, January 2007, p. 3.

[29] ibid*.,* p. 3.

[30] ibid., p. viii.

[31] Turbidity is a measure of suspended particulates in water. Dr Falconer stated that 'target turbidity in drinking water is less than 0.2 NTU and not to exceed 0.5 NTU (Australian Drinking Water Guideline 6, 2011)'. Hence turbid raw water requires treatment, by filtration or dissolved air flotation, to remove particulate material.

NTUs are Nephelometric Turbidity Units and measure the amount of suspended material in a water column.

[32] *Lower Cotter Catchment Strategic Management Plan*, ACT Government, January 2007, p. 62.

[33] ACTEW, *Annual Report 2006*, p. 22.

> treatment plant was undertaken to ensure the quality of Canberra's drinking water was protected during the Cotter River catchment's lengthy recovery.[34]

1.15 In 2005, the Office of Sustainability reported that 'water flowing from the LCC is of poor quality, mainly due to high turbidity levels, to the extent that it is not suitable for drinking water purposes without a high level of treatment'.[35]

The strategic management plan

1.16 The Strategic Management Plan set the future direction for the LCC:

> [the plan] ... identifies water as the most valuable resource in the catchment and recognises that the delivery of a clean and cost-effective water supply is dependent upon having stable and functional landscapes. Central to the plan are land use and land management practices that are consistent with achieving water quality goals.[36]

1.17 The plan set seven management goals:

1) High quality raw water in the Cotter reservoir
2) Healthy stream and riparian zones
3) Stable catchments and natural ecosystems
4) Access and use of the LCC that is consistent with delivering clean water and healthy landscapes
5) Conservation of natural and cultural heritage
6) Best practice management of the LCC, and
7) An involved and supportive community.

1.18 Drawing on the management goals and principles, the plan set four key management strategies, and under each strategy it outlined specific tasks ('Management Actions') to be achieved in: short time frames of one-to-three years; medium term tasks up-to-five years; and some strategic tasks, such as the restoration of riparian zones, erosion hotspots, and native vegetation and landscape function with a fifty-year timeframe. In all, the plan set twenty-nine management actions and assigned them to specific agencies. Chapter Three examines the achievement of these Management Actions.

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[34] Icon Water, *Water supply system: Mt. Stromlo Water Treatment Plant*; < http://www.actew.com.au/Water-Supply-System/Water-treatment/Mt-Stromlo-Water-Treatment-Plant.aspx> p. 1, accessed 2 March 2015.

[35] Office of Sustainability 2005, *Draft Report on Proposed ACT Catchment Management Plans and Governance,* Chief Minister's Department, ACT Government, unpublished; cited in *LCC Strategic Management Plan 2007*, p. 4.

[36] *Lower Cotter Catchment Strategic Management Plan*, ACT Government, January 2007, pp. xi, 3.

1.19 The plan's vision was for a 100-year restoration time frame with a suggested evaluation against the management goals in January 2017.[37]

Early restoration efforts

1.20 Icon Water is the publicly-owned corporation and the utility that owns and operates the water and sewerage distribution network in the ACT.[38] The 2006 ACTEW Annual Report stated that the poor state of the LCC was having a 'significant detrimental effect on the quality of water entering the Cotter reservoir' and as a result 'ACTEW was compelled to commence remediation work'[39]; at an estimated minimum cost to Icon Water of $11 million.

1.21 The restoration works conducted by Icon Water in concert with the then Parks, Conservation and Lands (PCL), included:

- the removal of standing burnt pines
- decommissioning of approximately 100km of roads
- building sediment control structures such as gabions in eroding gullies, sediment basins and wetlands, and a sedimentation pond at Pierces Creek
- improved road drainage and stabilisation works
- planting—pines (1285ha) and native vegetation (230 ha) and aerial sowed grasses
- weed control, and
- additional monitoring and scientific studies.[40]

1.22 The Strategic Management Plan noted that PCL had spent approximately $14.5 million on the LCC restoration prior to the 2006–07 financial year.[41]

1.23 Soon after the 2003 bushfires, a partnership was formed between the ACT Government and Greening Australia. For a decade now, Greening Australia has involved the community in replanting and weed management restoration efforts, focusing on the LCC. The planting program, which commenced in 2005 and is ongoing, has been monitored and was reported on by Greening Australia in its 2015 report: *Regreening the Cotter*.[42]

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[37] *Lower Cotter Catchment Strategic Management Plan*, ACT Government, January 2007, p. 1.

[38] Icon Water, *Why Icon water?*, <http://www.actew.com.au/Media-entre/Blogs/2014/November/18/Why-Icon-Water.aspx > p. 2, accessed 25 February 2015.

[39] ACTEW, *Annual Report 2006*, p. 22.

[40] *Lower Cotter Catchment Strategic Management Plan*, ACT Government, January 2007, pp. Viii, 6.

[41] ibid., p. 6.

[42] Greening Australia, *Regreening the Cotter: A Decade of Community Repair Work in Our Water Catchment*, January 2015, pp. 3, 8, 13.

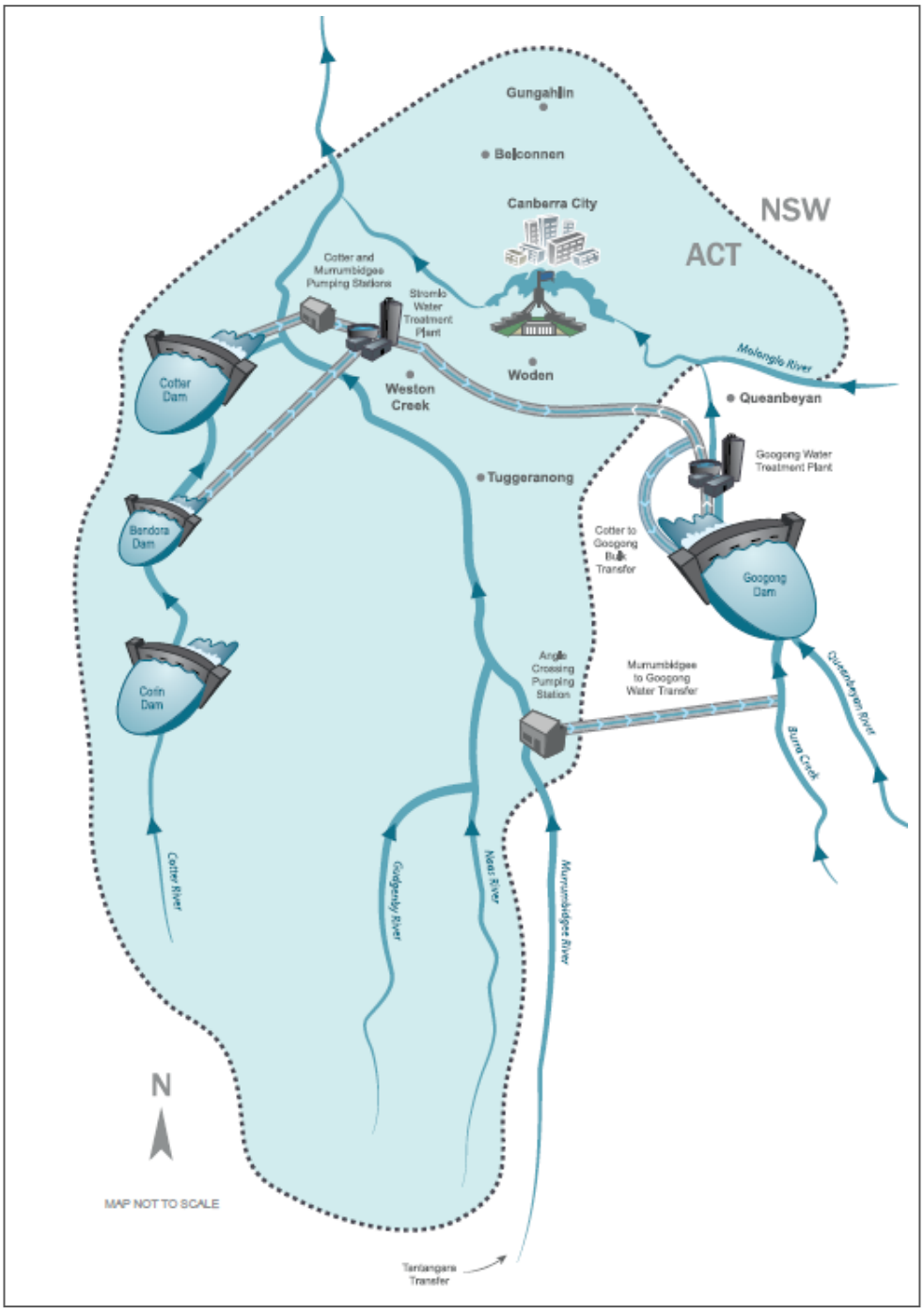
The Enlarged Cotter Dam

1.24 The Strategic Management Plan stated that due to the decision to commence construction of the Cotter Googong Bulk [water] Transfer, the importance of the Cotter Dam had increased; and if a decision was made to build the Enlarged Cotter Dam then, in the interests of achieving high quality water for Canberra, there would be a greater need to accelerate the restoration of the LCC[43], (see Figure 1-2 Icon Water's water supply network).

1.25 Construction of the Enlarged Cotter Dam commenced on 23 November 2009. The dam was completed in August 2013 and was opened on 14 October 2013. The capacity of the Cotter Dam was increased from four gigalitres to seventy-six gigalitres, now representing twenty-five percent of the ACT's potable water storage. The dam cost approximately $410.5 million; a final figure is yet to be announced.

[43] *Lower Cotter Catchment Strategic Management Plan*, ACT Government, January 2007, pp. 61, 62.

Figure 1-2 Icon Water's water supply network



Source: ACTEW Corporation Limited, Annual Report 2013–14, p.8.

Note: Map not to scale

Audit objective

1.26 The objective of the audit is to provide an independent opinion to the Legislative Assembly on the effectiveness of the management of the Lower Cotter Catchment by ACT Government agencies and Icon Water.

Audit criteria, scope and method

Criteria

1.27 The audit criteria examined whether:

- roles, responsibilities and accountabilities for the management of the Lower Cotter Catchment by ACT Government agencies and Icon Water are clearly defined and appropriate
- the management actions identified in the Lower Cotter Catchment Strategic Management Plan 2007 have been, or are being, implemented and achieved
- the implementation of the Lower Cotter Catchment Strategic Management Plan 2007 is integrated and coordinated with other environmental management strategies and plans for the Lower Cotter Catchment
- there is appropriate monitoring, review and oversight of ACT Government agencies' and Icon Water's management actions in the Lower Cotter Catchment, and
- ACT Government agencies' and Icon Water's management actions are achieving specified Government objectives.

Scope

1.28 The audit focused on ACT Government agencies and Icon Water's:

- implementation of the *Lower Cotter Catchment Strategic Management Plan 2007*, and
- other recent activities in the management of the LCC.

1.29 The audit did not consider in detail, post-bushfire restoration works occurring during the period 2003 to 2007, or works occurring prior to the January 2003 bushfires. These 'early' restoration works have already been subject to a number of reviews.

1.30 The audited agencies were:

- Icon Water
- Environment and Planning Directorate, including the Conservator of Flora and Fauna (the Conservator)

- Territory and Municipal Services Directorate, in particular the ACT Parks and Conservation Service (PCS), and
- the Environment Protection Authority (EPA).

Audit method

1.31 The audit followed the Audit Office's Performance Audit Methods and Practices and related policies, practice statements and guidance papers.

1.32 The audit approach and method consisted of:

- review of relevant records, plans and policies of the audited agencies
- interviews and discussions with key Directorate, Environment Protection Authority, Conservator of Flora and Fauna, and Icon Water staff
- the engagement of a subject matter expert in the field of water quality, Emeritus Professor Ian R. Falconer, AO. This independent expert:
  - considered whether the restoration efforts in the LCC, including ongoing management, have contributed to improved water quality
  - examined documents from the audited agencies, from the University of Canberra Institute of Applied Ecology, Greening Australia, and various published papers
  - visited the LCC with assistance from Parks and Conservation Service rangers and took photographs and recorded GPS locations
  - produced a final report for the Audit Office on 5 January 2015. Dr Falconer's report (Falconer Report) has been used as part of the evidentiary base for this audit report[44], and
- an interview with a key community stakeholder, the Conservation Council ACT Region.

Compliance with applicable Australian Auditing Standards and professional ethical pronouncements

1.33 Applicable requirements of Australian Auditing Standards and professional ethical pronouncements, including those relating to independence, were followed in the conduct of this audit.

1.34 The following paragraphs draw attention to matters that were considered in assessing the independence of the Auditor-General, Dr Maxine Cooper, in relation to the matters considered during the audit.

[44] Dr Ian R. Falconer, *Management of the Lower Cotter Catchment and in particular the implementation of the LCC Strategic Management Plan 2007, with respect to its effectiveness in improving water quality,* January 2015, unpublished.

1.35 Dr Maxine Cooper was previously employed as the Executive Director in Arts, Heritage and Environment ACT and Conservator of Flora and Fauna in 2005 and 2006, ceasing in September 2007. In these roles, Dr Cooper was responsible for:

- as Conservator, in May 2006 wrote to ACT Planning and Land Authority (ACTPLA) and asked ACTPLA to develop a new category of public land reserve—as a water supply catchment (see paragraph 2.65)
- as Executive Director of Arts, Heritage and Environment ACT, on 30 March 2006 approved the LCC Steering Committee Terms of Reference (see paragraph 2.104)
- as Executive Director of Arts, Heritage and Environment ACT, on 9 June 2006 signed *The Lower Cotter Catchment Restoration Deed* on behalf of the ACT Government (see paragraph 2.105)
- as Executive Director of Arts, Heritage and Environment, in August 2005 co-signed the ACT Code of Forest Practice 2005 (see paragraph 2.136).

1.36 References to these previous roles have been made in the text and footnotes of this report.

1.37 The period covered by this audit is from 2008 to May 2015.

2 CATCHMENT GOVERNANCE AND COORDINATION OF RESTORATION

2.1 This chapter examines:

- the arrangements in place to coordinate activities and restoration in the LCC. These arrangements include relevant legislation and major policies which establish roles and responsibilities and direct management activities within the catchment
- the roles and responsibilities of key agencies
- broader ACT arrangements which are being developed to integrate catchment management across the Territory and with NSW
- how the LCC may fit within these arrangements as they develop, and
- the arrangements and policies employed to coordinate the delivery of the Strategic Management Plan's management goals, including progress towards an LCC statutory Plan of Management.

Key findings

	Paragraph
The *Planning and Development Act 2007* provides an effective overarching legislative schema which provides a framework to protect the ACT's potable water catchments, making the protection of 'existing and future domestic water supply' the Act's highest objective for the LCC—thereby satisfying the requirement of the Australian Drinking Water Guidelines.	2.64
The primacy of the Management Objective—to protect the existing and future water supply—was not understood by all major agencies when interviewed for this audit. When it was explained that the priority in the legislation was protecting the water supply, two agencies expressed satisfaction that it provided a needed clarity for when they were negotiating with other parties to determine management activities related to the catchment.	2.70
The Explanatory Statement for the Nature Conservation Bill 2014 states that the primary purpose of catchment reserves is not conservation, and that catchment reserves are to be managed appropriately for their primary purpose – protection of the water catchment. The *Nature Conservation Act 2014* is therefore aligned with the *Planning and Development Act 2007*, reinforcing the primary management objective for the LCC—the protection of the water supply—and enhancing the alignment of ACT legislation with the requirements of the Australian Drinking	2.73

Water Guidelines.[45]

In October 2014, following policy development by the EPD, the ACT Government approved a set of arrangements for integrated catchment management within the ACT and cross-border to integrate the management of the ACT's catchments and the Murrumbidgee River [and tributaries] with NSW and NSW local councils. The decision includes the establishment of an ACT and Region Catchment Management Coordination Group which will advise the Minster for the Environment. 2.85

The commencement in February 2015 of the (interim) ACT and Region Catchment Management Coordination Group represents a significant investment of resources, both financial and managerial, into improving coordination and outcomes across the ACT's and NSW's catchments. 2.89

The LCC and its issues may not attract adequate priority or attention from the ACT and Region Catchment Management Coordination Group (and an associated working group) for several reasons, these are: 2.90

- the significant investment in the Basin Priority Project
- that the two coordination groups are large and will involve cross-border issues necessitating complex coordination
- the LCC is perceived by the EPD to be well managed for water quality
- that the latent and significant LCC risks with potential major consequences are not immediately apparent and pressing.

For this reason an over-arching risk management plan for the protection of the Lower Cotter Catchment is needed. A risk plan would assist with prioritisation of issues and decisions. The EPD advised that, as a priority, the ACT and Region Catchment Management Coordination Group would develop a high-level integrated catchment management strategy which would include a risk plan. 2.91

EPD advised the Audit Office that: 2.92

> A whole of Government approach will be considered for the LCC and its issues so that it can attract adequate priority or attention (i.e. budget allocation and implementation effort) in terms of competing ACT Government budget priorities. The roles and activities of the Catchment Management Coordination Group are closely aligned with the needs of the LCC. The issues of catchment management and water supply protection are fundamental issues for consideration by Government and in any new Coordination Group.

EPD also advised that, the Directors-General Water Group met on 12 May 2015 and 2.93

[45] Legislative Assembly ACT, Nature Conservation Bill 2014, Explanatory Statement, pp. 3, 56.

agreed to the prioritisation of the LCC as core and ongoing business.

The *Water Resources Act 2007* gives the EPA a central role in the management of water resources in the ACT.[46]This role includes: to coordinate policies in relation to water resource management; confer with similar Commonwealth or State water management bodies; to implement national or intergovernmental agreements relating to water resource management; and to promote an integrated approach to water resource management and water catchment management. 2.95

Despite this legislated schema, the statutory water policy coordination role of the EPA has not been implemented. The EPA has no line responsibility within EPD for: water policy coordination or cross-government agreements for water resource management; or for integrated catchment management. The EPA is a statutory authority and has no line authority for policy to EPD's Catchment Management and Water Policy group, or vice versa. Additionally, the EPA is not a member of the newly established high-level (interim) ACT and Region Catchment Management Coordination Group. 2.96

To achieve compliance with the *Water Resources Act 2007 t*here is a need to align the functional arrangements in directorates with EPA's central role and EPA's responsibilities in water policy and water management—as set out in the *Water Resources Act 2007,* or amend the legislation to reflect practices. 2.99

The arrangements in the 2006 Deed of Agreement for the LCC including the establishment of the Management and Program Management Groups were effective in bringing together the relevant agencies at both the decision maker and operational levels; they ensured improved coordination and facilitated considerable investment by Icon Water in the restoration of the LCC. 2.108

The Minutes for the Source Water Protection Program Consultative Committee were examined. This committee continued to meet and provided a communication forum between Icon Water, PCS, TAMS and other local and regional stakeholders. Despite the intention in late 2009 that the Source Water Protection Program Consultative Committee would take over the role of the LCC Management Group, it did not include high-level decision makers from agencies and was therefore unable to replicate the LCC Management Group's coordination and decision-making role. The SWPP Consultative Committee ceased in June 2013. 2.112

Coordination of activities in the LCC at a high-level has been reduced since the Deed of Agreement ceased in October 2009. The high-level coordination and decision making Management Group and its supporting Program Management 2.116

[46] Legislative Assembly ACT, *Water Resources Act 2007*, s 64.

Group, which had been responsible for progressing the implementation of the Strategic Management Plan, were replaced by a lower-level consultative group which did not include senior staff with decision-making authority. Other ACT-wide, high-level water coordination groups did not take on the role of coordinating the implementation of the Strategic Management Plan. Activities to manage the LCC have continued in both TAMS and Icon Water. The Source Water Protection Program Consultative Committee has performed a communication role at a lower level, however, there has been no integrated catchment management structure in place for the LCC from October 2009 to the present time.

To illustrate this, TAMS was not able to provide evidence of high-level formal reporting against the management actions in the Strategic Management Plan. This indicates that there has been no formal high-level review of progress against the strategies and the management actions in the Strategic Management Plan. In general, PCS coordination has been in response to operational needs and from relevant managers in PCS—commencing with the Murrumbidgee River Corridor Area Manager—informally reporting up through the PCS management structure. Management has been driven in response to operational needs, and has lacked the high-level support and awareness that is needed to address strategic risks and to enable coordination at higher levels with the various involved ACT Government agencies. 2.117

There is a risk that the management of the Cotter Catchment and the LCC will not receive the coordinated inter-agency attention that is appropriate, given the potential risks to the catchment, and adequate to protect the potable water catchment commensurate with the ACT's considerable investment in the Cotter Dam. 2.118

The *Planning and Development Act 2007* required TAMS to produce a Plan of Management 'as soon as practical'. TAMS commenced the process to develop an LCC Plan of Management in February 2013, and envisaged that it could take three to four years before the plan is completed. 2.123

Now, seven years after the LCC became public land, there is still no statutory LCC Plan of Management and TAMS is significantly overdue for the completion of this important coordinating policy document. TAMS explained that: it has commenced the process to produce the plan, it has the Strategic Management Plan for guidance, it has developed a Draft 2010 LCC Recreation Strategy which is available on the TAMS website and involved community consultation, and stated that the developments of: Uriarra Village on the border of the LCC; and of the Enlarged Cotter Dam from 2009 to 2012 meant that any plan would have needed to be revised to address the effects of their completion on the LCC. 2.128

The development of a LCC Plan of Management and its completion should become a high priority. It is important to consider that the significant policy decisions regarding land and water use have already been completed in the planning legislation. Therefore, the community consultation process should be aimed at defining 'low-impact recreation', informing the community, and developing awareness of the values of the catchment. Access for low-impact recreation is only suitable and permitted where it is not detrimental to protecting the water supply. Given this approach, the consultation process could be conducted within this context thereby expediting the implementation of the plan. 2.129

The *ACT Code of Forest Practice 2005* has not been updated as was required by the Strategic Management Plan in 2007. This task was not assigned as a specific Management action in the Strategic Management Plan. Its development was a joint responsibility of TAMS, EPD and the EPA. It is important because the EPA uses it as a control or standard for works done under an Environmental Authorisation. The parties need to review the policy as a priority, taking the most appropriate sections and developing a new potable water catchment management code to guide land management in the LCC. 2.139

The *Nature Conservation Act 1980*, s 99(1) (2), provides that the Conservator of Flora and Fauna may propose a management agreement to an agency (utility) if: 2.145

- the activities of the agency affect, or may affect, controlled land, and
- in the opinion of the Conservator, those activities may conflict with the land management objectives for the land.

The management objectives for the LCC are: firstly, 'to protect existing and future domestic water supply', and secondly, 'to conserve the natural environment', and thirdly, 'to provide for public use of the area for education, research and low-impact recreation'—the dominant objective is to manage the LCC catchment to protect the water supply. There is no Plan of Management to guide the achievement of that objective. The Conservator has not determined any objectives, in the form of a disallowable instrument [s 317 (2), (3)], which are considered secondary objectives. 2.148

Under s 99 of the *Nature Conservation Act 1980*, before proposing a Management Agreement, the Conservator is required to form an opinion that the utility's (Icon Water's) activities may conflict with the land management objectives for the LCC. The basis of the Conservator's opinion, that Icon Water's activities in the LCC may conflict with the land management objective of protecting the water supply, was considered. The Conservator advised that there was no written opinion. Similarly, the Management Agreement does not refer to, or record the Conservator's opinion which is a precondition for that management agreement. 2.149

There have been many instances where Icon Water has sought to positively influence activities in the LCC and provided funds and assistance to ensure the protection of the catchment. Icon Water's Source Water Protection Program is aimed at protecting the catchment by positively influencing the actions of other parties within the catchment, in order to protect the water supply and satisfy the Australian Drinking Water Guidelines. Icon Water's policies and actions with regard to the LCC have been aimed at protection of the water supply. 2.150

Reviewing the basis for the Management Agreement—as it relates to the LCC—is important because clarification of powers and roles in the LCC and streamlining of requirements or approvals will simplify processes and can facilitate effective, timely actions to maintain and protect the water supply. 2.153

If the Conservator remains of the opinion that the land in the LCC reserved as a catchment should be covered in the Management Agreement, it is important for the Conservator to state their reasons in the agreement. Regardless of any exclusion from the Management Agreement, the Conservator's general powers to protect fauna and flora would still apply in the LCC and would, of course, apply to those parts of the LCC which are listed in the *Territory Plan 2008* under s 315 (pb), and are within Namadgi National Park. If the Management Agreement is not continued, it would then be important to preserve the Code of Practice to guide maintenance activities. This could be retained under a MOU. 2.155

The Code of Practice for maintenance works requires that both Icon Water and PCS prepare an annual operations plan and submit it to the other party prior to each new financial year. Icon Water advised that this annual exchange does not occur. The Code of Practice for maintenance works also sets up arrangements for an exchange of 'works plans' which are to be submitted to the other party for approval at least fourteen days prior to the start of works. Under the Code of Practice for maintenance works, the works plans (including a risk assessment) are required for the following maintenance works: weed spraying, construction work, road works, vegetation clearing, all works requiring an Environmental Authorisation (including controlled burns in the fire season) or a Waterways Works Licence from the EPA, or that may impact upon declared threatened species. Icon Water advised that the exchange of works plans does not consistently occur for works in the LCC. Icon Water stated that TAMS does send one-day's notice before hazard reduction burning and TAMS sends notifications of applications yet to be approved to hold events on public land. However, it does not receive pesticide spraying notices unless it enquires or generated the work request, this is important as pesticide residue is a source water risk. 2.157

The practice of developing and sharing annual operations plans and works plans, including obtaining approval from the other party, are set out in the Code of 2.161

Practice for maintenance works which provides clear and relevant information. This has the potential to be an important coordinating document and process and is required by the Deed of Agreement. The processes set out in the Code of Practice for maintenance works are not being followed in the management of the LCC. There would be benefit in TAMS and Icon Water reviewing the information in the Code of Practice for maintenance works and in ensuring that the coordination and approval processes it contains are put into practice.

The ACT Government, in 2012, determined that the PCS Code of Sustainable Land Management was to be considered for funding and implementation. The document has not been finalised and remains in a draft form. The stated purpose of the Code of Sustainable Land Management was to inform and direct all of PCS land management activities. TAMS recently expressed ambivalence about the need for the Code. It is important for TAMS to review the purpose and utility of the Code and if it is a necessary policy, to support its development and completion. 2.166

Integrated catchment management for water supplies

2.2 The Australian Government's Australian Drinking Water Guidelines provides an evidence-based framework for the management of drinking water supplies to ensure safe, good quality water. They are not mandatory standards; however, 'they provide a basis for determining the quality of water to be supplied to consumers in all parts of Australia'.[47] The Australian Drinking Water Guidelines are intended to guide catchment managers, water utilities, water regulators and health authorities, and provide a risk-based approach to prevention and control of water quality hazards incorporating a 'multiple barrier' approach.[48]

2.3 A catchment is an area of land that drains into a water feature such as—a river, lake or reservoir. Ensuring the effective production of clean water from a catchment is a complex process known as 'integrated catchment management', which the Australian Drinking Water Guidelines defines as:

> The coordinated planning, use and management of water, land, vegetation and other resources on a river or groundwater catchment, based on cooperation between community groups and government agencies to consider all aspects of catchment management.[49]

2.4 Restoring the land and ecosystems in the LCC is important because, as stated in the Australian Drinking Water Guidelines :

[47] NRMMC, 2011, *Australian Drinking Water Guidelines Paper 6 National Water Quality Management Strategy*, Version 3, updated December 2014, National Health and Medical Research Council, National Resource Management Ministerial Council, Commonwealth of Australia, Canberra, p. 1.

[48] ibid., p. 1227.

[49] ibid., p. 1266.

> ... catchment management and source water protection provide the first barrier for the protection of water quality [and] ... the most effective barrier is protection of source waters [catchments] to the maximum degree practicable.[50]

2.5 The Australian Drinking Water Guidelines expand upon catchment management and source water protection, stating that a catchment management plan, incorporating the following elements, should be developed and implemented:

- a policy statement indentifying protection of water quality as an explicit objective of local legislation
- a clear statement of responsibilities of different agencies and agreed coordination processes
- a risk management approach
- a regular documented inspection process
- a community awareness program, and
- 'well-designed planning regulations [that] are a critical component of sound catchment management and protection of water quality'.[51]

2.6 The audit report addresses these Australian Drinking Water Guidelines elements in its analysis of the implementation of the Strategic Management Plan. The rest of this chapter examines: the responsibilities and roles of the agencies, ACT planning regulation which explicitly incorporates the water quality objective, and the coordination approach.

2.7 The Strategic Management Plan embodies the Australian Drinking Water Guidelines catchment-management objective in its management principle, *Primacy of purpose:*

> The protection and maintenance of water quality in the interests of public health is the primary and over-riding objective in the management of the LCC. Activities in the catchment to achieve the primary objective take precedence over activities conducted for other objectives.[52]

Roles and responsibilities

2.8 The roles and responsibilities of key agencies involved in the management of the LCC are established by legislation and by relevant high-level policies. This section examines the legislation, policies and the roles of key agencies.

[50] ibid., pp. 2, 28.

[51] *Australian Drinking Water Guidelines 2011*, updated December 2014, p. 1228.

[52] *Lower Cotter Catchment Strategic Management Plan*, ACT Government, January 2007, p. 16.

The Administrative Arrangements

2.9 The management of the LCC involves a wide range of parties. Examination of the *Administrative Arrangements 2015* (administrative arrangements) illustrates the potential coordination challenge.[53] The administrative arrangements show that potentially five ministers may be involved in decisions regarding the LCC, they are the:

- Chief Minister
- Minister for the Environment
- Minister for Territory and Municipal Services
- Minister for Planning, and
- Minister for Police and Emergency Services.[54]

2.10 The arrangements indicate that four directorates may be involved in matters in the LCC:

- Chief Minister, Treasury and Economic Development Directorate (CMTEDD)—environment protection and water regulation
- Environment and Planning Directorate (EPD)—environment protection policy, water policy and water efficiency programs, planning and development
- Territory and Municipal Services Directorate (TAMS)—land management and stewardship
- Justice and Community Safety Directorate—emergency services and policing.

2.11 Oversight of matters in the LCC is provided by four statutory bodies, the:

- Environment Protection Authority (in EPD)
- Conservator of Flora and Fauna (in EPD) (the Conservator)
- Commissioner for Sustainability and the Environment, and
- Independent Competition and Regulatory Commission (ICRC).

2.12 For the purpose of this performance the auditees are:

- Environment and Planning Directorate
- Environment Protection Authority
- Icon Water (ACTEW Water, ActewAGL), and
- Territory and Municipal Services Directorate.

[53] ACT, *Administrative Arrangements 2015,* (No 1), effective 21 January 2015.

[54] For example, in March and May 2015, these five ministries were occupied by five Members of the Legislative Assembly.

Relevant legislation and policy

Commonwealth legislation

2.13 *Australian Capital Territory (Planning and Land Management) Act 1988 (Commonwealth)*
This Act requires the development of the National Capital Plan and defines National Land—managed by the Commonwealth, and Territory Land—managed by the ACT Government. The LCC is on Territory Land.

2.14 *Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth)*
This Act provides for the protection of the environment including the conservation of heritage, it promotes biodiversity and provides guidance for co-operation between governments and the wider community to assist in achieving Australia's international environmental responsibilities.

ACT legislation

2.15 *Water Resources Act 2007*
This Act ensures that the management of ACT's water resources is conducted in a sustainable manner with a view to the needs of future generations with a focus on protecting the ecosystem and aquifers from damage. This Act defines the functions of the Environment Protection Authority and establishes the ACT Environmental Flow Guidelines and the Licence to Take Water.[55]

2.16 *Planning and Development Act 2007*
This Act defines the planning and land system that supports the orderly and sustainable development of the ACT. This Act establishes the *Territory Plan 2008* and defines the roles of the Conservator and the EPA in the ACT's planning system. The *Planning and Development Act 2007* needs to be consistent with the National Capital Plan, and if not consistent it will have no effect. The *Planning and Development Act 2007*, Schedule 3, also prescribes the management objectives for different categories of public land. The objectives will remain in this Act and will not be in the new *Nature Conservation Act 2014*.

2.17 *Territory Plan 2008*
The *Territory Plan 2008* is established under the *Planning and Development Act 2007* and commenced on 31 March 2008. The plan gives the ACT a framework for administering the planning system, including defining land use and guidance to assess development applications. The *Territory Plan 2008* comprises maps showing the ACT land by sections and blocks—zoned for particular land uses.

[55] This is a list of the major relevant legislation; it is not an exhaustive list.

2.18 *Environment Protection Act 1997*

This Act seeks to protect the environment from pollution and other environmental degradation including risk of harm to human health. The Act also establishes the Environment Protection Authority and gives the Authority the power to develop environment protection policies, enter environmental protection agreements, and issue environmental authorisations.

2.19 *Environment Protection Regulation 2005*

The regulation provides standards for treated and untreated water in a domestic water supply.

2.20 *Nature Conservation Act 1980*

The *Nature Conservation Act 1980* provides for the protection and conservation of wildlife, and for the reservation of areas of public land for these purposes. The act establishes the Conservator, and the PCS rangers who 'support the Conservator in the exercise of their responsibilities and for enforcement of the Act'.[56]

2.21 *Nature Conservation Act 2014*

This Act will replace the *Nature Conservation Act 1980* and come into effect by 11 June 2015. The object of this new act is to protect, conserve and enhance the biodiversity of the ACT. The requirement for a land manager to develop a Plan of Management under the *Planning and Development Act* 2007 will be transferred to this Act as a Reserve Management Plan. The ACT strengthens enforcement in reserves and recognises that water catchments are reserves with the primary function of protecting the water supply.

2.22 *Pest Plants and Animals Act 2005*

This Act seeks to protect the land and aquatic resources in the ACT from pest plants and animal by promoting a strategic and sustainable approach to pest management; of relevance to the LCC are the provisions for declaring pest plants and animals.

2.23 *Public Health Act 1997*

This Act protects the public from public health risks. The provision of drinking water by a utility requires a licence under this Act. The licence for Icon Water requires the Australian Drinking Water Guidelines to be met as far as reasonably possible. There is also a specific section which requires the water utility to provide specific information on drinking water quality to the Chief Health Officer.

2.24 *Public Health (Drinking Water) Code of Practice 2007*

The Code of Practice is part of a Drinking Water Utility Licence under the *Public Health Act 1997* and specifies the technical requirements for the supply, quality, monitoring of, and reporting on drinking water in the ACT. The Code requires the utility to participate with catchment bodies in a survey every three years, reported to the Chief Health Officer, with an annual water quality report and water quality improvement plans, with strategic risks and mitigation strategies. Section 14.1 of the Code states 'The Utility [Icon Water] must participate with the relevant water catchment management bodies for the purpose of information exchange in relation to activities in and around the catchments, which may

[56] Legislative Assembly ACT, Nature Conservation Bill 2014, Explanatory Statement, p. 14.

impact on water quality (including pesticides and agricultural chemical use) in all catchments'.

2.25 *Emergencies Act 2004*

This Act seeks to protect and preserve life, property and the environment. The Act also establishes the strategic and governance framework for the overall response to bushfire threats and requires the Emergency Services Commissioner to develop the ACT Strategic Bushfire Management Plan. The *Emergencies Act 2004* requires the land manager of unleased territory land to develop a Bushfire Operational Plan (BOP) and to seek approval for the plan from the Emergency Services Commissioner.

2.26 *Territory Owned Corporations Act 1990*

This Act establishes ACTEW Corporation Limited, now Icon Water.

2.27 *Commissioner for Sustainability and the Environment Act 1993*

This Act establishes the Commissioner for Sustainability and the Environment who is responsible for investigating complaints, conducting investigations and reporting on the state of the environment in the ACT.

2.28 *Independent Competition and Regulatory Commission Act 1997*

This Act establishes the ICRC, which is, among other things, tasked to provide water price directions.

2.29 *Utilities Act 2000*

Icon Water must comply with the obligations set out in the Utilities Services Licence which was issued by the ICRC under this Act in June 2001.

2.30 *Heritage Act 2004*

The Heritage Act 2004 establishes a system for the recognition, registration and conservation of natural and cultural heritage places and objects, including Aboriginal places and objects. This Act establishes a heritage council, heritage guidelines and a heritage register, and gives the Minister the option to enter heritage agreements.

2.31 *Fisheries Act 2000*

The Fisheries Act regulates fishing in the ACT and provides for the conservation of native fish species and their habitats and the management of sustainable fisheries. Under this Act, the Conservator is required to prepare a management plan for the management of fish species and their habitats in the ACT.

Policies

2.32 *ACT Water Strategy 2014–44*

The *ACT Water Strategy 2014–44; Striking the Balance* is the high-level water policy which informs the strategic planning of water resources to support the sustainable development of the ACT. The strategy focuses on three main outcomes:

- healthy catchments and water bodies
- a sustainable water supply used efficiently, and
- a community that values and enjoys clean, healthy catchments.

2.33 *Source Water Protection Program*

The Source Water Protection Program is an Icon Water strategy and program which focuses on catchment management and source water protection as the first barrier for the protection of water quality. The Source Water Protection Program addresses aspects of the Australian Drinking Water Guidelines, and is an integrated part of Icon Water's Hazard Analysis and Critical Control Point (HACCP) model for protecting the quality of drinking water.

2.34 *Water Quality Environment Protection Policy*

This 2008 policy provides clarification on: the application of the *Environment Protection Act 1997* and associated regulation, and on the management of water quality.

2.35 *Australian Drinking Water Guidelines 2011 (and updates)*

The Australian Drinking Water Guidelines (ADWGs) are published by the National Health and Medical Research Council and the Natural Resource Management Council and provide a non-mandatory framework for the management of drinking water supplies. The ADWGs are updated regularly to reflect the best available scientific evidence.

2.36 *Strategic Bushfire Management Plan*

This document sets the strategic direction for bushfire management in the ACT and provides a strategic framework for government agencies with a responsibility for bushfire response and management. The ACT Bushfire Management Standards define the measurable outcomes required under the Strategic Bushfire Management Plan.

2.37 *Bushfire Operational Plan*

The BOP sets out the work and activities that the land manager (for the LCC that is TAMS) aims to achieve each financial year to help manage bushfire risk.

2.38 *ACT Weeds Strategy 2009–19*

This strategy provides for a strategic approach to weed management aimed at the reduction of the impact of weeds on the environment, economy, human health and amenity. The planning and implementation of this strategy also considers the regional and national context, such as, the list of Weeds of National Significance—which includes the blackberry that infests large areas of the LCC.

2.39 *ACT Pest Animal Strategy 2012–22*

This strategy aims to reduce the social, environmental and economic damage caused by pest animals. The strategy sets out how to manage animals that are already pests in the ACT as well as those that might invade the ACT, for instance: rabbits, wild dogs, foxes, feral pigs, European wasps and some introduced fish and freshwater crustaceans.

2.40 *Nature Conservation Strategy 2013–23*

This strategy is prepared under the *Nature Conservation Act 1980* and provides a framework that guides priority setting for the management and restoration of natural areas and biodiversity, including riparian areas. The strategy identifies the LCC as a focal landscape for restoration of the LCC's ability to provide clean water and native landscape.

2.41 *ACT Aquatic Species and Riparian Zone Conservation Strategy 2007*
The strategy focuses on biodiversity and habitat conservation for rivers and riparian zones, with some consideration of water resource management and recreation; it is also an Action Plan for the management of declared threatened species: Perch, Trout Cod, Macquarie Perch, Two-spined Blackfish and Murray River Crayfish.

Roles of key agencies

2.42 This section sets out the roles of the major agencies with responsibilities for management or oversight of the LCC. Given the extent of the relevant legislation and the range of key operational and oversight agencies, it is clear that integrating and coordinating the management of the LCC is complex.

Icon Water

2.43 The ACT's water management assets are owned and managed by the water utility, Icon Water. The Icon Water website states that:

> ACTEW is an unlisted public company with assets and investments in water, wastewater, electricity and gas. ACTEW is owned by the ACT Government and has corporate reporting and compliance obligations under Corporations Law. Legislation governing the supply of water and sewerage services includes the *Utilities Act 2000*, *Water Resources Act 2007*, *Environment Protection Act 1997*, *Water and Sewerage Act 2000* and the *Public Health Act 1997.*[57]

2.44 Icon Water holds a Drinking Water Utilities Licence issued by the Health Directorate under the *Public Health Act 1997* as well as a Utilities Service Licence issued by the ICRC under the Utilities Act 2000. High quality water is necessary for Icon Water to maintain its licences: it reports through the Annual Drinking Water Quality Report and reports 'notifiable incidents' at the time of their occurrence to ACT Health.[58] In addition, Icon Water holds a licence to take water under the *Water Resources Act 2007*.

2.45 As Icon Water does not manage the land in the Cotter Catchment and the LCC, it relies upon its relationship with TAMS for the management of the land in the catchment. Some assets in the Cotter Catchment are maintained by Icon Water, for example roads where they are used primarily to access its water infrastructure; other roads are managed by TAMS. TAMS and Icon Water have entered into two Memorandums of Understanding (MOU) to clarify roles and responsibility for maintenance, and a Code of Practice which establishes standards for maintenance activities (see: Analysis of policies which coordinate actions, paragraph 2.132).

[57] Icon Water Website http://www.actew.com.au/Media-entre/Blogs/2014/November/18/Why-Icon-Water.aspx , p. 2, accessed 25 February 2015.

[58] ACTEW Water, *Annual Drinking Water Quality Report 2013-14,* pp. 34, 35.

2.46 Integrated management of the catchment relies on effective coordination between PCS and Icon Water, which is coordinated through Icon Water's Source Water Protection Program Consultative Committee and through direct contact between Icon Water and TAMS at operational and a managerial levels.

2.47 Icon Water and PCS also maintained a formal coordination meeting—the *ACTEW Water / PCS Enlarged Cotter Dam Working Group*. The role of this meeting was to coordinate matters relating to the establishment of the Enlarged Cotter Dam and the necessary restoration works following its construction. For example, the meeting has coordinated efforts related to works under the Enlarged Cotter Dam Biodiversity Offsets Implementation Plan (BOIP) including: plantings in and near the LCC; and the MOU between Icon Water and PCS whereby PCS was to maintain roads and sediment control structures in the LCC which were built by Icon Water[59] (see also paragraph 2.132). The November 2014 meeting included Icon Water informing PCS that the Defects and Liability period for the Enlarged Cotter Dam finished in October 2014 and that associated BOIP works such as the road maintenance MOU would end. The coordination meetings ceased after this date. Importantly, the meeting signalled that the parties would soon need to consider 'future management actions and relationships between ACTEW and PCS'.

Territory and Municipal Services

2.48 The Territory and Municipal Services Directorate (TAMS) contains PCS which manages the ACT's, parks, National Parks and nature reserves. TAMS is the land manager for the LCC, management activities are delivered by rangers from the PCS National Parks and Catchment Region.

2.49 PCS activities in the LCC include: management and maintenance of roads and tracks; managing public access to the LCC through gates and road closures; the PCS Fire Management Unit responds to fires in the PCS managed public land and plans and manages controlled burning in concert with Emergency Services Agency (ESA), weed control, recreation access, and development and maintenance of recreational facilities.

2.50 TAMS has responsibility for delivering on most of the management actions in the Strategic Management Plan; this role and the outcomes are discussed in depth in Chapter 3 (see paragraph 3.58).

Emergency Services Agency

2.51 The ACT Emergency Services Agency (ESA) is the ACT Government organisation charged with providing emergency management services to the Canberra community. The ESA comprises the ACT Ambulance Service, ACT Fire & Rescue, the ACT Rural Fire Service, the ACT State Emergency Service and the ESA Support Services.

[59] ACTEW Water & PCS, *LCC Sediment Control Maintenance MOU* under the *Biodiversity Offsets Implementation Plan 2009–14*.

2.52 The role of the Emergency Services Agency (ESA) is established by the *Emergencies Act 2004* (see paragraph 2.25). The ESA Commissioner approves the high-level policy for managing fire in the ACT—the Strategic Bushfire Management Plan (SBMP)—which is supported by for example, the Cotter Dam Regional Fire Management Plan (a multi-year coordinating plan) and annual BOPs. The PCS Fire Management Unit develops and executes the relevant annual BOPs which give effect to the SBMP, with assistance at times of the ACT Rural Fire Service.

2.53 The management of and response to fire in the Cotter Catchment including the LCC is a significant issue which was considered by Dr Falconer and is examined further in Chapter 4.

Environment and Planning Directorate

2.54 The Environment and Planning Directorate (EPD) provides policy direction on, among other things, planning, environmental and water-related issues. The Directorate's Planning and Sustainability Division has the responsibility, under the Minister, for land use and planning decisions in the Territory. This important role with regard to protection of the potable water catchments and the water supply is discussed in the following section (see Planning for potable water catchments, paragraph 2.64).

2.55 The Environment Division within the EPD contains the Catchment Management and Water Policy Branch. The Directorate is currently managing the statutory process for preparing and finalising the Plan of Management for the LCC, under the *Nature Conservation Act 2014*, as a Reserve Management Plan. The EPA and the Conservator are statutory functions which are placed administratively within the EPD.

Environment Protection Authority

2.56 The role and powers of Environment Protection Authority are established by the *Environment Protection Act 1997* and the *Water Resources Act 2007* (see paragraphs 2.15 and 0).

2.57 The Director of Environment Protection and Water Regulation in EPD holds the EPA position. The administrative functions of the EPA involve meeting the objectives of the Act, which include:

- protecting the environment
- ensuring decision-making incorporates ecologically sustainable development principles
- establishing a single and integrated regulatory framework for environmental protection, and
- encouraging responsibility by the whole community for the environment—general environmental duty of care.

2.58 The EPA grants Environmental Authorisations which regulate activities such as controlled burning. It promotes environmental awareness, enters into environmental protection agreements, develops codes of practice with industry, and administers environment protection orders and a range of other instruments. The Act covers all environment protection activities including emissions to air, land, water and noise.

2.59 The EPA also has the responsibility for administering the *Water Resources Act 2007* which aims to ensure the use and management of the Territory's water resources are sustainable while protecting the ecosystems that depend on the waterways including by protecting waterways and aquifers. The EPA issues Waterways Works Licences to protect waterways and riparian zones, and issues the Licence to Take Water which allows Icon Water to take and supply water for the ACT and Queanbeyan. The amount of water that can be taken is balanced with the environmental water flows required under the Environmental Flow Guidelines as approved by the Minister.[60] As a condition of the Licence, Icon Water is required to monitor water usage, quality, volume, and flows and to report this regularly to the EPA.

2.60 Together the two acts establish a strong coordinating role for the EPA in the management of the water catchments and water resources in the ACT, however not all aspects of this role are fulfilled; for further analysis see: Water policy: the Environment Protection Authority's role, paragraph 2.95.

The Conservator of Flora and Fauna

2.61 The Executive Director of Environment Division at the Environment and Planning Directorate holds the office of the Conservator of Flora and Fauna. The *Nature Conservation Act 1980* established the Conservator's role. The Conservator also has responsibilities under the *Planning and Development Act 2007*, the *Fisheries Act 2000* and the *Tree Protection Act 2005*.

2.62 The Conservator acts on issues that affect the conservation matters embodied in the *Nature Conservation Act 1980*. This relates in particular to protecting native plants and animals including: managing the nature reserve system; and protecting and conserving threatened species and ecological communities.

2.63 The Conservator is responsible for the Nature Conservation Strategy[61] and has specific powers relating to:

- declaration of protected and exempt flora and fauna
- making orders necessary for the protection or conservation of native animals or plants

[60] The ACT Government first developed Environmental Flow Guidelines in 1999, and they were revised in 2006.

[61] And for developing Action Plans for protecting threatened species and ecological communities in the ACT.

- enforcing and restricting activities in reserves using powers under the *Planning and Development Act 2007*, by for example—restricting public access to nature reserves, and
- administration of a licensing system for the taking, keeping, selling, importing, exporting, disturbing, displaying and killing of native plants and animals.

Planning for potable water catchments

2.64 The *Planning and Development Act 2007* provides an effective overarching legislative schema which provides a framework to protect the ACT's potable water catchments, making the protection of 'existing and future domestic water supply' the Act's highest objective for the LCC—thereby satisfying the requirement of the Australian Drinking Water Guidelines.

2.65 In May 2006, the then Conservator[62], who had been instrumental in the development of the Strategic Management Plan, wrote to the Chief Executive of the ACT Planning and Land Authority asking the Authority to change the land use for the former ACT Forests' pine plantation land within the LCC and to develop a new category of reserve under the ACT planning legislation which was then under review. The Conservator proposed a variation to the *Territory Plan 2008* making the LCC public land with the primary management objective—protection of the water supply—with its boundaries to be based upon catchment boundaries. This issue was followed up in March 2007 by the next Conservator, ensuring that the *Planning and Development Act 2007*, which took effect from 27 September 2007, and the *Territory Plan 2008* both protect the catchment.

2.66 In March 2008, the LCC land came under the public land category 'pg' in the *Territory Plan 2008* under a new subsection of the *Planning and Development Act 2007*, s 315(g) 'the protection of water supply'. Under s 316 of the *Planning and Development Act 2007*, public land must be managed according to Management Objectives which are contained in Schedule 3 of the Act. Section 317 requires that they be managed in a hierarchy from one down to three, whereby the Management Objective 'to protect existing and future water supply' is the highest objective.

Figure 2-1 Management objectives for public land – Schedule 3

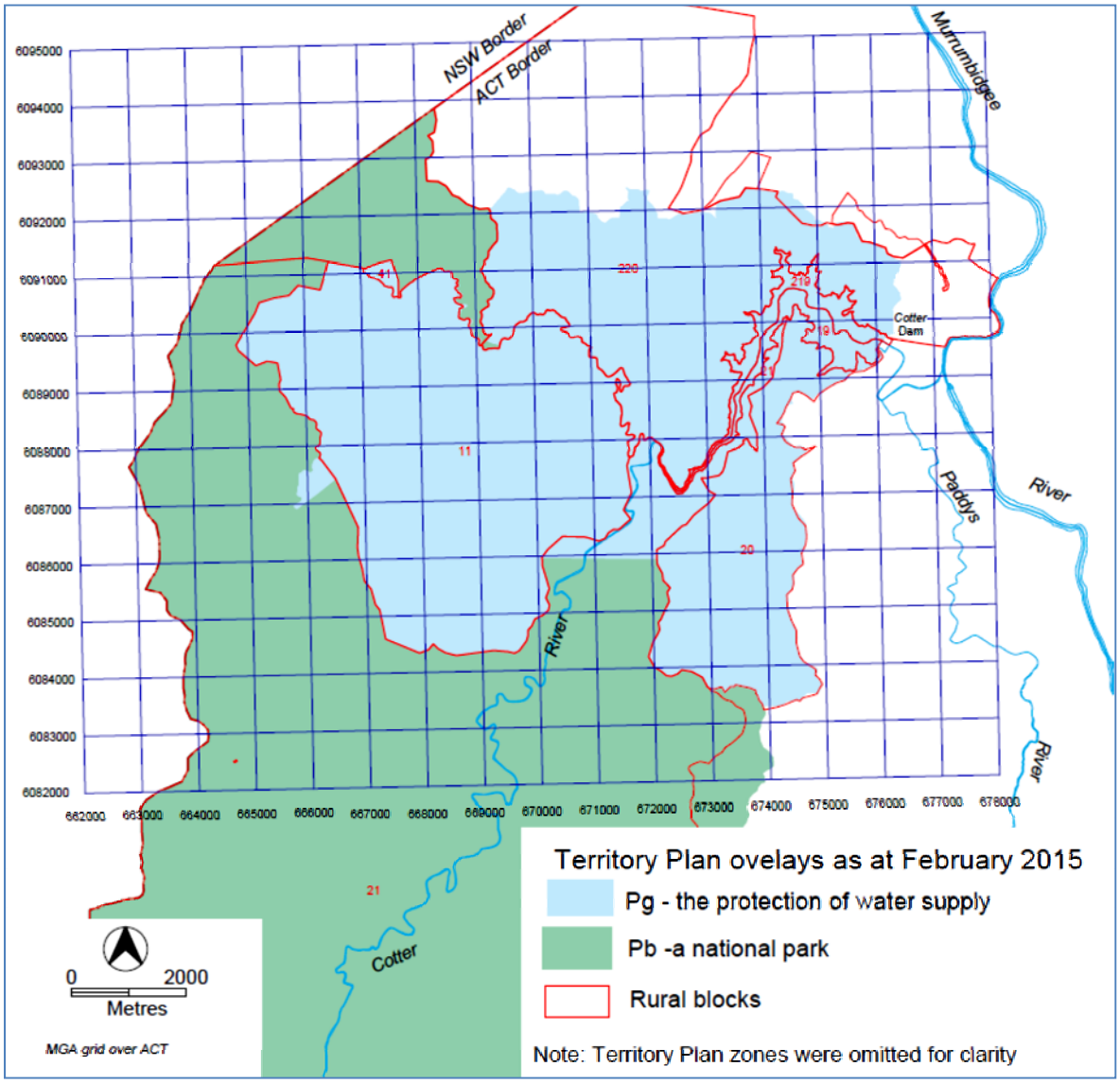
Category	Management objectives
Protection of water supply	1. To protect existing and future domestic water supply. 2. To conserve the natural environment. 3. To provide for public use of the area for education, research and low-impact recreation.

Source: *Planning and Development Act 2007*, Schedule 3, Item 7.

[62] The Auditor-General, Dr Maxine Cooper, was in May 2006 the Executive Director of Arts, Heritage and Environment ACT and the Conservator of Flora and Fauna. This is included here as background information.

2.67 This is further supported by the *Territory Plan 2008* which places the LCC in the 'Non Urban Zone—NUZ5—Mountains and Bushland' which has Zone Objectives. The first zone objective is to protect existing and future water supply, the second is to protect ecological resources, and the third is to maintain this zone as an important visual background to Canberra.

Figure 2-2 Lower Cotter Catchment – Reserved area 'Pg'– water supply



Source: Planning Division – Environment and Planning Directorate

Note: The EPD has overlaid a map grid over the *Territory Plan 2008* to enable comparison of the LCC 'Pg' with available map coordinates.

2.68 The *Territory Plan 2008* also contains the *Water Use and Catchment General Code* (The Catchment Code).[63] The Catchment Code provides a map showing the water use and Water Supply Catchments; and provides objectives and policies for water use and environment values in the Water Supply Catchments. The objectives explicitly protect the water supply, including groundwater. The Catchment Code sets the purposes for which water in the catchments may be used. For example, for the Cotter Reservoir (dam) the water may be used as: a domestic water supply, a view or waterscape, as an aquatic habitat, and to discharge stormwater. Land use must be consistent with 'maintaining water quality' and residential use and camping are excluded.

2.69 There appears to be an inconsistency between the Catchment Code and the *Fisheries Act 2000.* The Catchment Code does not permit fishing in the Cotter River from the Bendora Dam to the Cotter Reservoir.[64] However, a list of prohibited fishing waters in the ACT, in an information pamphlet published on the EPD website cites the *Fisheries Act 2000* and allows trout fishing in parts of the Cotter River, below the Bendora Dam wall. There would be merit in reviewing the *Fisheries Act 2000*, to ensure it aligns with the *Territory Plan 2008* as expressed in the Catchment Code.[65]

2.70 The primacy of the Management Objective—to protect the existing and future water supply—was not understood by all major agencies when interviewed for this audit. When it was explained that the priority in the legislation was protecting the water supply, two agencies expressed satisfaction that it provided a needed clarity for when they were negotiating with other parties to determine management activities related to the catchment.

2.71 The establishment of the LCC as a catchment under s 315(g) had the effect of excising the LCC from the enforcement powers of rangers in the Parks and Conservation Services, as they draw their enforcement powers from their role in supporting the Conservator in the *Nature Conservation Act 1980*. Under *The Nature Conservation Act 1980*, the Conservator has powers to control entry and prohibit activities in relation to public land reserved under s 315 as either: wilderness areas, national parks, nature reserves—but not water supply catchment reserves (which are under s 315 (g)).[66]

2.72 This problem was recognised and addressed in the development of the new *Nature Conservation Act 2014*, which will take effect by 11 June 2015. The *Nature Conservation Act 2014* now includes catchments as a reserve [as defined by the *Territory Plan 2008*]—allowing the Conservator's enforcement powers to apply to the catchments.

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[63] ACTPLA, *Territory Plan 2008*, Part 11, General Codes: *Water Use and Catchment General Code*, effective 17 April 2009.

[64] *Water Use and Catchment General Code*, Part B Water Supply Catchments, Schedules 3, 4.

[65] ACT Government, *Recreational Fishing in the ACT*, undated,< http://www.environment.act.gov.au/__data/assets/pdf_file/0006/576672/RECREATIONAL-FISHING-IN-THE-ACT_withsticker.pdf> accessed 4 March 2015.

[66] These powers apply to special purpose reserves under the *Nature Conservation Act 1980*, s 63(5).

2.73 The Explanatory Statement for the Nature Conservation Bill 2014 states that the primary purpose of catchment reserves is not conservation, and that catchment reserves are to be managed appropriately for their primary purpose – protection of the water catchment. The *Nature Conservation Act 2014* is therefore aligned with the *Planning and Development Act 2007*, reinforcing the primary management objective for the LCC—the protection of the water supply—and enhancing the alignment of ACT legislation with the requirements of the Australian Drinking Water Guidelines.[67]

Planning approval in the Lower Cotter Catchment

2.74 For new works or developments to be undertaken in the LCC there is often a requirement to obtain Development Approval under the *Planning and Development Act 2007*.

2.75 Section seven of the Planning and Development Act, defines development as the following activities:

- building, altering or demolishing a building or structure on the land
- carrying out earthworks or other construction work on or under the land
- carrying out work that would affect the landscape of the land
- using the land, or a building or structure on the land.[68]

2.76 Some developments are exempt from requiring a Development Approval. The determination of whether a development is exempt can be a complicated process that needs to take into account the various requirements under the *Territory Plan 2008*.

2.77 If Development Approval is required, a development application needs to be lodged with the EPD's planning division. Development proposals can be assessed in the Code, Merit or Impact Tracks. As the LCC is in the Non-Urban Zone 5, this then specifies the types of developments that have a lower level of assessment, the Minimum Assessment or Merit Track.

2.78 Icon Water provided an example of a development in 2014 which showed the complexity of obtaining Development Approval. The proposal was to build a crane pad and update a short road near the Bendora Dam in the Cotter Catchment on land that was in the Namadgi National Park. The southern two thirds of the Lower Cotter Catchment lies within Namadgi National Park and is land reserved as a nature reserve under the *Territory Plan 2008*. Any development proposal in a nature reserve requires either an Environmental Significance Opinion provided by the Conservator, or if that is not granted, the more extensive process for an Environmental Impact Statement.

[67] Legislative Assembly ACT, Nature Conservation Bill 2014, Explanatory Statement, pp. 3, 56.

[68] This is a shortened definition.

2.79 As discussed above, the land which the Strategic Management Plan calls the LCC is land reserved as a water catchment—'pg' under the *Territory Plan 2008* (see paragraph 2.66). A development proposal within the LCC on land which is reserved as a water supply catchment does not require an Environmental Significance Opinion from the Conservator. A proposal for development in the water catchment (LCC) only requires an Environmental Impact Statement under the Impact Track, if it 'is likely to have a significant adverse environmental impact on a domestic water supply catchment' or meets the other conditions from Schedule 4 (see Appendix B), as listed below:

- it is likely to have a significant adverse environmental impact on endangered, vulnerable, protected species
- it seeks the clearing of half a hectare or more of native vegetation
- it is likely to have a significant adverse impact on the heritage significance of a place or object registered under the Heritage Act 2004.

2.80 In this respect, the development approval process in a water supply catchment, reserved as a catchment, can be less complicated. The Conservator is not automatically involved, as occurs for developments in the Namadgi National Park, and works that are not going to have a 'significant adverse environmental impact' do not trigger the Impact Track and an Environmental Impact Statement. A minor or major road or a major utility installation for example, are assessed in the Merit Track.

Integrated catchment management in the ACT and region

2.81 The following section examines recent ACT Government efforts aimed at achieving integrated catchment management.

2.82 The *ACT Water Strategy 2014–44* identified that:

> Activities associated with the ACT's catchments [all catchments not just potable water] are managed by a diverse range of government agencies and other stakeholders, but there is no overall strategic catchment management setting, plan or policy for ACT agencies to operate against. Integrated catchment management must be seen as a collective responsibility across governments (ACT and NSW) and communities, rather than solely an ACT Government responsibility.[69]

2.83 The Strategy went on to state that a 'foundational action' was to establish catchment management arrangements 'to better integrate water and land management for improved water quality and catchment health in the ACT and region'.[70]

[69] ACT Government, *ACT Water Strategy 2014-44*, August 2014, p. 27.

[70] ibid., p.28.

2.84 The context for this includes three major drivers:

- since 2005 the ACT has the capability to draw water from the Murrumbidgee River at two abstraction points and to divert it to Googong Dam to use for potable water, making catchment protection in the Murrumbidgee River Corridor a greater priority[71]
- findings in the Commissioner for Sustainability's 2007 and 2011 *State of the Environment* Reports[72], which identified:
  - that an 'overarching coordination strategy is still not in place'
  - poor water quality in many ACT rivers and creeks, and Canberra's lakes, and
  - the poor state of riparian vegetation in the ACT's Murrumbidgee River Corridor[73]
- in February 2014 the ACT and Commonwealth Governments signed a five-year agreement, *The Murray Darling Basin Priority Project*, under which the ACT could receive up to $85 million dollars (subject to meeting requirements) and will itself contribute a further $8.5 million dollars to rectify water quality problems in six priority non-potable water[74] catchments in the ACT. These drain into the Murrumbidgee River and the Murray Darling Basin.

2.85 In October 2014, following policy development by the EPD, the ACT Government approved a set of arrangements for integrated catchment management within the ACT and cross-border to integrate the management of the ACT's catchments and the Murrumbidgee River [and tributaries] with NSW and NSW local councils. The decision includes the establishment of an ACT and Region Catchment Management Coordination Group which will advise the Minster for the Environment.

2.86 Icon Water was consulted in the policy development stages for the new catchment coordination group and expressed its strong support for the formation of a coordination group and 'suggested that a key role for the group would be to better clarify roles and responsibilities'.

2.87 The group's priorities are to include: improving water quality in Canberra's lakes, maintaining water quality in potable water catchments, improving catchment health in the ACT and region, and meeting the ACT's commitments in the Murray Darling Basin Plan.

2.88 The interim ACT and Region Catchment Management Coordination Group first met on 25 February 2015. The decision was announced by the Minister for the Environment in a Media Release on 25 February 2015. This group includes the Chief Executive of the National Capital Authority, Directors-General from ACT Directorates, General Managers

[71] ibid., p. 29. Icon Water can also pump directly from the Cotter to the Mount Stromlo Water Treatment Plant.

[72] The Commissioner for Sustainability and the Environment, *ACT State of the Environment Report 2011*, Vol. 1, p. 75.

[73] ibid., pp. 88, 108-109.

[74] The six catchments are either: semi-rural, urbanised, industrial or greenfields catchments <http://www.environment.act.gov.au/water/act-basin-priority-project> accessed 5 March 2015.

from bordering NSW local councils, a senior representative from: Icon Water, ESA, from the NSW South East Land Services, and from the Upper Murrumbidgee Catchment Coordination Committee—to be chaired by the Director-General EPD. The group is to be supported by: specialist water advisory bodies, and a second-level senior coordination group—this group may contain fourteen to eighteen members. The formation of the group has lead EPD into redefining the roles of the Directors-General Water Group and the Senior Executive Water Group. These groups are discussed in a later section (see paragraph 2.114).

2.89 The commencement in February 2015 of the (interim) ACT and Region Catchment Management Coordination Group represents a significant investment of resources, both financial and managerial, into improving coordination and outcomes across the ACT's and NSW's catchments.

2.90 The LCC and its issues may not attract adequate priority or attention from the ACT and Region Catchment Management Coordination Group (and an associated working group) for several reasons, these are:

- the significant investment in the Basin Priority Project
- that the two coordination groups are large and will involve cross-border issues necessitating complex coordination
- the LCC is perceived by the EPD to be well managed for water quality
- that the latent and significant LCC risks with potential major consequences are not immediately apparent and pressing.

2.91 For this reason an over-arching risk management plan for the protection of the Lower Cotter Catchment is needed. A risk plan would assist with prioritisation of issues and decisions. The EPD advised that, as a priority, the ACT and Region Catchment Management Coordination Group would develop a high-level integrated catchment management strategy which would include a risk plan.

2.92 EPD advised the Audit Office that:

> A whole of Government approach will be considered for the LCC and its issues so that it can attract adequate priority or attention (i.e. budget allocation and implementation effort) in terms of competing ACT Government budget priorities. The roles and activities of the Catchment Management Coordination Group are closely aligned with the needs of the LCC. The issues of catchment management and water supply protection are fundamental issues for consideration by Government and in any new Coordination Group.

2.93 EPD also advised that, the Directors-General Water Group met on 12 May 2015 and agreed to the prioritisation of the LCC as core and ongoing business.

2.94 Catchment management and coordination are discussed further and have led to Recommendation 5, see paragraph 4.6.

Water policy: the Environment Protection Authority's role

2.95 The *Water Resources Act 2007* gives the EPA a central role in the management of water resources in the ACT.[75]This role includes: to coordinate policies in relation to water resource management; confer with similar Commonwealth or State water management bodies; to implement national or intergovernmental agreements relating to water resource management; and to promote an integrated approach to water resource management and water catchment management.

2.96 Despite this legislated schema, the statutory water policy coordination role of the EPA has not been implemented. The EPA has no line responsibility within EPD for: water policy coordination or cross-government agreements for water resource management; or for integrated catchment management. The EPA is a statutory authority and has no line authority for policy to EPD's Catchment Management and Water Policy group, or vice versa. Additionally, the EPA is not a member of the newly established high-level (interim) ACT and Region Catchment Management Coordination Group.

2.97 To illustrate this, EPD in a September 2013 Ministerial Brief, informed the Minister that EPD provided 'coordination of ACT water policy matters, specifically national, regional matters and Murray Darling Basin policy'. In the Brief, EPD undertook to do 'a full analysis of roles and responsibilities within the ACT Government in terms of catchment management functions against legislative requirements'—to identify problems and gaps.

2.98 The subsequent analysis identified that the EPA had the legislated authority for many water matters including policy—but in practice these matters were 'operationally undertaken by Water Policy [EPD]'. Similarly, the *Administrative Arrangements 2015*, which are a Notifiable Instrument and subordinate to the Act, assign water policy to EPD and split the EPA functionally from EPD—assigning the EPA to the Chief Minister, Treasury and Economic Development Directorate.

2.99 To achieve compliance with the *Water Resources Act 2007 t*here is a need to align the functional arrangements in directorates with EPA's central role and EPA's responsibilities in water policy and water management—as set out in the *Water Resources Act 2007,* or amend the legislation to reflect practices.

[75] Legislative Assembly ACT, *Water Resources Act 2007*, s 64.

Review of environmental authorisations

2.100 The EPA's process for the review of existing standard Environmental Authorisations; such as those held by TAMS and Icon Water for the LCC was examined. In March 2011, the *Environment Protection Act 1997* was amended and the review process was to change from an annual review of the Environmental Authorisation, to a risk-based review at a suitable interval of up to five years. The examination of a recent review of TAMS Standard Authorisation for controlled burns showed some lack of clarity in the EPA's process; including two substantive issues. The substantive issues were:

- in reviewing an Environmental Authorisation for a controlled burns, including burns in the catchment in the fire season, the EPA was stipulating environmental air quality standards as a condition and was not stipulating water quality or riparian zone standards, for the burns, some of which were close to riparian zones
- the EPA has developed a risk-based approach to determine the frequency of the reviews, however this was not being applied to two recent TAMS reviews and EPA was still informing TAMS that the process was for an annual review.

2.101 There would be merit in the EPA reviewing and refreshing its processes in relation to the reviews and the authorisation of controlled burns in the catchment.

Coordination of the restoration of the LCC

2.102 The following section examines the coordination of restoration efforts in the LCC. It analyses the high-level coordination for the implementation of the Strategic Management Plan. Then it considers the development of a statutory Plan of Management for the LCC, and lastly examines the policies which are intended to coordinate actions in the LCC.

Analysis of coordination for restoration of the LCC

2.103 This section examines the effectiveness of the arrangements, policies, and plans which were developed to give effect to the Strategic Management Plan and to guide high-level coordination and decision making during the restoration of the LCC.

2.104 In March 2006, an across-agency LCC Steering Committee was formed to coordinate policy advice, to guide action within the LCC, and to develop the Strategic Management Plan; it reported to the Executive Director of Arts, Heritage and Environment, ACT.[76]

[76] The Auditor-General, Dr Maxine Cooper, was Executive Director of Arts, Heritage and Environment ACT and approved the LCC Steering Committee Terms of Reference on 30 March 2006. This is included here as background information.

2.105 On 9 June 2006, Icon Water and the ACT Government entered into a deed of agreement, *The Lower Cotter Catchment Restoration Deed* (the Deed) to direct their joint efforts in the LCC.[77] Icon Water and ACT Government had agreed to fund necessary restoration works aimed at improving the quality and quantity of water in the catchment. Under the Deed, the parties were to develop, share, and arrange approvals for annual works programs. The Deed also established two coordination and management groups:

- the LCC Management Group: which comprised a senior officer from Icon Water, EPA, Environment ACT (now EPD & TAMS) and ESA. This was the high-level coordination and decision making group, and
- the Program Management Group: which comprised officers from the same agencies at the program-management level who managed operational work—design, quotes, tenders—and coordinated the implementation of work programs.

2.106 By 20 June 2006, Parks, Conservation and Land (PCL) had appointed a LCC Coordinator who became a leading member of the Program Management Group. At that time, Icon Water and PCL each employed two full-time staff to coordinate and manage activities in the LCC.[78] The parties to the Deed supported the draft Strategic Management Plan which was then put to the ACT Government for endorsement and was released in January 2007.

2.107 The early meetings of the Management Group were chaired by Darro Stinson, who was engaged by the then ACT directorate of Arts, Heritage and Environment and was accepted as the appointed chair by both Icon Water and Environment ACT—as per the Deed. Subsequent chairs came from the agencies. An EPA statutory officer provided environmental authorisations and approvals under their powers from that act. The Management Group directed and endorsed four plans which directed the restoration efforts—the plans were:

- *Roading and Sediment Control Implementation Plan 2007–11*
- *Vegetation Management Implementation Plan 2007–11*
- *Fire Management Implementation Management plan 2007–11, and*
- *Monitoring and Research Implementation Plan 2007–11.*

2.108 The arrangements in the 2006 Deed of Agreement for the LCC including the establishment of the Management and Program Management Groups were effective in bringing together the relevant agencies at both the decision maker and operational levels; they ensured improved coordination and facilitated considerable investment by Icon Water in the restoration of the LCC.

[77] The Auditor-General, Dr Maxine Cooper, on 9 June 2006 was Executive Director of Arts, Heritage and Environment ACT and was a signatory to the LCC Restoration Deed. This is included here as background information.

[78] ACTEW, *Analysis of ACTEW's Efforts in Progressing the Restoration of the Lower Cotter Catchment*, April 2008, Darro Stinson, p. 14.

2.109 As discussed earlier, significant erosion control works were constructed, roads were closed or rehabilitated, large scale plantings and pine removal were completed. Some of the works which had been 'controversial in the past', such as removal of standing dead pine, windrow burning, and the use of heavy machinery for site preparation for replanting were able to be completed (see paragraph 1.21). In July 2009, locked gates were installed which have prevented public access to large areas of the LCC, reducing usage and wear on the roads and therefore reducing erosion and sediment from roads.

2.110 In June 2009, Icon Water considered that it had completed the required major works and commenced negotiations to cease the Deed and to hand over the completed erosion control works to TAMS, with ongoing maintenance by TAMS. These works included: approximately 200 kilometres of upgraded roads, 120 kilometre of closed roads, and 100 erosion control structures. In October 2009, Gary Byles, the Chief Executive of TAMS, agreed to Icon Water's request and terminated the Deed. Icon Water, TAMS and the LCC Management Group agreed that the Icon Water Source Water Protection Program's Consultative Committee was to become the forum for continued liaison and communication between Icon Water and TAMS for catchment management issues.

2.111 The termination of the Deed in 2009 saw the withdrawal of the EPA from a strong coordinating and approval role which it had taken in the restoration as an active member of the LCC Management Group.

2.112 The Minutes for the Source Water Protection Program Consultative Committee were examined. This committee continued to meet and provided a communication forum between Icon Water, PCS, TAMS and other local and regional stakeholders. Despite the intention in late 2009 that the Source Water Protection Program Consultative Committee would take over the role of the LCC Management Group, it did not include high-level decision makers from agencies and was therefore unable to replicate the LCC Management Group's coordination and decision-making role. The SWPP Consultative Committee ceased in June 2013.

2.113 From mid 2009, TAMS turned its attention to managing the potential effects of the construction phase of the Enlarged Cotter Dam on the LCC. TAMS advised that its LCC Coordinator was extensively involved in coordinating with Icon Water and the Bulk Water Alliance on Enlarged Cotter Dam planning and development with regard to the Cotter catchment and environs. TAMS cited notable achievements such as: the redevelopment of the recreation facilities at Casuarina Sands and Cotter Avenue, and the building of a large Enlarged Cotter Dam viewing platform in the Cotter Avenue. These provide recreational facilities for the ACT and its visitors and redirect recreational impacts away from more sensitive areas of the catchment. The PCS LCC Coordinator role ceased in February 2010 and the two other staff positions were redirected to other duties in Murrumbidgee River Corridor, while retaining some work responsibilities within the LCC. The Coordination of the LCC then rested with the PCS Area Manager who was also responsible for the

extensive Murrumbidgee River Corridor Nature Park.[79] By February 2013, a re-established PCS LCC Coordinator position was also responsible for Tidbinbilla, Namadgi National Park and the Murrumbidgee River Corridor.

2.114 There are two other ACT Government water resource coordinating committees, these are the: Directors-General Water Group; and the Senior-Executive Water Group. The Directors-General Water Group was originally called the Chief Executives' Water Group—the title is changed in the August 2012 minutes. The minutes for these groups, from July 2008 until June 2014, were examined to see if they fulfilled a coordinating role for the management of the LCC. Both groups are involved with a wide range of ACT and regional water management issues, but they did not take over a direct management and coordination role for the potable water catchments, including the LCC. The function of these two groups are now being reviewed in line with the development of new ACT integrated catchment management coordination structures which are discussed in a previous section (see paragraph 2.88).

2.115 The discussion in this analysis of coordination for the restoration has focussed on issues identified in maintaining consistent and effective higher-level coordination across the several agencies involved in the LCC. During the course of the audit, examples were encountered which demonstrated effective coordination and outcomes during the restoration from 2008 to date. Some examples were:

- the interaction between TAMS Fire Management Unit and the Rural Fire Service/ESA and EPD's Conservation Planning and Research section to develop and review the five-yearly Regional Fire Management Plans, and the associated development and implementation of annual BOPs
- Icon Water's Source Water Protection Program which has engaged with TAMS and other catchment land managers to proactively protect the catchment where Icon Water has no powers to do so directly. The Source Water Protection Program identified the TAMS BOPs as an important activity to manage fire hazard reduction and became engaged with TAMS Fire Management Unit in commenting and advising on water protection issues prior to controlled burning
- the success of TAMS and Icon Water in removing wrecked cars from the catchment at Vanitys Crossing and installing gates and barriers there to protect the water supply
- the National Parks Association of the ACT when consulted during the audit commented favourably on the relationship with and support provided by TAMS CPS rangers and managers, and

[79] In late April 2015, TAMS advised the Audit Office that three positions with roles in relation to the LCC are based in the Murrumbidgee River Corridor Nature Park. They are: a Senior Ranger with a substantial oversight responsibility for the LCC, and two staff who together comprise 110% of a position for the LCC; plus approximately eight depot staff who from time to time are engaged in operational matters in the LCC.

- agencies commented favourably on the Conservator's understanding of issues in managing the catchment and willingness to progress Environmental Significance Opinions in a timely and effective way.

2.116 Coordination of activities in the LCC at a high-level has been reduced since the Deed of Agreement ceased in October 2009. The high-level coordination and decision making Management Group and its supporting Program Management Group, which had been responsible for progressing the implementation of the Strategic Management Plan, were replaced by a lower-level consultative group which did not include senior staff with decision-making authority. Other ACT-wide, high-level water coordination groups did not take on the role of coordinating the implementation of the Strategic Management Plan. Activities to manage the LCC have continued in both TAMS and Icon Water. The Source Water Protection Program Consultative Committee has performed a communication role at a lower level, however, there has been no integrated catchment management structure in place for the LCC from October 2009 to the present time.

2.117 To illustrate this, TAMS was not able to provide evidence of high-level formal reporting against the management actions in the Strategic Management Plan. This indicates that there has been no formal high-level review of progress against the strategies and the management actions in the Strategic Management Plan. In general, PCS coordination has been in response to operational needs and from relevant managers in PCS—commencing with the Murrumbidgee River Corridor Area Manager—informally reporting up through the PCS management structure. Management has been driven in response to operational needs, and has lacked the high-level support and awareness that is needed to address strategic risks and to enable coordination at higher levels with the various involved ACT Government agencies.

2.118 There is a risk that the management of the Cotter Catchment and the LCC will not receive the coordinated inter-agency attention that is appropriate, given the potential risks to the catchment, and adequate to protect the potable water catchment commensurate with the ACT's considerable investment in the Cotter Dam.

2.119 The strategic risks are examined further in the following Chapter 3 and Chapter 4.

Implementation of a plan of management

2.120 The *Planning and Development Act 2007* Act makes the TAMS and the PCS the 'custodian' for public land and reserves in the ACT created under s 315: including national parks, wilderness areas and catchments.[80] More than sixty-five percent of the ACT is part of the reserve network, managed by TAMS including: wilderness areas—twelve percent, National

[80] Section 333 of the Planning Act establishes the custodian, and s 334 requires the planning authority to develop a custodianship map which assigns the administrative responsibility for the land to the custodian. The EPD Land Custodianship map< http://www.actmapi.act.gov.au/lc.html> accessed 3 March 2015, shows TAMS as the custodian for the land in the LCC.

Parks—thirty-five percent, nature reserves—eight percent, catchment areas—three percent and special purpose reserves—three percent.[81]

2.121 When the land was reserved as a catchment in March 2008 under the *Planning and Development Act 2007,* TAMS was required to develop an LCC Plan of Management.[82] Plans of Management are an important coordinating policy document as they align management activities with high-level land and water use policy and can assist to align the actions of stakeholders. The Conservation Council ACT Region advised that it valued Plans of Management as they provide a statutory basis for management planning and decisions, and their development involves public consultation.

2.122 The Plan of Management must describe the land and state 'how the management objectives for the area are to be implemented or promoted in the area'.[83] The Catchment Code also requires the Plan of Management to ensure that the water supply catchment policies are given effect.

2.123 The *Planning and Development Act 2007* required TAMS to produce a Plan of Management 'as soon as practical'. TAMS commenced the process to develop an LCC Plan of Management in February 2013, and envisaged that it could take three to four years before the plan is completed.

2.124 The August 2014, *ACT Water Strategy 2014-44; Implementation Plan 1 (2014-18)* indicated, as part of a catchment management strategy, that the LCC Plan of Management would commence—but that it was currently unfunded and funding options would be need to be addressed.[84]

2.125 TAMS, in progressing the Plan of Management has: developed a project plan and formed a multi-agency steering committee. In December 2014, TAMS developed a MOU with EPD for the plan, engaged a consultant, and developed draft chapters for the Plan. The MOU coordinates the development of the plan. Under the MOU, TAMS provided $25 000 to EPD to cover some of the consultancy costs. A long consultation process, including public consultation, is expected.

2.126 It was not clear which directorate, either EPD or TAMS, has responsibility to fund the production of the plan as both have contributed to the development of the plan. EPD has assigned two senior officers to the development of several Plans of Management including the LCC plan.

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[81] Legislative Assembly ACT, Nature Conservation Bill 2014, Explanatory Statement, p. 56.

[82] The requirement for Plans of Management for reserves will transfer to the *Nature Conservation Act 2014* when it takes effect, essentially the same, they will be called Reserve Management Plans.

[83] *Planning and Development Act 2007*, Part 10.3, Management of public land, and Part 10.4, Plans of management for public land.

[84] ACT Government, *ACT Water Strategy 2014-44; Implementation Plan 1 (2014-18)*, August 2014, pp. 4, 5.

2.127 The Plan of Management's draft chapters cover the management of: fire, water, risk, and access. Access management is an important aspect of catchment management. For example, the Australian Drinking Water Guidelines promote the development of community awareness of catchment values as an important function of the catchment manager. The delay in finalising the Plan hampers the roll out of a program of community awareness about reasonable access controls for the LCC.

2.128 Now, seven years after the LCC became public land, there is still no statutory LCC Plan of Management and TAMS is significantly overdue for the completion of this important coordinating policy document. TAMS explained that: it has commenced the process to produce the plan, it has the Strategic Management Plan for guidance, it has developed a Draft 2010 LCC Recreation Strategy which is available on the TAMS website and involved community consultation, and stated that the developments of: Uriarra Village on the border of the LCC; and of the Enlarged Cotter Dam from 2009 to 2012 meant that any plan would have needed to be revised to address the effects of their completion on the LCC.

2.129 The development of a LCC Plan of Management and its completion should become a high priority. It is important to consider that the significant policy decisions regarding land and water use have already been completed in the planning legislation. Therefore, the community consultation process should be aimed at defining 'low-impact recreation', informing the community, and developing awareness of the values of the catchment. Access for low-impact recreation is only suitable and permitted where it is not detrimental to protecting the water supply. Given this approach, the consultation process could be conducted within this context thereby expediting the implementation of the plan.

Analysis of policies which coordinate actions

2.130 This section examines the policies and agreements which were developed and are used to guide and coordinate action in the LCC. The Australian Drinking Water Guidelines require a catchment management plan which incorporates a clear statement of responsibilities of different agencies and the agreed coordination processes. The policies and codes examined in this section have the potential to elaborate the coordination processes, but they require further work, or implementation.

A catchment risk management plan

2.131 The Strategic Management Plan set four management strategies; Chapter 3 of the report examines in detail the implementation of the management actions associated with these strategies. The third strategy was a risk-management approach to protection of the water quality and the catchment, in particular the management of the risk of fire and erosion from severe storm events.[85] As discussed previously, there is no overarching, agreed risk management plan for the LCC (see paragraphs 2.90 & 2.117). As a result, an important coordinating document and approach is missing. It is important and high priority action for

[85] *Lower Cotter Catchment Strategic Management Plan*, ACT Government, January 2007, pp. xi, 40.

the major agencies in the management of the LCC: TAMS, Icon Water, ESA, and the EPA, EPD to adopt an agreed risk management plan. The LCC's strategic risks are examined in Chapter Three (see Strategic risks).

Memorandums of understanding

2.132 Icon Water and TAMS/PCS developed two Memorandums of Understanding (MOUs) to coordinate their activities in the LCC. They are:

- *LCC Sediment Control Maintenance MOU* under the *Biodiversity Offsets Implementation Plan 2009–14*, and the
- *MOU on the ownership of built assets on Controlled Lands of Cotter Dams and surrounds, 10 January 2014*.[86]

2.133 The Sediment Control Maintenance MOU was developed after the Deed was ceased and when Icon Water had handed over ownership and responsibility for the maintenance of the erosion control structures and the roads it had funded and built under the Deed. The MOU provided $500 000 from Icon Water to TAMS over five years, for the maintenance of these roads and structures. In January 2015 the MOU expired. Icon Water and TAMS were meeting to consider what, if any, arrangement would be established in its place. Icon Water has since advised that it will not develop a new MOU to fund further maintenance activities. As at 31 December 2014, TAMS had underspent $97 935. TAMS spent forty-seven percent ($190 308) of the MOU's maintenance budget in the final year of the five-year agreement. TAMS explained that underspend occurred as a result of major storm damage in early 2012 across a large part of the PCS-managed lands and roads. The storm damage resulted in extensive insurance-funded remediation works, the need to attend to these exceeded the capacity of the PCS roads section to manage and deliver against the MOU. The redirection of PCS staff away from the LCC may have also impacted upon the ability to deliver against the MOU. For instance, in an email dated February 2012, PCS sought details from Icon Water of the number and location of the erosion control structures installed by Icon Water in the LCC between 2005 and 2008.

2.134 In February 2014, Icon Water reported to TAMS that Icon Water's inspection in 2013 of the Cotter Catchment had found sediment control structures and road crossings in need of maintenance. Icon Water reported that: fifteen sediment basins required assessment; six gabion baskets full of sediment needed cleaning out and twelve road crossings were unstable and needed repair. This is an example of cooperation, however, it was TAMS responsibility under the MOU to regularly inspect and rectify sediment control structures, in particular in 2013. In late 2014, TAMS spent $61 000 on gabion repair, cleaning out one sediment basin, and repairing roads in the LCC. Some of this work was in the Pierces Creek area. From the evidence provided by TAMS, is not clear that all the sediment basins, road crossings, and gabion baskets reported by Icon Water in February 2014, and those identified by Professor Falconer in late 2014 have been rectified. It is clear that the

[86] Version 1.3.

assessment and maintenance of sediment control structures has not been conducted regularly throughout the life of the MOU and that maintenance has been delayed.

2.135 The MOU on the ownership of built assets arose from difficulties experienced by Icon Water and TAMS in determining which agency should pay for road repair in the larger Cotter Catchment; and for resolution of difficulties related to 'road access through the LCC to ACTEW owned assets' and 'installation of gates surrounding the Enlarged Cotter Dam'. For Icon Water there was a risk that delays in resolving the issue of who paid could have delayed 'access to vital infrastructure for maintenance or emergency response'.[87] The MOU defines asset ownership, maintenance responsibility and entry requirements in areas of the Controlled Land in the LCC under the *Nature Conservation Act 1980* (see paragraph 2.140).This MOU is an example of an effective solution which clarifies and resolves complex arrangements for maintenance and access control where the land is managed by one party, TAMS, and the assets and infrastructure are owned and operated by either Icon Water or TAMS.

The ACT Code of Forest Practice 2005

2.136 When the LCC was largely an ACT Forests managed pine plantation, the then ACT Government Environment ACT and the EPA developed and authorised a Code of Forest Practice to protect environmental values during forestry operations.[88] These values were: water quality and flow, soils, flora, fauna, and cultural heritage.[89] The Code incorporated guidance for operating within the Environmental Authorisations provided by the EPA. The Code provided guidance on management of important activities such as: activities within riparian zones which it defined and classified; the maintenance and development of roads and the management of road-related erosion; and fire management and controlled burns.

2.137 The ACT Code of Forest Practice 2005 principally applied to managed pine forests in the ACT. Reflecting the change of land use in the LCC, the Strategic Management Plan stated 'updating the Code is essential if it is to be relevant and useful to the new role of the catchment, that is domestic water supply'.[90]The Code stated that it was to be reviewed in 2008, and subsequently every five years. The Code does need review, for example, it defines riparian zones based upon a reference to the previous ACT water strategy—*Think Water Act Water 2004*—which has been superseded.

[87] ACTEW Water, *Memorandum: Endorsement for the development of a Memorandum of Understanding between ACTEW and the ACT Government*, 30 November 2012.

[88]The Auditor-General, Dr Maxine Cooper, was in August 2005 the Executive Director of Arts, Heritage and Environment ACT and was a signatory to the ACT Code of Forest Practice 2005, Version1. This is included here as background information.

[89] Environment ACT, *ACT Code of Forest Practice*, Version 1, August 2005, pp. 7, 8.

[90] *Lower Cotter Catchment Strategic Management Plan*, ACT Government, January 2007, p. 6.

2.138 A significant issue is that the EPA cites the ACT Code of Forest Practice 2005 as a current standard and one of the conditions for the granting of an Environmental Authorisation for a Class A activity[91], such as controlled burning.

2.139 The *ACT Code of Forest Practice 2005* has not been updated as was required by the Strategic Management Plan in 2007. This task was not assigned as a specific Management action in the Strategic Management Plan. Its development was a joint responsibility of TAMS, EPD and the EPA. It is important because the EPA uses it as a control or standard for works done under an Environmental Authorisation. The parties need to review the policy as a priority, taking the most appropriate sections and developing a new potable water catchment management code to guide land management in the LCC.

RECOMMENDATION 1 DEVELOPING A CODE OF CATCHMENT MANAGEMENT

A Code of Potable Water Catchment Management, to direct land management activities in the LCC, should be developed, in consultation with: Territory and Municipal Services, Icon Water, the Environment and Planning Directorate and the Environment Protection Authority, by December 2016.

A lead agency has not been nominated as it may be affected by a decision in relation to Recommendation 5.

(The Code of Potable Water Catchment Management could be based on a review of the *ACT Code of Forest Practice 2005* and be used as a standard and a condition contained in environmental authorisations for the LCC. It should be consistent with the *Australian Drinking Water Guidelines* and consistent with provisions of the TAMS and ACTEWAGL, *Code of Practice: Practical guidelines and standards for co-operation for maintenance works*.)

Management Agreement for Controlled Land in the Lower Cotter Catchment

2.140 This section examines the powers of the Conservator to control the activities of energy and water utilities on public controlled land, through the mechanism of a management agreement. Controlled land is defined in the *Nature Conservation Act 1980*, s 98 as: 'public land, or Territory land that is not subject to a Territory lease'.

2.141 There are two documents that arise from a management agreement relating to the LCC which can coordinate and regulate maintenance activities by Icon Water in the LCC. These are:

- the *Site Management Agreement for Controlled Land* which commenced in November 2010, and

[91] Legislative Assembly ACT, *Environment Protection Act 1997,* Schedule 1, Class A Activities.

- the *Code of Practice: Practical guidelines and standards for co-operation for maintenance works* (Code of Practice for maintenance works).

2.142 The Conservator can seek to enter into a management agreement with an agency (utility) which supplies services such as gas, electricity or water, where the utility's facilities are located on, or the utility requires access to, public land for the construction, repair or maintenance of those facilities. The Site Management Agreement was made under s 100 (Part 10—Management Agreements) of the *Nature Conservation Act 1980* between the Conservator and Icon Water.

2.143 The Site Management Agreement covers ACTEW-AGL's and Icon Water's activities across all controlled land in the ACT.

2.144 The Code of Practice for maintenance works between TAMS and Icon Water guides maintenance activities on Controlled Land, and was made under the management agreement. The Code of Practice for maintenance works contains a map of the controlled (public) land in the ACT—much of which is within the Namadgi National Park—and includes the land reserved as the Cotter catchment (and the LCC) and the Canberra Nature Park. The Code is examined further in the next section.

2.145 The *Nature Conservation Act 1980*, s 99(1) (2), provides that the Conservator of Flora and Fauna may propose a management agreement to an agency (utility) if:

- the activities of the agency affect, or may affect, controlled land, and
- in the opinion of the Conservator, those activities may conflict with the land management objectives for the land.

2.146 A management agreement must set out the standards and conditions for avoiding or minimising any conflict with the land management objectives for controlled land which might arise as a result of the Agency's activities.

2.147 The land management objectives for controlled land are defined in the *Nature Conservation Act 1980* as:

> the management objectives applying to the land under s 317 [*Planning and Development Act 2007*], and any objectives, policies or purposes specified in the Territory Plan for that land, and the objective of conservation of the qualities of the natural environment on, and in the vicinity of, the land.

2.148 The management objectives for the LCC are: firstly, 'to protect existing and future domestic water supply', and secondly, 'to conserve the natural environment', and thirdly, 'to provide for public use of the area for education, research and low-impact recreation'—the dominant objective is to manage the LCC catchment to protect the water supply. There is no Plan of Management to guide the achievement of that objective. The Conservator has not determined any objectives, in the form of a disallowable instrument [s 317 (2), (3)], which are considered secondary objectives.

2.149 Under s 99 of the *Nature Conservation Act 1980*, before proposing a Management Agreement, the Conservator is required to form an opinion that the utility's (Icon Water's) activities may conflict with the land management objectives for the LCC. The basis of the Conservator's opinion, that Icon Water's activities in the LCC may conflict with the land management objective of protecting the water supply, was considered. The Conservator advised that there was no written opinion. Similarly, the Management Agreement does not refer to, or record the Conservator's opinion which is a precondition for that management agreement.

2.150 There have been many instances where Icon Water has sought to positively influence activities in the LCC and provided funds and assistance to ensure the protection of the catchment. Icon Water's Source Water Protection Program is aimed at protecting the catchment by positively influencing the actions of other parties within the catchment, in order to protect the water supply and satisfy the Australian Drinking Water Guidelines. Icon Water's policies and actions with regard to the LCC have been aimed at protection of the water supply.

2.151 The new *Nature Conservation Act 2014* which takes effect by 11 June 2015 has similar provisions for establishing Management Agreements. The elements of the management objectives for public land remain the same as those in the *Nature Conservation Act 1980*.[92] The new Act maintains the hierarchy of Management Objectives in s 371 of the *Planning and Development Act 2007* retaining the primary objective of protection of the water supply.

2.152 The Explanatory Memorandum for the Nature Conservation Bill 2014 provides further clarity and should be considered in conjunction with management objectives for the catchments—it emphasises the primacy of the objective of protection of the water supply in catchments, over nature conservation. The creation of reserves occurs through the *Planning and Development Act 2007*. The intention is to bring reserves whose primary purpose is not 'nature conservation'—such as special purpose reserves and water catchments[93]—into the Act is to provide for consistent management of these areas to protect the values for which they were reserved, which may be for water catchment or aesthetics.

2.153 Reviewing the basis for the Management Agreement—as it relates to the LCC—is important because clarification of powers and roles in the LCC and streamlining of requirements or approvals will simplify processes and can facilitate effective, timely actions to maintain and protect the water supply.

[92] In section 309, the objective of conserving the qualities of the natural environment is listed first, and then the other elements including: Schedule 3 Management Objectives, the policy for Non Urban Zone 5, and the Catchment Code are listed.

[93] Legislative Assembly ACT, Nature Conservation Bill 2014, Explanatory Statement, p. 3.

2.154 At the time of the audit, the Conservator and Icon Water were renegotiating the Site Management Agreement, but negotiations had reached an impasse over the extent of regulation to be included in the revised agreement. Given that the framework for catchment protection is provided by the *Planning and Development Act 2007*, it would be reasonable for this framework to be considered in the development of any new agreement negotiated, and for the Conservator to consider if the scope of such an agreement should exclude the land in LCC which is a reserve for the protection of the water supply.

2.155 If the Conservator remains of the opinion that the land in the LCC reserved as a catchment should be covered in the Management Agreement, it is important for the Conservator to state their reasons in the agreement. Regardless of any exclusion from the Management Agreement, the Conservator's general powers to protect fauna and flora would still apply in the LCC and would, of course, apply to those parts of the LCC which are listed in the *Territory Plan 2008* under s 315 (pb), and are within Namadgi National Park. If the Management Agreement is not continued, it would then be important to preserve the Code of Practice to guide maintenance activities. This could be retained under a MOU.

RECOMMENDATION 2 REVIEW OF MANAGEMENT AGREEMENT

The purpose and intention of the Management Agreement between the Conservator of Flora and Fauna and Icon Water (ActewAGL Distribution)—as it relates to the Lower Cotter Catchment—should be reviewed by the Conservator to determine if the agreement should specifically exclude the Lower Cotter Catchment.

(There may be no substantial basis for the inclusion of the Lower Cotter Catchment, as its inclusion in the agreement is only needed if Icon Water's actions might conflict with the management objectives for the catchment, in particular, protecting the water supply. If the Conservator considers that an agreement is necessary, the reasoning for including the Lower Cotter Catchment should be documented in the agreement being developed.)

Code of Practice for maintenance works

2.156 Under the Site Management Agreement, TAMS and ActewAGL developed the *Code of Practice: Practical guidelines and standards for co-operation for maintenance works*—to set standards and agreed processes for maintenance and inspection work on Controlled Land. The Code of Practice for maintenance works covers Icon Water's activities in the ACT including in the LCC and was published in September 2009. The Code does not cover new construction works for which a Development Application is required.

2.157 The Code of Practice for maintenance works requires that both Icon Water and PCS prepare an annual operations plan and submit it to the other party prior to each new financial year. Icon Water advised that this annual exchange does not occur. The Code of Practice for maintenance works also sets up arrangements for an exchange of 'works plans' which are to be submitted to the other party for approval at least fourteen days prior to

the start of works. Under the Code of Practice for maintenance works, the works plans (including a risk assessment) are required for the following maintenance works: weed spraying, construction work, road works, vegetation clearing, all works requiring an Environmental Authorisation (including controlled burns in the fire season) or a Waterways Works Licence from the EPA, or that may impact upon declared threatened species. Icon Water advised that the exchange of works plans does not consistently occur for works in the LCC. Icon Water stated that TAMS does send one-day's notice before hazard reduction burning and TAMS sends notifications of applications yet to be approved to hold events on public land. However, it does not receive pesticide spraying notices unless it enquires or generated the work request, this is important as pesticide residue is a source water risk.

2.158 In March 2015, Icon Water advised that:

- An example of the singular focus of the burden for compliance with the Code of Practice for maintenance works being on Icon Water and not shared is the recent 2014 TAMS contract for works in the broader Cotter Catchment. A determination of an Environmental Significance Opinion[94] was provided on 18 April 2014 for TAMS to undertake batter stabilisation of roads at sixteen sites and repair erosion across Namadgi National Park and the Cotter. A search of ACT Planning and Land Authority's website did not show an accompanying Development Application; so as a result, the activity was not formally referred to Icon Water.
- The Environmental Significance Opinion determination required, as a condition, that the works be conducted in accordance with the Code of Practice for maintenance works between ACT Government and ActewAGL. Icon Water has no record of receiving a works schedule for this activity or any consultation on the activity (as would be expected in accordance with the requirements of the Code of Practice for maintenance works).

2.159 The Deed of Agreement ceased in October 2009 however, Clause 9.2 of the Deed survives termination of the Deed. This clause states that the ACT Government agreed to liaise with Icon Water and 'take account of ACTEW's views, as soon as practicable after becoming aware of the need for ... future works' which may affect the quality or quantity of water in the LCC water supply.[95] In June 2009, the PCS LCC Coordinator, in an email to members of the Management Group, confirmed the requirement for PCS to liaise with Icon Water and obtain Icon Water's agreement for works plans.

[94] The Conservator of Flora and Fauna prepares an Environmental Significance Opinion when required to under the *Planning and Development Act 2007,* s 138AD. An Environmental Significance Opinion—that a proposed development is unlikely to have a significant adverse environmental impact, allows the proposal to be assessed in the merit track under the Planning Act.

[95] ACTEW Corporation & Environment ACT, *Lower Cotter Catchment Restoration Deed,* June 2006, Clause 9.2.

2.160 TAMS does prepare works plans, some examples of which were examined. They include a risk assessment specific to each planned activity and are internally approved by TAMS. In an example of a works plan pro forma examined, there was no acknowledgement of the requirement to inform and seek approval from Icon Water.

2.161 The practice of developing and sharing annual operations plans and works plans, including obtaining approval from the other party, are set out in the Code of Practice for maintenance works which provides clear and relevant information. This has the potential to be an important coordinating document and process and is required by the Deed of Agreement. The processes set out in the Code of Practice for maintenance works are not being followed in the management of the LCC. There would be benefit in TAMS and Icon Water reviewing the information in the Code of Practice for maintenance works and in ensuring that the coordination and approval processes it contains are put into practice.

RECOMMENDATION 3	IMPLEMENT THE TAMS AND ICON WATER CODE OF PRACTICE

The ACT Code of Practice which guides maintenance works on Controlled Land should be implemented by the Territory and Municipal Services Directorate and Icon Water, giving particular attention to the information-sharing and approval processes for annual operations plans and works plans.

(If the Conservator of Flora and Fauna specifically excludes the Lower Cotter Catchment from the Management Agreement (Recommendation 2) then Icon Water and Territory and Municipal Services Directorate should develop a Memorandum of Understanding to integrate their activities using the ACT Code of Practice.)

TAMS Code of Sustainable Land Management

2.162 The Code of Practice for maintenance works states that PCS works plans will be 'consistent with the *PCL Code of Sustainable Land Management 2009*'.[96] A copy of the PCL Code was sought from TAMS. TAMS advised that the PCL Code of Sustainable Land Management was in draft form only and had not been progressed.

2.163 This Code has a recent history. In May 2012, CSIRO published a report and stated that TAMS had informed CSIRO that the Draft Code of Sustainable Land Management was a key document which provided guidelines on how to conduct plantation [forestry] operations.[97]

[96] TAMS & ActewAGL, *Code of Practice: Practical guidelines and standards for co-operation for maintenance works*, September 2009, p. 14.

[97] CSIRO, *Assessment of Code of Practice for Plantation Forestry: Australian Capital Territory,* Department of Agriculture, Fisheries and Forestry, May 2012, pp. 6, 7.

2.164 The Commissioner for Sustainability and the Environment, in their October 2011 report of an investigation into Canberra Nature Park, recommended that TAMS finalise and implement the draft Code of Sustainable Land Management. The Commissioner reported that the Code of Sustainable Land Management was going to contain guiding principles to underpin all land management activities in reserves including: 'access tracks, road works and vegetation management such as mowing and slashing' it would 'also address ways to mitigate the impact of soil disturbance using best management practices'.[98]

2.165 The Minister for the Environment in June 2012 presented the Government Response to the Commissioner's report, in which the Government 'Agreed in Principle' to this recommendation stating that 'implementation arrangements and likely resourcing needs will require further consideration and examination'.[99]

2.166 The ACT Government, in 2012, determined that the PCS Code of Sustainable Land Management was to be considered for funding and implementation. The document has not been finalised and remains in a draft form. The stated purpose of the Code of Sustainable Land Management was to inform and direct all of PCS land management activities. TAMS recently expressed ambivalence about the need for the Code. It is important for TAMS to review the purpose and utility of the Code and if it is a necessary policy, to support its development and completion.

RECOMMENDATION 4	REVIEW AND FINALISE THE PARKS AND CONSERVATION SERVICE CODE OF SUSTAINABLE LAND MANAGEMENT
The status of the draft Parks and Conservation Service, Code of Sustainable Land Management should be reviewed and either finalised or rescinded by the Territory and Municipal Services Directorate. If finalised, this should occur by October 2016.	

[98] The Commissioner for Sustainability and the Environment, *Investigation into the Canberra Nature Park (nature reserves); the Molonglo River Corridor (nature reserves) and Googong Foreshores*, October 2011, p. 84.

[99] Legislative Assembly ACT, *Government Response to the Report on the Canberra Nature Park (nature reserves); the Molonglo River Corridor (nature reserves) and Googong Foreshores Investigation*, June 2012, Recommendation 4.4, p. 14.

3 EVALUATION OF THE IMPLEMENTATION OF THE STRATEGIC MANAGEMENT PLAN

Key findings

	Paragraph
The most important outcome in the LCC is that the water quality has steadily improved and turbidity has declined—indicating that the natural regeneration of the vegetation cover over time and the efforts and resources expended to reduce and control sediments have been successful. Dr Falconer reported that 'while rainfall in 2007 was roughly comparable to that in 2014, the peak turbidities in the Cotter Reservoir in 2007 ranged from 30 NTU to a spike of 70 NTU, with many about 20 NTU, whereas in 2014 the peaks were about 15 to 25 NTU with many of 5 NTU or less'.[100]	3.4
However, there are still turbidity problems following heavy rainfall events. Dr Falconer reported that: 'the main picture shown by the Cotter reservoir turbidity data is that the water quality of the overall catchment has steadily improved between 2006 and 2014. During the dry or average rainfall periods, the turbidity has substantially decreased. With heavy rainfall in the order of 100mm in a single day, there was both a significant discharge volume and significant (extreme) turbidity in the Condor Creek. This may well have heightened the overall increase in Cotter reservoir turbidity with peaks of 50 NTU or over during these events'.[101]	3.5
The vegetation recovery has been much better than was expected; the ability of native vegetation to regenerate in areas that were devastated by fire has exceeded expectations and has demonstrated the resilience of native species.	3.10
The 2006 to 2014 community revegetation program by Greening Australia and supported by PCS, has revegetated sections of Uriarra Forest and Pierces Creek, and importantly has involved the community in restoring and caring for the catchment. This project supports the Australian Drinking Water Guidelines' goal for a water catchment of developing 'a community awareness program'.	3.12
Not all of the landscapes, ecosystems, sedimentation works and water quality	3.14

[100] NTUs are Nephelometric Turbidity Units and measure the amount of suspended material in a water column. The amounts above are for raw water before it is treated. Dr Falconer stated that 'target turbidity in drinking water is less than 0.2 NTU and not to exceed 0.5 NTU (Australian Drinking Water Guideline 6, 2011)'.

[101] Dr Falconer also stated: 'the proportion of Condor Creek water was small since the inflow to the Cotter reservoir at Vanitys Creek was 30,000ML/day and at the Condor Creek 2300ML/day on the day of peak flow', Falconer Report, p. 32.

outcomes examined by Dr Falconer demonstrated an improvement; some show the existence of significant risks for the LCC. For example, Dr Falconer concluded:

> The landscape organisation, a measure of stability, and the landscape function analysis, which includes stability, infiltration and nutrient recycling, show overall progressive improvement from [reports in] 2008, 2010 to 2014. The worst areas monitored, Lees Creek 2 and Pago Hill, still need considerable improvement, as do several areas which were not monitored in the lower Pierces Creek region.

Based upon analysis of relevant risk assessments, the strategic risks for the LCC are: fire and wildfire in the catchment exacerbated by the effects of climate change; the risk of erosion following heavy rainfall events; erosion from roads and unstable soils especially following a major fire; the need to manage public access to the catchment as access can increase the risks of erosion and water contamination and fire; weed proliferation—in particular pine wildlings and blackberries; and finally, following from fire or erosion the associated turbidity which is detrimental to water quality. 3.21

Icon Water's 2009 risk management plan rated bushfire and bushfire followed by a high rainfall event as the two highest risks in the LCC, and noted that the risks were increasing with climate change.[102] This plan rated recreational access to the LCC as presenting a moderate risk. Similarly, Dr Falconer noted the Strategic Management Plan's view that 'fire will become an increasingly important aspect of land management as the effects of climate change become more apparent'. He commented on the LCC's fire history and risk: 3.24

> The catchment is liable to both wildfires from lightning strikes in the mountains adjacent, as in 1983 and 2003 and from campfires/arson as in 1926 and 1939.

The recent Icon Water risk assessment ratings of 'moderate' and 'medium' for fire in the Cotter Catchment and the LCC are not consistent with other current assessments of the level of risk. Icon Water's assessment of the likelihood and consequence for fire do not align with the ACT territory-wide assessment, nor with ESA's statement in the SBMP. Dr Falconer's view is that the rating for fire in the LCC is 'high'. This difference illustrates the importance of Icon Water, TAMS, ESA and EPD being involved in a joint assessment and determination of the risks for the LCC, as was directed by the Strategic Management Plan's management action, 4.3.3.a. 3.29

In discussion in April and May 2015, Icon Water stated that the risk scenario being assessed was the impact of fire in the catchment on its ability to meet the Australian Drinking Water Guidelines. The risk rating was influenced by the controls available to Icon Water which included alternative drinking water sources. The 3.30

[102] ActewAGL, Water Futures, *Cotter Catchment Water Quality Risk Management Plan,* December 2009, pp. 5, 6.

ability to draw water from alternative drinking water sources had reduced the impact of potential problems in the LCC on Icon Water's overall ability to meet the Australian Drinking Water Guidelines. Icon Water welcomed and supported a cross-agency approach to a common LCC risk assessment.

3.33 Dr Falconer reported that water quality was generally improving. However, he also reported on peaks of turbidity in July, September and November 2013 as measured at Condor Creek by the University of Canberra. Dr Falconer concluded:

> Two heavy rainfall events since the remediation work was completed resulted in major gully formation and extension in both northern and southern parts of the catchment, at upper levels and on lower drainage slopes. It also exacerbated surface erosion. The data for turbidity clearly demonstrate sediment movement into the reservoir. Restoration work is urgently required, as further heavy rain will have more severe impacts on water quality.

3.36 The erosion risk is increased where there is an inadequate vegetation cover to protect and hold the soil. The TAMS *2014 LCC Vegetation Monitoring Program Report* showed that several areas in the LCC have experienced problems re-vegetating; these include parts of the Blue Range, Condor Creek, Lees Creek and Pago Hill. Some of the areas at risk are a result of pine windrow burning which further scorched the earth preventing regrowth. Pago Hill was considered to be at particular risk to lose landscape functionality as the original logs used to control erosion are now decaying: 'the rapid decomposition of the erosion control structures may also put some areas at risk and may require further intervention'.[103] Dr Falconer reported that logs had been used extensively as an erosion control structure, so there is now a developing risk that some of these logs will cease to be effective at controlling erosion.

3.38 Dr Falconer noted that sediment ponds he saw were operating effectively but needed regular inspection [and maintenance as required] due to the risk of heavy rains damaging the pondage. He identified several failed sediment control structures—gabions—damaged road culverts, and a sediment pond in Pierces Creek that was washed out and ineffective.

3.39 Dr Falconer inspected the LCC in October 2014 and noted, 'active gully and surface erosion in both sectors of the catchment, with no visible present attempt at control or remediation. Heavy rainfall in February and December 2010, November 2011 and February/March 2012 ... can be expected to be responsible for the damage. While road maintenance appears to be effective and current, erosion control appears to have been neglected from the report covering 2007–08 to the present'.

[103] TAMS, *Lower Cotter Catchment Vegetation Monitoring Program Report*, 2014, pp. v, vii.

He also found gully formation in Pierces Creek and Upper Condor Creek. Dr Falconer reported that; 3.40

> In the very unstable soils of the lower Pierces Creek area, with deep igneous-derived sand, gully erosion is an intractable problem which requires continuing attention. The vegetation cover is sparse and any concentration of water flow can have disastrous results, whether from road runoff or natural depressions.
>
> On ground inspection in October 2014 as part of this report showed that the mid/lower portion of Pierces Creek land area also had extensively deteriorated, with surface erosion, gullying and loss of gabions into gullies.

Adequate attention has not consistently been given to the inspection and repair of the sediment control structures in the LCC. Additionally, some of the erosion gully work has exceeded the resources available under the MOU for Sediment Control Maintenance. For example, in October 2013 Icon Water identified a 'large erosion gully near East-West Break and Pipeline Road'—where costly and 'extensive repairs and remediation [were] required'. 3.41

Evidence of inappropriate recreational access in the LCC was found. A ranger reported to PCS significant motorbike activity over a long weekend, another ranger sought advice on the legal basis to prevent kayakers in the Corin Dam. Dr Falconer reported on the increased risk of deliberate and accidental fires consequent to recreational access. He cited examples of damage to the catchment and erosion caused by trail bike riding. 3.45

Dr Falconer concluded that: 'recreational management of the Lower Cotter catchment is a critical part of source water protection for drinking water supplies'. 3.46

Two matters have delayed the ability of TAMS to regulate public access to the LCC to manage this risk. Firstly, the enforcement power of PCS rangers, as provided by the *Nature Conservation Act 1980,* ceased in March 2008 with the establishment of the LCC as a reserve under the *Territory Plan 2008.* For example, the Explanatory Statement for the Nature Conservation Bill 2014 recognised this and stated, 'Conservation Officers have no effective powers in the LCC'.[104] This has been rectified with the new *Nature Conservation Act 2014* which will take effect by 11 June 2015. TAMS advised the Audit Office that its officers had continued to have other enforcement powers available to them under other Territory Acts, including the: *Trespass on Territory Land Act 1932*, *Domestic Animals Act 2000, Litter Act 2004, Pest Plants and Animals Act 2005, Public Unleased Land Act 2013,* and others. Notwithstanding these powers, the Explanatory Statement stated that 'day to day 3.47

[104] Legislative Assembly ACT, Nature Conservation Bill 2014, Explanatory Statement, p. 57.

management is undertaken by the PCS, and there are insufficient regulatory provisions under other statutes to provide for adequate day to day management, such as restricting access, managing recreational use etc.[105] Secondly, the LCC Plan of Management remains incomplete as there has been a major delay in developing a LCC Plan of Management. Completing the plan would be an important step towards regulating access and increasing the awareness of the community on catchment protection in order to mitigate these risks.

The installation of locked gates in 2009 has managed access to some areas and to an extent has mitigated the risk. Dr Falconer reported that: 3.48

> Regulations and legislation are only effective insofar as they are implemented. Control of illegal use of the Lower Cotter catchment will be problematic, due to the large area and topography.

TAMS and Dr Falconer both drew attention to the problem of the management of pine wildlings and to the un-managed regrowth pine forest within and surrounding the LCC and in areas to the LCC's northwest, east and south. One area in particular, the Blue Range is rated by TAMS as an extreme fire risk. 3.51

Dr Falconer concluded: 3.52

> Pine wildling control is the most crucial part of weed control in the catchment. Pines suppress native vegetation, and provide a high fire fuel load, which potentially can result in extensive fire damage as occurred in 2003. A consistent, continued program of wildling removal is essential, particularly following controlled burning. Blackberry control will continue to be needed, particularly in riparian zones.
>
> Pine wildling control will be essential after the controlled burns, or the risk will be ongoing and continuingly costly to manage.

Significant progress has been made in restoring the LLC over the last ten years; such that we are now entering the consolidation and maintenance phases of the restoration. In general, water quality has steadily improved along with improvements in landscape function. The completion of major sediment control engineering works and revision of the road network have contributed to reducing the rate of sediment movement into the Enlarged Cotter Dam. This is the outcome that has led the EPD to conclude that the potable water catchment is well managed. 3.54

Despite the improvements in water quality, the LCC is exposed to significant risks which are inter-related and which, under adverse conditions, could accumulate and lead to a catastrophic failure of the water catchment. The ultimate risk is of the movement of large volumes of unmanaged sediment from unstable soils into the 3.55

[105] ibid., p. 56.

reservoir. Wildfire is a significant risk which will increase with climate change and requires persistent and effective management efforts. The controls which regulate public access to the LCC are inadequate; increasing the risks of fire, landscape damage and erosion. If a fire were to occur and if it was followed by a heavy rainfall event(s), then there is a significant risk that the under-maintained, and the damaged, sediment control structures would be overwhelmed and ineffective, culminating in high levels of turbidity in the catchment leading to loss of water quality and consequently increased cost of water treatment.

It was not evident that the four agencies: the EPD, EPA, Icon Water and TAMS who shape the plans for, or undertake management actions in the LCC, had a shared knowledge of the cascading effect of risks and their potential consequences as there is no shared over-arching risk identification process and risk management plan. The development of a shared risk plan is important so that risks can be used to effectively and efficiently determine financial resources needed for risk mitigation strategies including: fire management, maintenance of sediment control structures, and public access controls for the LCC. 3.56

TAMS was not able to provide evidence of documented high-level reporting against the management actions, or of a high-level review of progress against the management actions in the Strategic Management Plan. This supports the finding that, since late 2009—with the cessation of the Management Group and the redirection of PCS staff to other roles—there has been a reduction in the capacity to coordinate the implementation of Strategic Management Plan in the LCC. 3.59

The Strategic Management Plan set out twenty-nine management actions and, including sub parts—forty-nine separate actions to be achieved. Seventeen of the management actions (58.5 percent) in the Strategic Management Plan were achieved; a further eight were partly achieved (27.5 percent). Only four (14 percent) of the management actions were not achieved, in what has been and continues to be a major land restoration project for a fire-damaged and erosion degraded potable water catchment. This is a significant achievement for a cooperative approach across several agencies, an important partner—Greening Australia, and community volunteers in the restoration of the catchment. 3.63

Three of the management actions in Strategy 1—a water resources approach, and one in Strategy 2—a landscape approach, were rated as Achieved and Ongoing or Partly Achieved and Ongoing. This indicates that there is still significant work required over time frames of twenty-to-fifty years in order to restore the landscape and vegetation to achieve the goal of resilient native woodland and grasslands. One management action in Strategy 1 and five in Strategy 3 were rated as Partly Achieved. 3.64

These management actions were in important areas such as: developing a risk management plan; regular review of the road network for safe fire management and to minimise sediment generation; regular assessment and maintenance of important sediment basins and control structures; the delay in adequately managing recreational access to the LCC; and inadequate progress in reviewing, completing and implementing policies which regulate maintenance and management activities in the catchment. 3.65

3.1 This chapter presents the major outcomes which have been achieved in the restoration of the LCC and describes the significant risks which have been identified. The chapter then evaluates the implementation of the twenty-nine management actions which are contained in the Strategic Management Plan. The next chapter, Chapter 4, follows on from this analysis and examines the current management issues which remain to be addressed as the restoration of the catchment progresses.

3.2 In order to establish the high-level perspective before delving down into the implementation of the management actions in detail, the following two sections describe the major outcomes achieved and the strategic risks which exist.

3.3 The report on the outcomes and risks described in these sections is derived from: the report by Dr Falconer—the water quality subject matter expert engaged by the Audit Office; the analysis of other reports such as the Stinson Report; vegetation analysis reports from TAMS; the Greening Australia reports on its planting program; an analysis of the implementation of the management actions; from agency records; and from interviews with key staff and stakeholders.

Major outcomes

3.4 The most important outcome in the LCC is that the water quality has steadily improved and turbidity has declined—indicating that the natural regeneration of the vegetation cover over time and the efforts and resources expended to reduce and control sediments have been successful. Dr Falconer reported that 'while rainfall in 2007 was roughly comparable to that in 2014, the peak turbidities in the Cotter Reservoir in 2007 ranged from 30 NTU to a spike of 70 NTU, with many about 20 NTU, whereas in 2014 the peaks were about 15 to 25 NTU with many of 5 NTU or less'.[106]

3.5 However, there are still turbidity problems following heavy rainfall events. Dr Falconer reported that: 'the main picture shown by the Cotter reservoir turbidity data is that the water quality of the overall catchment has steadily improved between 2006 and 2014.

[106] NTUs are Nephelometric Turbidity Units and measure the amount of suspended material in a water column. The amounts above are for raw water before it is treated. Dr Falconer stated that 'target turbidity in drinking water is less than 0.2 NTU and not to exceed 0.5 NTU (Australian Drinking Water Guideline 6, 2011)'.

During the dry or average rainfall periods, the turbidity has substantially decreased. With heavy rainfall in the order of 100mm in a single day, there was both a significant discharge volume and significant (extreme) turbidity in the Condor Creek. This may well have heightened the overall increase in Cotter reservoir turbidity with peaks of 50 NTU or over during these events'.[107]

3.6 Dr Falconer in demonstrating this cited the work of Levings and Harrison in 2012–13:

> Despite the persistence of relatively high turbidity during rain events, turbidity in forestry affected catchment areas in this study has not reached the extreme levels observed in the years immediately following the 2003 fires. It is likely that event turbidity peaks in Lees and Condor Creeks will continue to decline toward the pre-fire condition with the continuation of current land management.[108]

3.7 Dr Falconer examined the outcomes in the LCC for the water yield, that is—the amount of water produced from rainfall in the catchment less the amount used by the vegetation as it regenerates. Water yield from the LLC was raised in the Strategic Management Plan because the role of the catchment is to produce potable water. Regenerating native or pine forests will both consume more water as they grow over the first seven to fifty years of their life spans. Dr Falconer concluded:

> The current revegetation in the LCC has positive implications for [water] yield. Conversion of the majority of the catchment to native grassy woodlands is the desired outcome, with removal of pines, and will maximise yield.

3.8 As noted in the introduction, since the Teakle Report in 1961 it has been known that the major sources of sediment in the LCC were roads and firebreaks, the extent of the road and firebreak network was related to the management of the land as a pine plantation. Dr Falconer also examined and reported on the efforts to control sediment stating:

> Substantial work has been undertaken to reduce erosion from roads, by closure, remediation, gabion construction and culvert design and location. Road maintenance is of high quality. Construction of sediment retention ponds has retained substantial volumes of sediment otherwise deposited in the reservoir.

3.9 Dr Falconer noted that 'a limited current inspection of closed roads showed effective remediation' and that 'rollovers were constructed to distribute runoff into locations where gully formation was unlikely'; he also noted that 'the major process has been laying logs across the gradient, creating sediment barriers and reducing water speed down the slope. These will revegetate over time, further trapping sediment'.

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[107] Dr Falconer also stated: 'the proportion of Condor Creek water was small since the inflow to the Cotter reservoir at Vanitys Creek was 30,000ML/day and at the Condor Creek 2300ML/day on the day of peak flow', Falconer Report, p. 32.

[108] Levings, C. and Harrison, E. *Stream turbidity assessment in the Lower Cotter catchment: progress report,* Institute of Applied Ecology University of Canberra, August 2012-January 2013, cited by Dr Falconer, p. 14.

3.10 The vegetation recovery has been much better than was expected; the ability of native vegetation to regenerate in areas that were devastated by fire has exceeded expectations and has demonstrated the resilience of native species.

3.11 Dr Falconer examined the vegetation surveys carried out in the LCC in 2008, 2010 and 2014. He reported:

> As described in the 2008 report, the tussock grasslands of the lower slopes recovered rapidly, assisted by the increased nutrients coming from the burnt vegetation. The naturally forested and shrub vegetated areas recovered by seed germination, and regrowth of the more resilient native eucalypts and shrubs from the base and by epicormic growth.
>
> The formerly native vegetation areas showed similar ecological recovery to that seen in the upper Cotter catchments, with growing tree canopies, shrubs and grassland. The former pine plantations in the Pierces Creek area showed considerable problems with revegetation, by both native species and planted pines, many of which died.
>
> The 2010 report describes continuous improvement in the areas of originally native vegetation, with eucalypt canopies larger and shrub layers. The former forestry areas have been improved by planting of native vegetation which will result in a sustainable vegetation community in the future. In the upper Pierces Creek area the report notes dense Acacia regeneration and eucalypt growth.
>
> The lower area of Pierces Creek shows poor and inconsistent recovery, associated with poor and unstable soils.
>
> The 2014 report describes establishment of eight categories of land use, and appropriate monitoring plots. These plots have now been monitored over six years. "All sites demonstrated an increasing trend in overall ecological function", with the one exception of a site subjected to a controlled burn. Sites exceeding the Land Function Analysis criteria thus exhibiting highly functional ecological communities were five, one just lower, and four "continue to have dysfunctional characteristics".

3.12 The 2006 to 2014 community revegetation program by Greening Australia and supported by PCS, has revegetated sections of Uriarra Forest and Pierces Creek, and importantly has involved the community in restoring and caring for the catchment. This project supports the Australian Drinking Water Guidelines' goal for a water catchment of developing 'a community awareness program'.

3.13 Dr Falconer reported on the efforts of Greening Australia in the LCC stating:

> The replanting program from 2005 onwards by Greening Australia [and PCL / ACT Forests] has resulted in significant stabilisation of the landscape over a wide and critical area of the Lower Cotter catchment. The magnitude of their achievement can be seen from the outcomes, they report planting of 280,000 native seedlings, in 420 ha of eroding soils, by 11,700 volunteer hours of work over 270 events. The work was carefully monitored, and reported in 'Landscape under Fire: The survival of planted vegetation following fire' (Greening Australia, undated). The drought in 2006 resulted in some plant losses, but overall planting was highly successful with 81% of eucalypts,

> 76% of acacias and 50% of shrubs surviving. It was reported that blackberry density had increased over the period of monitoring of the transects.[109]

3.14 Not all of the landscapes, ecosystems, sedimentation works and water quality outcomes examined by Dr Falconer demonstrated an improvement; some show the existence of significant risks for the LCC. For example, Dr Falconer concluded:

> The landscape organisation, a measure of stability, and the landscape function analysis, which includes stability, infiltration and nutrient recycling, show overall progressive improvement from [reports in] 2008, 2010 to 2014. The worst areas monitored, Lees Creek 2 and Pago Hill, still need considerable improvement, as do several areas which were not monitored in the lower Pierces Creek region.

3.15 Dr Falconer examined efforts to manage cultural heritage in the LCC. He reported on a successful indigenous training program:

> During the restoration work following the fires, a two year program the 'Yurung Dhaura Aboriginal Land Management Team ACT', was set up to train and employ seven young Aboriginal adults. They received formal training in Aboriginal natural resources management, cultural leadership, interpretation of cultural heritage, and conservation and land management. They formed a highly capable bush-regeneration team, which was awarded the national Indigenous Land Management Award from Landcare Australia in 2014. Some members have now obtained employment in related activities, including in Greening Australia.

3.16 The Commissioner for Sustainability and the Environment, reported in 2011 on the successes achieved in the Cotter Catchment (including the LCC) with improving the habitat for the threatened fish species, the Two-spined Blackfish and Macquarie Perch and the Murray River Crayfish. The report showed that the population of the Blackfish and Perch 'appeared to be recovering, indicating improvements in habitat quality at regulated sires following the 2003 fires'. [110]

3.17 Lastly, as discussed in a previous section, the construction of the Enlarged Cotter Dam from November 2009 to its opening in October 2013, with its potential to impact significantly upon the LCC, has been managed by Icon Water and TAMS during the period of the implementation of the Strategic Management Plan (see paragraph 2.113).

[109] This is also reported in the publication—ACT Government, Greening Australia, *Regreening the Cotter: A decade of community repair work in our water catchment,* 2015.

[110] The Commissioner for Sustainability and the Environment, *ACT State of the Environment Report 2011*, Vol. 1, p. 75.

Strategic risks

3.18 Strategy 3 of the Strategic Management Plan directed the agencies to take a risk management approach to protecting the water quality in the catchment: PCS, Icon Water and ESA were to identify risks and prepare a risk management plan for the LCC. PCS was to lead the development of the risk management plan.[111]

3.19 They were to ensure that:

> Appropriate standards and controls have been applied to road access, fire management, recreation, and management activities in the catchment.

3.20 The Australian Drinking Water Guidelines stress the importance of a risk-management approach to protecting water quality. They provide a risk assessment process, qualitative ratings measures for Likelihood and Consequence, and a risk analysis matrix from which the level of risk can be determined: risk are rated from Low, Moderate, High, to Very High.[112]

3.21 Based upon analysis of relevant risk assessments, the strategic risks for the LCC are: fire and wildfire in the catchment exacerbated by the effects of climate change; the risk of erosion following heavy rainfall events; erosion from roads and unstable soils especially following a major fire; the need to manage public access to the catchment as access can increase the risks of erosion and water contamination and fire; weed proliferation—in particular pine wildlings and blackberries; and finally, following from fire or erosion the associated turbidity which is detrimental to water quality.

Fire and wildfire risks; and the effect of climate change

3.22 The ACT *Territory Wide Risk Assessment Report July 2014* was developed by ESA in concert with ACT Government agencies and analyses twenty-three hazards. Three of the hazards were rated as 'extreme'; one of these was bushfire with the potential to impact on the water supply.[113]

3.23 The *Strategic Bushfire Management Plan 2014* (SBMP) lists the large fires in the ACT from 1939; they are 1939, 1952, 1979, 1983, 1985, 1991, 2001, and 2003. From this list it is apparent that large fires are frequent in the ACT. The SBMP recognises that warming temperatures associated with climate change 'increase the ACT's bushfire risk profile'. The SBMP states that:

[111] Strategic Management Plan, Strategy 3, management actions 4.3.3.a & 4.3.3.b.

[112] *Australian Drinking Water Guidelines 2011,* updated December 2014, pp.1224–1226. The likelihood ratings are: Rare, Unlikely, Possible, Likely, Almost Certain; and the consequence ratings are: Insignificant, Minor, Moderate, Major and Catastrophic.

[113] ACT Government, *Territory Wide Risk Assessment Report*, July 2014, pp. 7, 8, 58.

> ... the ACT water catchments are considered critical assets. High intensity, unplanned bushfires over a significant area of the ACT's water catchments present the most significant risk to these catchments in terms of water quality. [114]

3.24 Icon Water's 2009 risk management plan rated bushfire and bushfire followed by a high rainfall event as the two highest risks in the LCC, and noted that the risks were increasing with climate change.[115] This plan rated recreational access to the LCC as presenting a moderate risk. Similarly, Dr Falconer noted the Strategic Management Plan's view that 'fire will become an increasingly important aspect of land management as the effects of climate change become more apparent'. He commented on the LCC's fire history and risk:

> The catchment is liable to both wildfires from lightning strikes in the mountains adjacent, as in 1983 and 2003 and from campfires/arson as in 1926 and 1939.

3.25 Dr Falconer noted that the 2003 fires were started by lightning strikes to the west and that 'many fires in peri-urban areas are started by deliberate or accidental human activity'. Dr Falconer stated:

> The program of fire fuel reduction by controlled burns is the most important management action in the Lower Cotter Catchment at the present time.
>
> Another major fire in the catchment will have a far more serious impact on Canberra's water supply, now that the Enlarged Cotter Dam is in place as a major part of the water storage.

3.26 Icon Water revised its risk rating for fire in the LCC in 2013 down to 'moderate'[116] and in 2014 it assessed the risk for 'force majeure' which included fire and storm in the Cotter Catchment as 'medium'. The revised rating was a significant change from the Icon Water's 2009 'high' rating and differed from ESA's statement on risk to the catchment in the 2014 SBMP and the 2014 Territory Wide Risk Assessment Report's rating of 'extreme'. Additionally, in 2013 and 2014, Icon Water was using two different risk matrixes.

3.27 The risk ratings were examined.[117] Icon Water's 2014 'medium' rating was based upon a likelihood rating for fire in the Cotter Reservoir of 'unlikely', whereas ESA's 'extreme' rating was derived from a likelihood rating of 'likely'—for fire in the ACT including the catchments. This is a significant difference, their consequence ratings also differed. The ACT territory-wide assessment for fire was based upon a consequence rating of 'catastrophic'. The 2013 Icon Water report which had given the fire rating of 'moderate' for the Cotter catchments, in the same section, noted that 'however, catastrophic fires

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[114] Emergency Services Agency ACT, *Strategic Bushfire Management Plan, Version 3,* 2014, pp. 10, 15, 65.

[115] ActewAGL, Water Futures, *Cotter Catchment Water Quality Risk Management Plan,* December 2009, pp. 5, 6.

[116] ACTEW Water, *The water quality management prerequisite program for ACT drinking water catchments*, March 2013, pp. 51–53.

[117] As a means of comparison, the Australian Drinking Water Guidelines for example, provides likelihood ratings of: Rare, Unlikely, Possible, Likely, Almost Certain; and the consequence ratings are: Insignificant, Minor, Moderate, Major and Catastrophic. (ADWGs updated December 2014, pp.1224–1226). Icon Water advised that it uses a risk assessment process based upon the current ISO 31000.

can result in massive contamination that can overwhelm a reservoir'. In comparison, the risk rating in the Australian Drinking Water Guidelines for a catastrophic consequence and an unlikely rating gives a 'very high' risk.

3.28 In March 2015, Icon Water advised that the basis for their 2013 and 2014 ratings was that the drought, which influenced the 2009 high ratings, had ceased and this together with recovery of the catchment had influenced the current 'moderate' rating. Icon Water stated that it would defer to the ACT Government's expertise to assess the risk of a fire occurring. Icon Water was also considering proposing to EPD that they become involved in a joint risk assessment and was undertaking further research into the impact of extreme weather events on the assessment of risks to the catchment.

3.29 The recent Icon Water risk assessment ratings of 'moderate' and 'medium' for fire in the Cotter Catchment and the LCC are not consistent with other current assessments of the level of risk. Icon Water's assessment of the likelihood and consequence for fire do not align with the ACT territory-wide assessment, nor with ESA's statement in the SBMP. Dr Falconer's view is that the rating for fire in the LCC is 'high'. This difference illustrates the importance of Icon Water, TAMS, ESA and EPD being involved in a joint assessment and determination of the risks for the LCC, as was directed by the Strategic Management Plan's management action, 4.3.3.a.

3.30 In discussion in April and May 2015, Icon Water stated that the risk scenario being assessed was the impact of fire in the catchment on its ability to meet the Australian Drinking Water Guidelines. The risk rating was influenced by the controls available to Icon Water which included alternative drinking water sources. The ability to draw water from alternative drinking water sources had reduced the impact of potential problems in the LCC on Icon Water's overall ability to meet the Australian Drinking Water Guidelines. Icon Water welcomed and supported a cross-agency approach to a common LCC risk assessment.

3.31 Fire management and the effectiveness of controls which ensue that planned burns occur are examined further in Chapter 4.

Erosion, sediment control and turbidity risks

3.32 Erosion, unless prevented or managed, can lead to water turbidity in the catchment which can exceed the ability of, or increase the expense of, water management by the Mount Stromlo Water Treatment Plant.

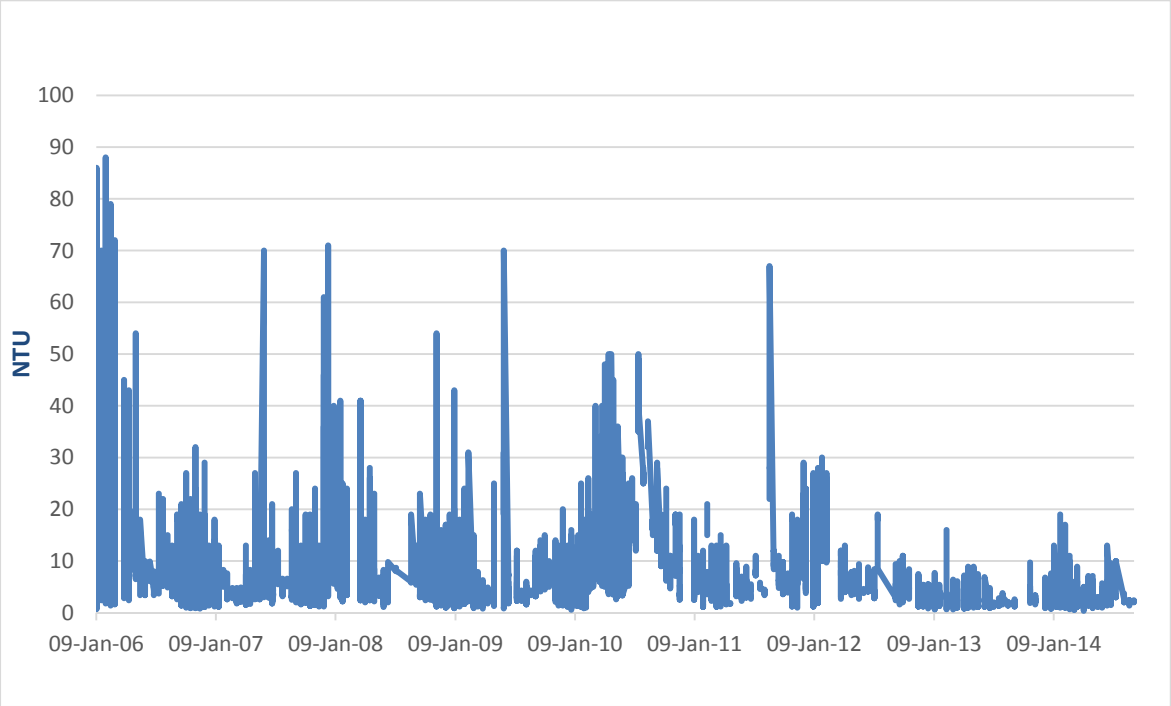
3.33 Dr Falconer reported that water quality was generally improving. However, he also reported on peaks of turbidity in July, September and November 2013 as measured at Condor Creek by the University of Canberra. Dr Falconer concluded:

> Two heavy rainfall events since the remediation work was completed resulted in major gully formation and extension in both northern and southern parts of the catchment, at upper levels and on lower drainage slopes. It also exacerbated surface

erosion. The data for turbidity clearly demonstrate sediment movement into the reservoir. Restoration work is urgently required, as further heavy rain will have more severe impacts on water quality.

3.34 Figure 3-1 illustrates the Cotter turbidity in NTU for January 2006 to January 2014.

Figure 3–1 Cotter turbidity levels from January 2006 to January 2014



Source: Dr Falconer's report, citing ACTEW: Cotter reservoir turbidity, all depths superimposed.

3.35 The 2014 publication by the Bushfire Cooperative Research Centre—on catchments, fire and subsequent erosion—stated that dry sclerophyll forests such as the Cotter Catchment are the most sensitive to post fire erosion, particularly after wildfire. The Bushfire Cooperative Research Centre noted that the erosion after the ACT 2003 bushfires was primarily caused by two post-fire intense rain storms.[118] The Bushfire Cooperative Research Centre rated the post-fire erosion risk for Canberra catchments as 'moderate likelihood but high consequence' and that 'regions of ACT ... fall into some of the highest risk categories in terms of fire, storm and topographic controls.[119]

3.36 The erosion risk is increased where there is an inadequate vegetation cover to protect and hold the soil. The TAMS *2014 LCC Vegetation Monitoring Program Report* showed that several areas in the LCC have experienced problems re-vegetating; these include parts of

[118] The Bushfire CRC noted that 'an investigation into the frequency of these extreme fire-related erosion responses indicate that the last event of a similar magnitude occurred about 400 years ago'. Nyman, P. & Sheridan, J., *Erosion in burned catchments of Australia: Regional syntheses and guidelines for evaluating risk*¸ December 2014, Bushfire Cooperative Research Centre, University of Melbourne.

[119] ibid., pp. 21, 26.

the Blue Range, Condor Creek, Lees Creek and Pago Hill. Some of the areas at risk are a result of pine windrow burning which further scorched the earth preventing regrowth. Pago Hill was considered to be at particular risk to lose landscape functionality as the original logs used to control erosion are now decaying: 'the rapid decomposition of the erosion control structures may also put some areas at risk and may require further intervention'.[120] Dr Falconer reported that logs had been used extensively as an erosion control structure, so there is now a developing risk that some of these logs will cease to be effective at controlling erosion.

3.37 Dr Falconer identified that:

> The worst areas monitored, Lees Creek 2 and Pago Hill, still need considerable improvement, as do several areas which were not monitored in the lower Pierces Creek region.

3.38 Dr Falconer noted that sediment ponds he saw were operating effectively but needed regular inspection [and maintenance as required] due to the risk of heavy rains damaging the pondage. He identified several failed sediment control structures—gabions—damaged road culverts, and a sediment pond in Pierces Creek that was washed out and ineffective.

3.39 Dr Falconer inspected the LCC in October 2014 and noted, 'active gully and surface erosion in both sectors of the catchment, with no visible present attempt at control or remediation. Heavy rainfall in February and December 2010, November 2011 and February/March 2012 ... can be expected to be responsible for the damage. While road maintenance appears to be effective and current, erosion control appears to have been neglected from the report covering 2007–08 to the present'.

3.40 He also found gully formation in Pierces Creek and Upper Condor Creek. Dr Falconer reported that;

> In the very unstable soils of the lower Pierces Creek area, with deep igneous-derived sand, gully erosion is an intractable problem which requires continuing attention. The vegetation cover is sparse and any concentration of water flow can have disastrous results, whether from road runoff or natural depressions.
>
> On ground inspection in October 2014 as part of this report showed that the mid/lower portion of Pierces Creek land area also had extensively deteriorated, with surface erosion, gullying and loss of gabions into gullies.

3.41 Adequate attention has not consistently been given to the inspection and repair of the sediment control structures in the LCC. Additionally, some of the erosion gully work has exceeded the resources available under the MOU for Sediment Control Maintenance. For example, in October 2013 Icon Water identified a 'large erosion gully near East-West Break and Pipeline Road'—where costly and 'extensive repairs and remediation [were] required'.

[120] TAMS, *Lower Cotter Catchment Vegetation Monitoring Program Report*, 2014, pp. v, vii.

3.42 Given the unstable soils and steeper slopes in parts of the LCC, along with the gully formation and damage to sediment structures reported by Dr Falconer, erosion will continue to be a major risk in the LCC.

3.43 Figure 3-2 shows deep gully erosion in the LCC.

Figure 3–2 Deep gully erosion in the LCC

Source: Photograph by Dr Falconer

Access management risks

3.44 In 2009, the Water Services Association of Australia examined the effects of recreational activities on potable water catchments in Australia. The report analysed the impacts of a range of recreational activities including: bushwalking, camping, trail bike riding, four-wheel driving, horse riding, swimming and boating. The Association found that climate change was increasing the risk of wildfires and that recreational access significantly increased the risk of accidental and deliberately lit fires.[121]

3.45 Evidence of inappropriate recreational access in the LCC was found. A ranger reported to PCS significant motorbike activity over a long weekend, another ranger sought advice on the legal basis to prevent kayakers in the Corin Dam. Dr Falconer reported on the

[121] Water Services Association of Australia, Occasional Paper No. 22, *Effects of recreational activities on source water protection areas,* April 2009, pp. 9, 10, 15, 18, 69-72.

increased risk of deliberate and accidental fires consequent to recreational access. He cited examples of damage to the catchment and erosion caused by trail bike riding.

3.46 Dr Falconer concluded that: 'recreational management of the Lower Cotter catchment is a critical part of source water protection for drinking water supplies'.

3.47 Two matters have delayed the ability of TAMS to regulate public access to the LCC to manage this risk. Firstly, the enforcement power of PCS rangers, as provided by the *Nature Conservation Act 1980,* ceased in March 2008 with the establishment of the LCC as a reserve under the *Territory Plan 2008.* For example, the Explanatory Statement for the Nature Conservation Bill 2014 recognised this and stated, 'Conservation Officers have no effective powers in the LCC'.[122] This has been rectified with the new *Nature Conservation Act 2014* which will take effect by 11 June 2015. TAMS advised the Audit Office that its officers had continued to have other enforcement powers available to them under other Territory Acts, including the: *Trespass on Territory Land Act 1932*, *Domestic Animals Act 2000, Litter Act 2004, Pest Plants and Animals Act 2005, Public Unleased Land Act 2013,* and others. Notwithstanding these powers, the Explanatory Statement stated that 'day to day management is undertaken by the PCS, and there are insufficient regulatory provisions under other statutes to provide for adequate day to day management, such as restricting access, managing recreational use etc.[123] Secondly, the LCC Plan of Management remains incomplete as there has been a major delay in developing a LCC Plan of Management. Completing the plan would be an important step towards regulating access and increasing the awareness of the community on catchment protection in order to mitigate these risks.

3.48 The installation of locked gates in 2009 has managed access to some areas and to an extent has mitigated the risk. Dr Falconer reported that:

> Regulations and legislation are only effective insofar as they are implemented. Control of illegal use of the Lower Cotter catchment will be problematic, due to the large area and topography.

3.49 Access management is examined further in Chapter 4.

Weed management risks

3.50 The two predominant weeds in the LCC are related to its history as a pine plantation, they are:

> pine wildlings—immature self-sown pine seedlings which can grow into dense thickets of pine. When grown they present an expensive management problem and a major fire risk. Unless managed, they can reseed after controlled burns and become the dominant vegetation type, and

[122] Legislative Assembly ACT, Nature Conservation Bill 2014, Explanatory Statement, p. 57.

[123] ibid., p. 56.

> blackberry—which has tended to co-exist with pines and is an extensive weed in the LCC, infesting riparian zones in particular. The management of blackberry involves a continual program of suppression.

3.51 TAMS and Dr Falconer both drew attention to the problem of the management of pine wildlings and to the un-managed regrowth pine forest within and surrounding the LCC and in areas to the LCC's northwest, east and south. One area in particular, the Blue Range is rated by TAMS as an extreme fire risk.

3.52 Dr Falconer concluded:

> Pine wildling control is the most crucial part of weed control in the catchment. Pines suppress native vegetation, and provide a high fire fuel load, which potentially can result in extensive fire damage as occurred in 2003. A consistent, continued program of wildling removal is essential, particularly following controlled burning. Blackberry control will continue to be needed, particularly in riparian zones.
>
> Pine wildling control will be essential after the controlled burns, or the risk will be ongoing and continuingly costly to manage.

3.53 Figure 3-3 illustrates the problem associated with unmanaged pine wildings.

Figure 3–3 Pine wildlings at Blue Range

Source: Photograph by Dr Falconer

Lower Cotter Catchment risk conclusion

3.54 Significant progress has been made in restoring the LLC over the last ten years; such that we are now entering the consolidation and maintenance phases of the restoration. In general, water quality has steadily improved along with improvements in landscape function. The completion of major sediment control engineering works and revision of the road network have contributed to reducing the rate of sediment movement into the Enlarged Cotter Dam. This is the outcome that has led the EPD to conclude that the potable water catchment is well managed.

3.55 Despite the improvements in water quality, the LCC is exposed to significant risks which are inter-related and which, under adverse conditions, could accumulate and lead to a catastrophic failure of the water catchment. The ultimate risk is of the movement of large volumes of unmanaged sediment from unstable soils into the reservoir. Wildfire is a significant risk which will increase with climate change and requires persistent and effective management efforts. The controls which regulate public access to the LCC are inadequate; increasing the risks of fire, landscape damage and erosion. If a fire were to occur and if it was followed by a heavy rainfall event(s), then there is a significant risk that the under-maintained, and the damaged, sediment control structures would be overwhelmed and ineffective, culminating in high levels of turbidity in the catchment leading to loss of water quality and consequently increased cost of water treatment.

3.56 It was not evident that the four agencies: the EPD, EPA, Icon Water and TAMS who shape the plans for, or undertake management actions in the LCC, had a shared knowledge of the cascading effect of risks and their potential consequences as there is no shared over-arching risk identification process and risk management plan. The development of a shared risk plan is important so that risks can be used to effectively and efficiently determine financial resources needed for risk mitigation strategies including: fire management, maintenance of sediment control structures, and public access controls for the LCC.

Management goals and strategies

3.57 The Strategic Management Plan set management goals centred on the primary goals of clean water and healthy landscapes (see paragraph 1.17). The Plan developed four management strategies to achieve the goals, these are:

1) A water resources approach to management to achieve water quality outcomes.
2) An ecosystem approach to management focused on the functioning of natural ecosystems for sustainable water quality outcomes.
3) A risk management approach with the aim of protecting the quality and quantity of water supplied to Canberra including managing the fire risk.

4) An adaptive and collaborative approach whereby research and monitoring is focused on achieving best practice catchment management.[124]

Implementation of the management actions

3.58 Under each management strategy the Strategic Management Plan outlined relevant management policies and set specific and measurable management actions aimed at achieving the management goals. Each strategy identified which management goals the strategy and management actions were addressing. Each management action had a specific timeframe for its achievement and was assigned to a specific agency or agencies. There are twenty-nine management actions, the majority of which were assigned to TAMS (then PCL now PCS).

3.59 TAMS was not able to provide evidence of documented high-level reporting against the management actions, or of a high-level review of progress against the management actions in the Strategic Management Plan. This supports the finding that, since late 2009—with the cessation of the Management Group and the redirection of PCS staff to other roles—there has been a reduction in the capacity to coordinate the implementation of Strategic Management Plan in the LCC.

3.60 Each of the management actions in the Strategic Management Plan was considered, the supporting evidence was examined, and the degree of the implementation of the management action was rated against the evidence. The January 2015 report by the Audit Office's water quality subject matter expert, Professor Falconer, contains evidence based upon his observations of the outcomes in the LCC in late 2014, and his examination of agency information. Dr Falconer's evidence has also informed our analysis of the implementation of the management actions.

3.61 The assigned ratings involved consideration of the implementation timeframes. The ratings are: Achieved, Achieved and Ongoing, Partly Achieved, Partly Achieved and Ongoing and Not Achieved. Some management actions contained multiple sub-actions. Where a management action contained multiple sub-actions a rating was applied based upon the rating achieved for seventy-five percent or more of the sub-actions.

3.62 The Audit Office's analysis is presented in Table 3-1 which presents a summary of the recommendations, the ratings and the percentage implemented and achieved. The table in Appendix A provides each strategy and the related management actions, the rating assigned, and the evidence and analysis from which the rating was derived.

[124] *Lower Cotter Catchment Strategic Management Plan*, ACT Government, January 2007, pp. xi, 33, 36, 40, 43.

Table 3-1 Summary: implementation of management actions

Strategy	1) A water resource approach to management	(2) A landscape and ecosystem approach to management	(3) A risk management approach	(4) An adaptive and collaborative management approach	Total
Number of Management Actions	**8**	**6**	**6**	**9**	**29 (100%)**
Achieved (including achieved & ongoing)	5	6[125]	1	5[126]	17 (58.5%)
Partly Achieved (including partly achieved & ongoing)	3	0	5	0	8 (27.5%)
Not Achieved	0	0	0	4	4 (14%)

Source: Audit Office analysis.

3.63 The Strategic Management Plan set out twenty-nine management actions and, including sub parts—forty-nine separate actions to be achieved. Seventeen of the management actions (58.5 percent) in the Strategic Management Plan were achieved; a further eight were partly achieved (27.5 percent). Only four (14 percent) of the management actions were not achieved, in what has been and continues to be a major land restoration project for a fire-damaged and erosion degraded potable water catchment. This is a significant achievement for a cooperative approach across several agencies, an important partner—Greening Australia, and community volunteers in the restoration of the catchment.

3.64 Three of the management actions in Strategy 1—a water resources approach, and one in Strategy 2—a landscape approach, were rated as Achieved and Ongoing or Partly Achieved and Ongoing. This indicates that there is still significant work required over time frames of twenty-to-fifty years in order to restore the landscape and vegetation to achieve the goal of resilient native woodland and grasslands. One management action in Strategy 1 and five in Strategy 3 were rated as Partly Achieved.

3.65 These management actions were in important areas such as: developing a risk management plan; regular review of the road network for safe fire management and to minimise sediment generation; regular assessment and maintenance of important sediment basins and control structures; the delay in adequately managing recreational

[125] This includes management action 4.2.3.c, comprised of 13 sub-actions to reflect the overall status—individual sub-action assessments were: 7 achieved, 5 achieved and ongoing, and 1 insufficient evidence.

[126] This includes management action 4.4.3.a, comprised of 9 sub-actions—individual sub-action assessments were: 7 achieved, 1 partly achieved, and 1 unknown.

access to the LCC; and inadequate progress in reviewing, completing and implementing policies which regulate maintenance and management activities in the catchment.

3.66 The management actions which were rated as Not Achieved were all in Strategy 4—an adaptive and collaborative management approach, and are of secondary importance in achieving the goals of restoration of the catchment.

4 CURRENT ISSUES FOR THE LOWER COTTER CATCHMENT

4.1 The final chapter analyses the current issues for the LCC which will continue to require management in the medium to longer term in order to achieve the goal of a stable and resilient catchment which provides potable water of a high quality and maximises water yield. This chapter draws together the issues and the identified risks to the catchment outlined in Chapter 2 and Chapter 3 and in Dr Falconer's report.

Key findings

	Paragraph
The ACT Government is aware that water catchment management is complex and lacks a strong coordinated approach. The Government is taking steps to improve catchment coordination across and external to the ACT. However, as discussed in the section on integrated catchment management in the ACT and region, there is a risk that these developing arrangements will give insufficient priority and inadequate attention to the LCC as they focus primarily on other important, non-potable water catchment matters.	4.5
The new ACT and Region Catchment Management Coordination Group may not be able to attend sufficiently to the LCC's high-level coordination and mid-level operational needs to ensure successful management of the maintenance and consolidation phases of the LCC's restoration. The reasons for this are: • importantly, the Catchment Management Coordination Group is an advisory, communication and coordination group—as suits a cross-jurisdictional body—whereas the LCC needs a coordination group comprised of decision-makers from across the agencies in order to expedite and resolve issues. The LCC Management Group was successful as it brought together the senior decision makers and resources to complete the required engineering works • funding and decision making priorities of the Commonwealth Basin Priority Project may dominate the group's agenda and discussion—as this is an important project with potential funding of $93.5 million over the next five years • the membership of the group may be extensive, the reformed Senior Executive Water Group may have 14-18 members and address multiple cross-jurisdictional issues, and • the issues in the LCC and Cotter Catchment may lack consideration due to the need to give priority and time to cross-border issues, and the lack of an over arching risk plan which emphasises the values of the LCC and enables the LCC's strategic risks—which are significant—to be recognised and prioritised accordingly.	4.6

Therefore, there would be benefit in the ACT Government developing a specific coordination and decision making body and processes for the LCC; as stated in Recommendation 5. 4.7

The coordination of the LCC at the higher, decision making levels has reduced since the Deed of Agreement ceased in October 2009—alongside the reduction in the role of the EPA. At the same time, TAMS and Icon Water have progressively redirected staff away from direct dedicated roles in the LCC—although this was recently rectified by TAMS to an extent. Icon Water's Source Water Protection Program Consultative Committee was intended to be the coordination forum to replace the role preformed by the original LCC Management Group. It has performed a useful mid-and-operational level coordinating function, but it has not had involvement of senior staff from across Icon Water, TAMS, the EPD and EPA which could have enabled it to replicate the functions of the successful inter-agency Management Group and Program Management Group under the Deed. The other extant ACT cross-government (including Icon Water) water coordinating committees—the Directors-General Water Group and the Senior Executive Water Group have not undertaken a coordinating role for the LCC. 4.8

The catchment management and coordination arrangements for the LCC need to be reviewed in concert with the major agencies: TAMS PCS, Icon Water, EPD (including ACT Planning and Land Authority) and the EPA. A new management—coordination and decision-making structure—specifically for the Lower Cotter Catchment needs to be given a high priority. The goal of this needs to be the development of effective, streamlined coordination and decision making arrangements at the high level, and the integration of these arrangements into the operational level, because catchment management can involve repeated and complex coordination tasks at the operational level. An important consideration is that the decision-makers must also have the authority to assign and commit the necessary resources to implement their decisions. 4.10

There is no overarching integrated risk-assessment process and plan for the LCC. It is important for a risk plan to be developed for the catchment as the plan is an important coordinating mechanism which can help align and set clear priorities for all agencies to understand and follow, even where their actions are independent. Icon Water's 2009 Cotter Catchment Risk Plan provides a sound basis for the development of an LCC risk plan.[127] 4.12

A cross-agency risk plan is important as the Enlarged Cotter Dam contains twenty-five percent of the ACT's potable water supply and represents an investment of approximately $410.5 million dollars. A process which jointly identifies the strategic 4.13

[127] ActewAGL & Water Futures, *Cotter Catchment Water Quality Risk Management Plan,* December 2009.

risks can be used to determine the appropriate financial resources for allocation to ongoing risk mitigation strategies including: fire management, maintenance of roads and sediment control structures, and weed management. Based upon analysis of relevant risk assessments and expert opinion, the highest risks to manage are: fire and wildfire, turbidity due to erosion, recreational access, and management of pine wildlings. Development of a cross-agency risk management process and plan is a high priority.

4.14 The Plan of Management, as required by the *Planning and Development Act 2007* and similarly the new *Nature Conservation Act 2014,* which gives effect to the management objectives for the LCC is now overdue by seven years. [128] The plan needs to be completed and implemented as a priority to enable effective regulation of public access. The plan should incorporate the elements of a catchment management plan as articulated in the Australian Drinking Water Guidelines; especially—a clear statement of responsibilities of different agencies and agreed coordination processes. The plan needs to define appropriate low-impact recreational activities based upon a risk assessment.

4.18 Dr Falconer stressed the importance of hazard reduction burning in the LCC, stating:

> The program of fire fuel reduction by controlled burns is the most important management action in the Lower Cotter catchment at the present time. The catchment is liable to both wildfires from lightning strikes in the mountains adjacent, as in 1983 and 2003 and from campfires/arson as in 1926 and 1939. High fuel loads need continuous reduction, to prevent serious erosion and fire debris deposition following fire with consequent unavoidable deterioration of reservoir water quality.
>
> It is essential that the planned controlled burns are carried out as soon as feasible, and that a major program of physical pine removal is implemented.
>
> Particular care will be needed to prevent the burns from continuing onto revegetated areas which have been planted to stabilise the erodible soils.

4.19 Dr Falconer recognised that fuel reduction burns in some areas of the LCC would require careful preparation of sediment and debris-control structures to minimise effects on the water quality post burns. He stated:

> While controlled burns are an essential part of the overall risk management in the Lower Cotter, the extent of the fire fuel accumulation, when burnt, can be expected to have adverse effects on water quality. Considerable burnt debris will be generated, and in hotter areas of the burn the soils will again be damaged with potential

[128] As discussed, the plan was due to commence in 2008 and commenced in 2014, with an estimated time frame of several years before it is completed.

subsequent erosion. Any heavy rainfall shortly after the burns will carry fire debris down into the reservoir, with consequent loss of water quality. These issues are extensively discussed in White et al. (2006). Sediment retention ponds will need to be constructed or refurbished in the crucial gully lines to retain debris.

Effective controlled burns of moderate intensity are necessary for fire risk management over many areas of the catchment, and can be undertaken with little subsequent erosion or degradation of the natural ecology.

4.20 The Strategic Management Plan required ESA, PCS and Icon Water to review the Fire Fuel Management Zones in the LCC and to prepare a fire management plan, see management action 4.3.3.b. As discussed in the section, 'Implementation of the management actions' these management actions have been achieved and as a result, some areas in the south and northwest of the LCC are now Strategic Fire-fighting Advantage Zones. The current high-level plan and policy is the *ACT Strategic Bushfire Management Plan 2014*.

4.23 The Icon Water 2009 Cotter Catchment Risk Plan identified that an important control for fire management in the Cotter Catchment was the monitoring of the success of burns in the BOPs. As reported in the section, Evaluation of the implementation of the Strategic Management Plan (Appendix A 4.3.3.c), the Cotter Dam Regional Fire Management Plan for 2009–19, and the revised draft Cotter Dam Regional Fire Management Plan 2013–19 were examined. It appears that not all interventions planned from 2009 onwards had occurred. The Regional Fire Management Plans' for the Cotter pre and post 2014: version 2 2013–19, and draft version 3 2013–19 showed that only three of either eight or ten planned controlled burns had occurred in the LCC, some of the planned burns were in or adjacent to the Strategic Fire-fighting Advantage Zones, so they were of strategic importance.

4.24 The reason for the inability to conduct the planned burns was found in the reports on the Prescribed Burn Monitoring Program by Conservation Research (EPD). These describe the difficulties in conducting the BOP controlled-burn activities in the ACT during three of the last four years due to above average rainfall in the autumn burn seasons leaving the forest fuels wet and unable to be burnt: 2010–11, 2011–12, and 2013–14. The 2012–13 season allowed three small prescribed burns. March 2015 had five burns covering an extensive area.

4.25 ESA and the Rural Fire Service (RFS) were approached for confirmation of what burns had occurred and how effective this control was. For monitoring of BOPs to be fully effective as a control, an accumulation of BOPs over several years where prescribed burns where not able to occur should have raised a flag to direct senior management attention to a developing strategic fuel management issue in the LCC.

The RFS demonstrated that it has taken steps to make the review and audit process for the annual BOPs more rigorous following the Audit Office Report on Bushfire Preparedness in 2013. For example, commencing in 2014–15, the RFS receives TAMS Fire Management Unit data from a TAMS database. The RFS then checks the burns that were planned, conducts an audit including on-the-ground inspections of the outcomes of a sample of burns and reports upwards on burns which were not completed. High priority burns are identified and factored into planning for the next season's BOPs. 4.26

The process of developing the BOPs and the Regional Fire Management Plans requires extensive coordination and an iterative process between ESA, RFS, TAMS Fire Management Unit and Conservation Research (EPD). The review period for the Regional Fire Management plans is five years and this process involves the most concerted analysis of cumulative outcomes of burns in regions. The process of analysing the effects of an accumulation of uncompleted burns between five-yearly Regional Fire Management plans could be more developed as a control, however, the achievement of that level of control could be complex. The ESA Commissioner reported to TAMS in September 2014 that the Bushfire Council had indentified difficulties in obtaining 'known, firm and consistent information and late access to information' on the BOP process and recommended that ESA increase the monitoring of the planning and implementation of the [BOP] program. 4.27

The 2015 late summer/autumn burn season has provided favourable conditions for conducting of controlled burns. As at 31 March 2015, the Fire Management Unit had completed five of seven planned burns for the larger LCC, as described in the map entitled 'Lower Cotter Catchment 2014–15 BOP Works'.[129] 4.30

TAMS and Dr Falconer have both drawn attention to the problem of the management of pine wildlings and of the un-managed regrowth pine forests within and surrounding the LCC—in areas to the LCC's northwest, east and south. Dr Falconer's report highlighted the fire risk in an area called the Blue Range which is partly within and partly adjacent to the LCC in the northwest. This is a steeper part of the LCC where twelve years regrowth of a mixture of dense pine and scattered eucalyptus stands presents a very high fuel load. Dr Falconer reported 'ignition here has the potential to burn the whole catchment, if the wind is from the northwest and crosses control lines'. He also stated: 4.31

- This region of the catchment has the most extreme risk from wildfire, with limited access, very high fuel loads, and no effective barrier from major fires arising to the north or west in the eucalypt forest in NSW.
- As it is located in the upper Condor Creek, fire debris from wild or planned fires will flow directly into the reservoir, unless adequate retention ponds are constructed.

The accumulation of thick pine and fuel in the Blue Range has been a PCS target for fuel reduction since early 2009 and different methods such a physical removal of the pine or controlled burning have been considered. However, the management of the Blue Range area has demonstrated difficulties in achieving planned prescribed burns due to autumns over the intervening years where it was too wet to burn, or a time when other fire management issues were considered a higher priority. The ACT Bushfire Council recognised the problem of the accumulation of fuel in the Blue Range in June 2013. 4.32

In December 2014 and January 2015, the TAMs Fire Management Unit and ESA were consulted about the risks and management strategies for the Blue Range. TAMS has rated the Blue Range as an 'extreme risk, especially to the Cotter Catchment and therefore Canberra's water security'. TAMS had consulted and developed the *Draft Blue Range Rehabilitation Plan 2014–2025.* This provided a systematic approach to the management and fuel reduction in the area, while also protecting the riparian zones and the water quality at Condor Creek, and managed by compartments the higher more erosion-prone slopes. The *Draft Blue Range Rehabilitation Plan* would take ten years to implement at an estimated cost of $5.8 million. A significant part of this plan is at present unfunded. Dr Falconer emphasised the importance of resolving the Blue Range and ESA was aware of and supported the Blue Range Plan. By late March 2015, the Fire Management Unit had completed a fuel reduction burn in one part of the Blue Range and several other key areas.[130] 4.33

The problem of the Blue Range is a more severe example of the problem of dealing with thick regrowth of pine wildlings; however it is one of several unmanaged pine regrowth forests in and around the LCC. TAMS, Dr Falconer and EPD all pointed out the importance of developing management plans and solutions for these areas as a priority for this stage of the restoration of the LCC. 4.34

The Emergency Services Commissioner supported the observations and conclusions contained in Dr Falconer's summary report on fire in the LCC. The Commissioner also commented positively on the willingness of TAMS to prepare and implement fuel reduction strategies, and that the solution was broader than fuel management. The Commissioner noted that effective fuel reduction in the LCC does not stop the risk of bushfire burning the whole catchment.[131] 4.38

[130] This area of 282 hectares was called Condor Creek Hazard Reduction Burn FB079.

[131] The SBMP supports this view: 'However, it should be noted that under elevated fire danger conditions, the advantage resulting from planned fire will be reduced' p. 40.

To improve access to the LCC to support a rapid response to unplanned fire,[132] the Commissioner intends to revisit (with TAMS and EPD) the extent of the fire trail access network in the LCC, with a key priority being to meet the goal of safe access for fire-fighting and management. ESA considers that better access would also allow fuel reduction burning in smaller blocks, which is a safer strategy. At the same time, the review would consider public access management for roads and fire trails[133] in the LCC to prevent unauthorised access and reduce the risk of deliberate or accidental fire in the catchment. As part of the review of the road and fire trail network, it will be important to balance appropriate access management sufficient to enable safe fire-fighting with the goal of minimising roads and fire trails to reduce the associated risk of generating sediment. EPD advised that a 2006 CSIRO report was of considerable value in informing the original revision of the LCC road network.[134] 4.39

Despite a MOU between TAMS and Icon Water which required the inspection and repair of roads and sediment control structures in the LCC, Dr Falconer's report identifies damaged and ineffective sediment control works which may have been in that state for some time. He also found problematic gully erosion and noted that erosion is an intractable problem in some of the areas of the LCC such as Pierces Creek with its unstable soils. 4.42

Dr Falconer recommended that restoration work is urgently required. He demonstrated that heavy rainfall events at times in the last several years have resulted in spikes in turbidity in feeder streams—indicating unstable soils and sediment movement at those times. Therefore, it is essential that the erosion control structures are inspected regularly and well maintained while the catchment is experiencing routine conditions; it is even more important if a fire, or a fire and a major rainfall event were to damage parts of the catchment, significantly increasing the risk of sediment movement and the possibility of overwhelming less functional, ageing, or under-maintained control structures. The MOU has now ceased. 4.45

Therefore, it is now time for a reassessment of the condition of the landscape; focusing on the eroded areas and formed gullies, on the damaged erosion control structures, the capacity of the sediment ponds, and the state of the logs which are decaying. This is a high priority action to protect the catchment. 4.46

[132] Strategic Bushfire Management Plan, 'Objective 4 —Extinguish bushfires when they occur, a rapid, decisive and coordinated response', p. 3.

[133] The review is to be of unsealed mineral earth roads and fire trails.

[134] *Revegetation of water supply catchments following bushfire: A review of the scientific literature relevant to the Lower Cotter Catchment,* Paul K. Rustomji and Peter H. Hairsine, CSIRO Land and Water Science Report 9/06, April 2006.

The Strategic Management Plan proposed an evaluation of the success of the implementation against the plan's management goals, after ten years of implementation.[135] This audit report has reviewed the implementation of the management actions and has addressed the management issues identified in the plan. The report has identified current issues for the successful coordination and management of the restoration of the LCC. There would be merit in conducting an evaluation of the Strategic Management Plan, and reporting on that evaluation within two years of the publication of this audit report. The Commissioner for Sustainability and the Environment may be well placed to undertake such an evaluation. 4.49

The Stinson Report 2008

4.2 In April 2008 Darro Stinson reported on the effectiveness of Icon Water's efforts in restoring the LCC (Stinson Report). Some of the issues raised in the Stinson Report are incompletely addressed and are still relevant to the management of the LCC.

4.3 The following is a list of issues raised in the Stinson Report which remain relevant to the LCC:

- the need to ensure a long-term maintenance and constant monitoring program for the sediment control structures. The Stinson Report stated: 'an ongoing maintenance program for the infrastructure in the LCC is a concern that has been expressed by most individuals interviewed'[136]
- the importance of wildfire and of controlled burning for fuel reduction
- the main driver for the road network then and now is for fire suppression; it is important to balance adequate roads for this purpose with the goal of reducing sediment by minimising roads
- despite the presence of individual risk plans for specific activities, there was no integrated risk assessment process or plan in place for the LCC; such a plan could analyse cumulative impacts on the LCC
- the need to progress a Plan of Management, and
- that pine wildlings pose a long term threat to the LCC.[137]

[135] *Lower Cotter Catchment Strategic Management Plan*, ACT Government, January 2007, p. 1.

[136] Darro Stinson, *Analysis of ACTEW's efforts in progressing the restoration of the LCC*, April 2008, p. 16.

[137] ibid., pp. 7, 8, 9, 13, 14.

Current management issues for the LCC

4.4 The following analysis of current issues in the LCC shows striking similarities to the issues raised by Stinson—demonstrating that they are strategic issues and that the success of the restoration of the LCC is a long-term task and goal which continues to require a strategic approach.

New ACT integrated catchment management arrangements

4.5 The ACT Government is aware that water catchment management is complex and lacks a strong coordinated approach. The Government is taking steps to improve catchment coordination across and external to the ACT. However, as discussed in the section on integrated catchment management in the ACT and region, there is a risk that these developing arrangements will give insufficient priority and inadequate attention to the LCC as they focus primarily on other important, non-potable water catchment matters.

4.6 The new ACT and Region Catchment Management Coordination Group may not be able to attend sufficiently to the LCC's high-level coordination and mid-level operational needs to ensure successful management of the maintenance and consolidation phases of the LCC's restoration. The reasons for this are:

- importantly, the Catchment Management Coordination Group is an advisory, communication and coordination group—as suits a cross-jurisdictional body—whereas the LCC needs a coordination group comprised of decision-makers from across the agencies in order to expedite and resolve issues. The LCC Management Group was successful as it brought together the senior decision makers and resources to complete the required engineering works
- funding and decision making priorities of the Commonwealth Basin Priority Project may dominate the group's agenda and discussion—as this is an important project with potential funding of $93.5 million over the next five years
- the membership of the group may be extensive, the reformed Senior Executive Water Group may have 14-18 members and address multiple cross-jurisdictional issues, and
- the issues in the LCC and Cotter Catchment may lack consideration due to the need to give priority and time to cross-border issues, and the lack of an over arching risk plan which emphasises the values of the LCC and enables the LCC's strategic risks—which are significant—to be recognised and prioritised accordingly.

4.7 Therefore, there would be benefit in the ACT Government developing a specific coordination and decision making body and processes for the LCC; as stated in Recommendation 5.

Improving coordination to consolidate gains

4.8 The coordination of the LCC at the higher, decision making levels has reduced since the Deed of Agreement ceased in October 2009—alongside the reduction in the role of the EPA. At the same time, TAMS and Icon Water have progressively redirected staff away from direct dedicated roles in the LCC—although this was recently rectified by TAMS to an extent. Icon Water's Source Water Protection Program Consultative Committee was intended to be the coordination forum to replace the role preformed by the original LCC Management Group. It has performed a useful mid-and-operational level coordinating function, but it has not had involvement of senior staff from across Icon Water, TAMS, the EPD and EPA which could have enabled it to replicate the functions of the successful inter-agency Management Group and Program Management Group under the Deed. The other extant ACT cross-government (including Icon Water) water coordinating committees—the Directors-General Water Group and the Senior Executive Water Group have not undertaken a coordinating role for the LCC.

4.9 There was evidence of effective mid-and-lower-level coordination, and many reports of effective working relationships across agencies involved in the LCC.

4.10 The catchment management and coordination arrangements for the LCC need to be reviewed in concert with the major agencies: TAMS PCS, Icon Water, EPD (including ACT Planning and Land Authority) and the EPA. A new management—coordination and decision-making structure—specifically for the Lower Cotter Catchment needs to be given a high priority. The goal of this needs to be the development of effective, streamlined coordination and decision making arrangements at the high level, and the integration of these arrangements into the operational level, because catchment management can involve repeated and complex coordination tasks at the operational level. An important consideration is that the decision-makers must also have the authority to assign and commit the necessary resources to implement their decisions.

RECOMMENDATION 5	REVIEW THE MANAGEMENT AND COORDINATION ARRANGEMENTS FOR THE LOWER COTTER CATCHMENT

HIGH PRIORITY RECOMMENDATION

New catchment management coordination and decision-making arrangements specifically for the Lower Cotter Catchment should be developed by the ACT Government and involve consultation with Icon Water, Territory and Municipal Services, Environment Protection Authority, Environment and Planning Directorate and Emergency Services Agency.

(The aim is to develop effective, streamlined coordination and decision-making arrangements at the high level, and to integrate these arrangements into the operational level. An important consideration is that the decision-makers must also have the authority to assign and commit the necessary resources to implement their decisions.)

4.11 As discussed in the earlier section: 'Water policy: the Environment Protection Authority's role', the policy authority for water resources is given in legislation to the EPA and is held in practice by the EPD. There is no policy authority or linkage for water policy from the EPA to the EPD. The Legislative Assembly gave the EPA a coordinating role for integrated catchment management and water policy in 2007. This situation should be reviewed as a priority; the Administrative Arrangements may also need review. In the short term, the EPD should organise the policy authority to align with legislation, and should resource the EPA appropriately for that role. In the longer term, the Government may wish to cement the recommended arrangements, or to consider a review of the *Water Resources ACT 2007.*

RECOMMENDATION 6	GIVING EFFECT TO THE WATER RESOURCES ACT: WATER POLICY COORDINATION

The Environment Protection Authority's role as articulated in section 64 of the *Water Resources Act 2007* should be implemented or reviewed.

(The Administrative Arrangements for water policy should align with section 64 of the *Water Resources Act 2007* or if existing arrangements are maintained in that water policy is in the Environment and Planning Directorate, the *Water Resources ACT 2007* should be amended.)

LCC catchment risk plan

4.12 There is no overarching integrated risk-assessment process and plan for the LCC. It is important for a risk plan to be developed for the catchment as the plan is an important coordinating mechanism which can help align and set clear priorities for all agencies to understand and follow, even where their actions are independent. Icon Water's 2009 Cotter Catchment Risk Plan provides a sound basis for the development of an LCC risk plan.[138]

4.13 A cross-agency risk plan is important as the Enlarged Cotter Dam contains twenty-five percent of the ACT's potable water supply and represents an investment of approximately $410.5 million dollars. A process which jointly identifies the strategic risks can be used to determine the appropriate financial resources for allocation to ongoing risk mitigation strategies including: fire management, maintenance of roads and sediment control structures, and weed management. Based upon analysis of relevant risk assessments and expert opinion, the highest risks to manage are: fire and wildfire, turbidity due to erosion, recreational access, and management of pine wildlings. Development of a cross-agency risk management process and plan is a high priority.

[138] ActewAGL & Water Futures, *Cotter Catchment Water Quality Risk Management Plan,* December 2009.

RECOMMENDATION 7	DEVELOPMENT OF A LOWER COTTER CATCHMENT RISK PLAN

HIGH PRIORITY RECOMMENDATION

A cross-agency risk management process and plan for the management of the Lower Cotter Catchment in reference to the land managed as a drinking water catchment should be developed by the Territory and Municipal Services Directorate, in consultation with key stakeholders, in particular Icon Water, Emergency Services Agency and the Environment and Planning Directorate, by June 2016.

(Territory and Municipal Services should therefore take carriage of the risk process and plan which should be reviewed every three years or sooner if the risk profile merits review.)

LCC plan of management

4.14 The Plan of Management, as required by the *Planning and Development Act 2007* and similarly the new *Nature Conservation Act 2014,* which gives effect to the management objectives for the LCC is now overdue by seven years. [139] The plan needs to be completed and implemented as a priority to enable effective regulation of public access. The plan should incorporate the elements of a catchment management plan as articulated in the Australian Drinking Water Guidelines; especially—a clear statement of responsibilities of different agencies and agreed coordination processes. The plan needs to define appropriate low-impact recreational activities based upon a risk assessment.

4.15 The development of the plan requires the engagement of the community through consultation. This important community consultation should be able to be less protracted, than is anticipated by EPD and TAMS, because the Legislative Assembly has already decided the priorities for the potable water catchment in the *Planning and Development Act 2007* and the *Territory Plan 2008*. A large part of the consultation should focus on informing the community about the high-level objectives for the potable water catchments.

4.16 The LCC access management risk plan should be developed in tandem with, or draw upon, the LCC risk plan. A program of community awareness and related signage describing the value of the LCC as a water catchment and guiding the community on permitted and prohibited activities within the catchment needs to be developed and rolled out.

[139] As discussed, the plan was due to commence in 2008 and commenced in 2014, with an estimated time frame of several years before it is completed.

RECOMMENDATION 8	FINALISE THE PLAN OF MANAGEMENT FOR THE LOWER COTTER CATCHMENT

The Plan of Management for the Lower Cotter Catchment should be finalised, by the Territory and Municipal Services Directorate, by July 2017.

(Community consultation for the Plan of Management should be based on the knowledge that the key management objectives for the Lower Cotter Catchment have been decided and are contained in the *Planning and Development Act 2007* and the *Territory Plan 2008*.)

Fire: fuel reduction and access management for fire fighting

4.17 The SBMP states, 'fuel is the critical element in reducing bushfire risk because it can be directly modified by land managers'.[140] The TAMS Fire Management Unit similarly stated that 'hazard reduction burning is a key component of the fuel management program in the Australian Capital Territory. The aim of burning is to reduce the fuel load and change the fuel structure so that unplanned fires that may occur in the future are more easily suppressed or mitigated'.

4.18 Dr Falconer stressed the importance of hazard reduction burning in the LCC, stating:

> The program of fire fuel reduction by controlled burns is the most important management action in the Lower Cotter catchment at the present time. The catchment is liable to both wildfires from lightning strikes in the mountains adjacent, as in 1983 and 2003 and from campfires/arson as in 1926 and 1939. High fuel loads need continuous reduction, to prevent serious erosion and fire debris deposition following fire with consequent unavoidable deterioration of reservoir water quality.
>
> It is essential that the planned controlled burns are carried out as soon as feasible, and that a major program of physical pine removal is implemented.
>
> Particular care will be needed to prevent the burns from continuing onto revegetated areas which have been planted to stabilise the erodible soils.

4.19 Dr Falconer recognised that fuel reduction burns in some areas of the LCC would require careful preparation of sediment and debris-control structures to minimise effects on the water quality post burns. He stated:

> While controlled burns are an essential part of the overall risk management in the Lower Cotter, the extent of the fire fuel accumulation, when burnt, can be expected to have adverse effects on water quality. Considerable burnt debris will be generated, and in hotter areas of the burn the soils will again be damaged with potential subsequent erosion. Any heavy rainfall shortly after the burns will carry fire debris down into the reservoir, with consequent loss of water quality. These issues are

[140] Emergency Services Agency ACT, *Strategic Bushfire Management Plan, Version 3,* 2014, p. 10.

extensively discussed in White et al. (2006). Sediment retention ponds will need to be constructed or refurbished in the crucial gully lines to retain debris.

Effective controlled burns of moderate intensity are necessary for fire risk management over many areas of the catchment, and can be undertaken with little subsequent erosion or degradation of the natural ecology.

4.20 The Strategic Management Plan required ESA, PCS and Icon Water to review the Fire Fuel Management Zones in the LCC and to prepare a fire management plan, see management action 4.3.3.b. As discussed in the section, 'Implementation of the management actions' these management actions have been achieved and as a result, some areas in the south and northwest of the LCC are now Strategic Fire-fighting Advantage Zones. The current high-level plan and policy is the *ACT Strategic Bushfire Management Plan 2014*.

4.21 The purpose of Strategic Fire-fighting Advantage Zones is to reduce the intensity and spread of bushfires in the LCC, to make any unplanned fires easier to fight in moderate weather conditions, and to reduce the impact of a fire.

4.22 The location and timing of fuel reduction activities in the Strategic Fire-fighting Advantage Zones are identified in the Regional Fire Management Plans and then in the annual BOPs, prepared by the TAMS Fire Management Unit and approved by ESA. The Regional Fire Management Plans are a developing process, they are designed for a five-year period and set out planned burns and maintenance and upgrades to roads and infrastructure to assist access for fire fighting. The production of annual BOPS for the LCC demonstrates that ongoing planning for bushfire mitigation has occurred.

4.23 The Icon Water 2009 Cotter Catchment Risk Plan identified that an important control for fire management in the Cotter Catchment was the monitoring of the success of burns in the BOPs. As reported in the section, Evaluation of the implementation of the Strategic Management Plan (Appendix A 4.3.3.c), the Cotter Dam Regional Fire Management Plan for 2009–19, and the revised draft Cotter Dam Regional Fire Management Plan 2013–19 were examined. It appears that not all interventions planned from 2009 onwards had occurred. The Regional Fire Management Plans' for the Cotter pre and post 2014: version 2 2013–19, and draft version 3 2013–19 showed that only three of either eight or ten planned controlled burns had occurred in the LCC, some of the planned burns were in or adjacent to the Strategic Fire-fighting Advantage Zones, so they were of strategic importance.

4.24 The reason for the inability to conduct the planned burns was found in the reports on the Prescribed Burn Monitoring Program by Conservation Research (EPD). These describe the difficulties in conducting the BOP controlled-burn activities in the ACT during three of the last four years due to above average rainfall in the autumn burn seasons leaving the forest fuels wet and unable to be burnt: 2010–11, 2011–12, and 2013–14. The 2012–13 season allowed three small prescribed burns. March 2015 had five burns covering an extensive area.

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4.28 The RFS provided evidence that the Bushfire Council was made aware of the Blue Range issues in November 2013, and that the RFS reports to the ESA Commissioner on the outcomes of BOP audits and outcomes.

4.29 The Cotter Dam Regional Fire Management Plan draft version 3 was approved by the ESA Commissioner as the Cotter Dam Regional Fire Management Plan 2014–19 on 19 February 2015. This plan shows two additional large controlled burns planned for 2015 in areas within the LCC, and adjacent to the LCC to the north west.

4.30 The 2015 late summer/autumn burn season has provided favourable conditions for conducting of controlled burns. As at 31 March 2015, the Fire Management Unit had completed five of seven planned burns for the larger LCC, as described in the map entitled 'Lower Cotter Catchment 2014–15 BOP Works'.[141]

The Blue Range fire risk

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LCC—in areas to the LCC's northwest, east and south. Dr Falconer's report highlighted the fire risk in an area called the Blue Range which is partly within and partly adjacent to the LCC in the northwest. This is a steeper part of the LCC where twelve years regrowth of a mixture of dense pine and scattered eucalyptus stands presents a very high fuel load. Dr Falconer reported 'ignition here has the potential to burn the whole catchment, if the wind is from the northwest and crosses control lines'. He also stated:

> This region of the catchment has the most extreme risk from wildfire, with limited access, very high fuel loads, and no effective barrier from major fires arising to the north or west in the eucalypt forest in NSW.
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4.34 The problem of the Blue Range is a more severe example of the problem of dealing with thick regrowth of pine wildlings; however it is one of several unmanaged pine regrowth forests in and around the LCC. TAMS, Dr Falconer and EPD all pointed out the importance of developing management plans and solutions for these areas as a priority for this stage of the restoration of the LCC.

4.35 These areas were unmanaged as the Government decided in 2006 to cease forestry operations in the LCC and to move to the more fire-resilient native ecosystems which are

[142] This area of 282 hectares was called Condor Creek Hazard Reduction Burn FB079.

the longer-term strategy for the protection of water quality. The pine plantations were commercially unviable and required a larger road footprint, which increased sediment generation—especially when coupled with active plantation management. As a consequence, the unmanaged pine forest timber may not be the saleable product that the Strategic Management Plan had anticipated.

4.36 The Emergency Services Commissioner stated that the SBMP 2014 had recognised the broader problem of these areas:

> Recommendations concerning land use and fire management will be developed for previous plantation areas within and surrounding the Lower Cotter Catchment. Recommendations will determine the cost-effectiveness and risk-reduction issues associated with the options developed, which may include commercial plantation operations. Outcomes of this review will inform the development of the Plan of Management for the Lower Cotter Catchment.[143]

4.37 In April 2015, TAMS advised the Audit Office that it considers that the Blue Range Rehabilitation Plan was intended to be a preliminary consultation paper; and that ESA has provided TAMS with ESA's views and recommendations on the plan. TAMS further advised that, in early 2015, it had commissioned a report into the management options for pine wilding fuels in the Blue Range. TAMS will receive a report containing a recommended plan to address fire fuels which it will then consider in the broader context of the management of these ex-plantation pine wilding areas.

RECOMMENDATION 9	REGROWTH PINE FOREST IN AND ADJACENT TO THE LOWER COTTER CATCHMENT

An action plan for the removal of the regrowth and unmanaged remnant pine forests in, an adjacent to, the Lower Cotter Catchment should be developed and implemented by the Territory and Municipal Services Directorate. In the development of the plan and in implementing it consultation should occur with the Emergency Services Agency, the Environment and Planning Directorate, and Icon Water.

4.38 The Emergency Services Commissioner supported the observations and conclusions contained in Dr Falconer's summary report on fire in the LCC. The Commissioner also commented positively on the willingness of TAMS to prepare and implement fuel reduction strategies, and that the solution was broader than fuel management. The Commissioner noted that effective fuel reduction in the LCC does not stop the risk of bushfire burning the whole catchment.[144]

[143] Emergency Services Agency ACT, *Strategic Bushfire Management Plan, Version 3,* 2014, Specific actions 2014–19, p. 53.

[144] The SBMP supports this view: 'However, it should be noted that under elevated fire danger conditions, the advantage resulting from planned fire will be reduced' p. 40.

4.39 To improve access to the LCC to support a rapid response to unplanned fire,[145] the Commissioner intends to revisit (with TAMS and EPD) the extent of the fire trail access network in the LCC, with a key priority being to meet the goal of safe access for fire-fighting and management. ESA considers that better access would also allow fuel reduction burning in smaller blocks, which is a safer strategy. At the same time, the review would consider public access management for roads and fire trails[146] in the LCC to prevent unauthorised access and reduce the risk of deliberate or accidental fire in the catchment. As part of the review of the road and fire trail network, it will be important to balance appropriate access management sufficient to enable safe fire-fighting with the goal of minimising roads and fire trails to reduce the associated risk of generating sediment. EPD advised that a 2006 CSIRO report was of considerable value in informing the original revision of the LCC road network.[147]

4.40 The Commissioner's intended review of road access aligns with the Strategic Management Plan as the main determinant of the LCC's road network is to be fire management operations.[148] The management action associated with the review of the road network, 4.1.3.c, required an initial review of the road network and road closures, followed by annual reviews—this action was rated Partly Achieved as the annual reviews have not occurred.

RECOMMENDATION 10	REVIEW OF LOWER COTTER CATCHMENT ROAD AND FIRE TRAIL NETWORK

The road and fire trail network in the Lower Cotter Catchment should be reviewed and a road network improvement plan should be developed by Territory and Municipal Services in consultation with Emergency Services Agency, Icon Water and the Environment and Planning Directorate. The review should be completed by July 2016.

(The review should define the minimum road and fire trail network that balances the goal of access for fire fighting with the goal of minimising roads and fire trails so as to minimise erosion and sediment movement into the reservoir; and examine gates and other control structures that effectively restrict or control public access but allow access for fire fighting and service needs.)

[145] Strategic Bushfire Management Plan, 'Objective 4 —Extinguish bushfires when they occur, a rapid, decisive and coordinated response', p. 3.

[146] The review is to be of unsealed mineral earth roads and fire trails.

[147] *Revegetation of water supply catchments following bushfire: A review of the scientific literature relevant to the Lower Cotter Catchment,* Paul K. Rustomji and Peter H. Hairsine, CSIRO Land and Water Science Report 9/06, April 2006.

[148] See management action 4.1.3.c.

4.41 Finally, an important strategic achievement by ESA has been the amendment in November 2014 of the *Emergencies Act 2004* consequent with the passing of the *Nature Conservation Act 2014*. This amendment gives the SMBP authority over any Plan of Management for unleased or Territory-occupied land, giving precedence to fire prevention and fire fighting activities.[149] [150]

Erosion and sediment control

4.42 Despite a MOU between TAMS and Icon Water which required the inspection and repair of roads and sediment control structures in the LCC, Dr Falconer's report identifies damaged and ineffective sediment control works which may have been in that state for some time. He also found problematic gully erosion and noted that erosion is an intractable problem in some of the areas of the LCC such as Pierces Creek with its unstable soils.

4.43 The TAMS 2014 Vegetation Monitoring Program Report indicated a general improvement in ecological function in all reference sites in the LCC. However, it expressed concern that some of the logs (used extensively in the LCC) as an erosion control device were approaching the end of their useful lives and may become ineffective. The report commented on several areas with poor vegetation cover that were prone to erosion, notably Pago Hill; and potentially at Condor Hill—where 'the log erosion control structures were rapidly deteriorating [and lifting] with the potential to fail during the next high rainfall events'.[151]

4.44 In 2013, Icon Water noted an example of extensive gully erosion which would cost more to rectify than was available through the MOU at that time and it considered that remediation was not likely to represent good value for money. TAMS was unable to spend the full MOU erosion control budget due to reported capacity issues—staffing resources to manage the purchasing and contracting of repairs. For example as late as 2012, after a period of reduced staffing resources in the LCC, TAMS was seeking an accurate list to locate and document the existing erosion control structures to enable inspection.

4.45 Dr Falconer recommended that restoration work is urgently required. He demonstrated that heavy rainfall events at times in the last several years have resulted in spikes in turbidity in feeder streams—indicating unstable soils and sediment movement at those times. Therefore, it is essential that the erosion control structures are inspected regularly and well maintained while the catchment is experiencing routine conditions; it is even more important if a fire, or a fire and a major rainfall event were to damage parts of the catchment, significantly increasing the risk of sediment movement and the possibility of

[149] Legislative Assembly ACT, *Emergencies Act 2004*, s 77A, commenced 11 November 2014.

[150] The recent changes to the *Emergencies Act 2004* also require the ESA Commissioner to consult with the Conservator in preparing the draft SBMP [s 72 (2) (b)] and report to the Minister on the Commissioner's response to any matters raised in writing by the Conservator [s 72 (3) (a, b)].

[151] TAMS, *Lower Cotter Catchment Vegetation Monitoring Program Report*, 2014 pp. iii, 19.

overwhelming less functional, ageing, or under-maintained control structures. The MOU has now ceased.

4.46 Therefore, it is now time for a reassessment of the condition of the landscape; focusing on the eroded areas and formed gullies, on the damaged erosion control structures, the capacity of the sediment ponds, and the state of the logs which are decaying. This is a high priority action to protect the catchment.

RECOMMENDATION 11	REMEDIATION OF SEDIMENT CONTROL STRUCTURES IN THE LOWER COTTER CATCHMENT

HIGH PRIORITY RECOMMENDATION

The effectiveness of sediment control structures in the Lower Cotter Catchment should be assessed to identify damaged and poorly functioning structures and pondage, and an action plan developed for implementing repairs by Territory and Municipal Services in collaboration with Icon Water.

Consolidation of lessons learned

4.47 Many research and consultancy reports, and some published articles relating to adaptive management for the LCC, were encountered during the course of the audit. TAMS reports or TAMS commissioned reports on vegetation, road management, erosion control and monitoring, fire management, the replanting program; EPD reports on monitoring of controlled burns for ecological protection, Water Watch and University of Canberra water quality reports, Icon Water analyses on including on risk management and generated by the Source Water Protection Program. However, Strategy 4, an adaptive management approach, with management actions related to information collection had four actions that were not achieved. A proposed information system to manage research reports, management action 4.4.3.i, was not achieved.

4.48 The EPD advised that there was no central repository for cataloguing and retaining this information. The concern here is that an opportunity to collate and retain this information is being missed; so that the lessons learned can be retained and referred to as needed over the maintenance and consolidation phases of what is intended to be a fifty to a hundred year restoration project. The question for the agencies which care for the LCC is: is a central repository or librarianship / curatorship for the research information on the LCC valuable? And achievable?

2017: evaluation of the Strategic Management Plan

4.49 The Strategic Management Plan proposed an evaluation of the success of the implementation against the plan's management goals, after ten years of implementation.[152] This audit report has reviewed the implementation of the management actions and has addressed the management issues identified in the plan. The report has identified current issues for the successful coordination and management of the restoration of the LCC. There would be merit in conducting an evaluation of the Strategic Management Plan, and reporting on that evaluation within two years of the publication of this audit report. The Commissioner for Sustainability and the Environment may be well placed to undertake such an evaluation.

RECOMMENDATION 12	REPORT ON RESTORATION AGAINST THE STRATEGIC MANAGEMENT PLAN

The Commissioner for Sustainability and the Environment should evaluate the restoration of the Lower Cotter Catchment against the Management Goals contained in the Strategic Management Plan, and report to the Minister for the Environment on priorities to be identified for the next decade, by December 2017.

(This aligns with the requirement in the Strategic Management Plan for it to be evaluated, Section 1.1)

[152] *Lower Cotter Catchment Strategic Management Plan*, ACT Government, January 2007, p. 1.

APPENDIX A: EVALUATION OF THE IMPLEMENTATION OF THE STRATEGIC MANAGEMENT PLAN

Strategy 1: A water resource approach to management

Management Goals: 1. High quality raw water; 2. Healthy streams & riparian zones; 4. Access & use consistent with clean water healthy landscapes.

Action	Time Frame	Agency
4.1.3.a Assess existing sediment control measures. Develop an erosion control plan that identifies erosion control measures for areas of extreme and very high erodibility and erosion hot spots. Eroding slopes connected to streams and gullies are the highest priority for management. **Rating: Achieved**	0–1 year (2007)	PCL with Icon Water [**N.B.** PCL is now Parks and Conservation Service PCS]

Evidence: A *Roading and Sediment Control Implementation Plan 2007–11* was endorsed by the Management Group in April 2008. In 2008 a report was developed for Icon Water to report on the progress of implementing the Strategic Management Plan 2008—*Analysis of ACTEW's efforts in progressing the restoration of the LCC* (Stinson Report).

The report stated: '[sediment control] ... has been a high priority ... work has progressed on identifying areas of concern, hotspots and future problem areas which were originally assessed by a multidisciplinary team consisting of academics, consultants, TAMS, ESA and ACTEW professionals. Engineering works to reduce the water flow rate and capture sediments before they reach the Cotter River have been completed and observations after rain events demonstrate their effectiveness'.

Action	Time Frame	Agency
4.1.3.b Assess stream banks and gullies and continue restoration of riparian buffers by maintaining the planting program and remedial work where necessary. The priority for work is in degraded riparian areas connected to streams and rivers (erosion hot spots). In general, restoration of riparian areas (replacing weeds with native vegetation) will be part of a LCC integrated weed management plan (s. 4.2.3). Ideally restoration work will commence in upstream areas where there is good native vegetation cover progressing to areas with poor cover. In addition, undertake a planting program with native vegetation in identified erosion hot spots. **Rating: Achieved & Ongoing [extended time frame of 0–50 years]**	0–5 years (2011) – address restoration in erosion hot spots 0–50 years (ongoing) Riparian restoration required	PCL is the responsible agency. Collaborative partnerships will be formed with Icon Water, research institutions and community groups.

Evidence: The LCC Steering Committee endorsed the *Vegetation Management Implementation Plan 2007–11* in April 2008. This plan addressed vegetation management actions identified in the Strategic Management Plan, including restoring riparian buffers and erosion hot-spots, restoring native vegetation and landscape function, managing weeds and monitoring.

The Stinson Report 2008 stated:' ... planting programs have been jointly funded by TAMS and ACTEW. Field observations and results from interviews have indicated that there has been substantial progress in this area with better than expected natural regeneration taking place'.

The University of Canberra report on stream health in the LCC, entitled: *Biological response to environmental flows below Corin, Bendora, Cotter and Googong Dams, Autumn 2009 Report*, noted that 'a reversal of declining condition of streams within the LCC is largely dependent on the return of more characteristic rainfall. However, until catchment sediments are adequately stabilised and streamside vegetation returns to a more natural state, the degree and permanence of improvements to stream condition will remain limited'.

The *ACT State of the Environment Report 2011* cited a 2010 study (Ishyama et al. 2010) stating, 'the condition of the Cotter River was extremely good in Namadgi National Park, but poorer in the former softwood plantation area of the LCC.

The Falconer Report 2015 noted significant efforts by Icon Water in developing sediment control works, gabions, road culvert design and sedimentation ponds to control sediment movement. Dr Falconer noted successful works and also ongoing unstable soils in the Lower Pierces Creek area and Upper Condor Creek with gully erosion, washouts and some failure of erosion control measures.

Dr Falconer stated, 'the program of [blackberry] control from 2009–12 shows extensive control activity particularly along riparian zones, but much of the area is still affected. Ongoing blackberry control in perpetuity will be needed particularly as the controlled burn program is implemented, which will encourage blackberry growth'.

The *LCC Vegetation Monitoring Program Report 2014* did not specifically report on riparian zones, however it commented on one of the sample sites, the Cotter River, stating that it 'had exceeded Landscape Function Analysis targets at the new Black Mountain reference sites ... [and was] considered to be [one of the] highly functional communities analogous to those occurring within the local Canberra area'.

Action	Time Frame	Agency
4.1.3.c Revise the modified road network plan for the catchment to be consistent with the recommended change in land use policy. Roads are a major source of sediment to streams and a progressive reduction in the number of roads will result in considerable improvement to water quality. The road network will be determined primarily by requirements for fire management operations. (See Map 7 Indicative Road Map*) Roads that are additional to fire suppression requirements may be retained or left dormant if they are needed for management purposes such as: • fire fuel management; • revegetation and restoration programs; • weed control; • soil erosion control measures; and • water monitoring. A greater level of management access will be required while rehabilitation work is being undertaken. Access roads will be progressively closed as vegetation re-establishes and restoration work completed. **Rating: Partly Achieved & Ongoing**	0–1 year (2007) for road plan Review plan annually 0–20 years (2026) for progressive closure of roads	PCL (in consultation with ESA and Icon Water) PCL with Icon Water

Evidence: The evidence in this section addresses the revision of the road network and the development of a road plan. *The Roading and Sediment Control Implementation Plan 2007–11* (September 2007) was developed during 2007 and endorsed by the Management Group in April 2008. The road plan was to be reviewed annually. After the formal reporting against the road plan in 2007–08, there is no evidence that a review of the road network plan has occurred, nor annual reviews.

It is now time for the road network to be reviewed; the Emergency Service Agency Commissioner (ESA), in meetings with the Audit Office in January 2015, raised the need for a review of road access for fire

management. There will be a need to balance sufficient access for fire management with adequate road closures for sediment reduction and to continue sediment control measures, to prevent turbidity. It is important to note that the timeframe for progressive closure of the roads extends until 2026.

The Falconer Report examined the Roading and Sediment Control Implementation Plan and its 'objectives, strategies and actions', aimed at reducing sediment movement, and also examined Objective 3 – Redundant Roads. Dr Falconer stated that 'a significant effort has been made with respect to redundant roads'. The criteria for redundancy were identified in the plan, and these criteria provided 'a sound basis for decision, and underlie the closure of 100 km of roads. Treatment of closed roads was investigated by Landvision [2006] ... some needed access roads were gated, others where access was denied for erosion control were blocked by trees and branches ... rollovers were constructed to distribute runoff into locations where gully formation was unlikely, and tree trash laid over the roads between rollovers to slow water movement'. Dr Falconer stated that his ' limited current inspection of closed roads showed effective remediation'.

There is a Memorandum of Understanding (MOU) between Icon Water and TAMS which provided $500,000 to be spent over 5 years for roading and sediment control works in the LCC, the *LCC Sediment Control Maintenance Implementation under the Biodiversity Offsets Implementation Plan 2009 – 14*. By December 2014, TAMS had spent approximately $341,000, which was an underspend. The MOU also required an assessment of sediment control structures in 2013, before the final year of works in 2014.

Dr Falconer's report identifies damaged and ineffective sediment control works which may have existed for some time. Dr Falconer inspected the LCC in October 2014 and noted, 'active gully and surface erosion in both sectors of the catchment, with no visible present attempt at control or remediation. Heavy rainfall in February and December 2010, November 2011 and February/March 2012 ... can be expected to be responsible for the damage. While road maintenance appears to be effective and current, erosion control appears to have been neglected from the [time off the] report covering 2007–08 to the present'.

The 2014 report of the TAMS, *LCC Vegetation Monitoring Program,* identified that where pine logs and tree trash had been used as erosion control measures on closed roads, they may be approaching the end of their useful life; in particular this applied to Pago Hill, 'the rapid decomposition of the erosion control structures may also put some areas at risk and may require further intervention'. It is timely for a review of sediment control structures employed on closed roads.

Action	Time Frame	Agency
4.1.3.d Close, remove, rehabilitate or upgrade roads that are a direct source of sediment to streams. Priorities for road closures and rehabilitation will be those that: • occur in erosion hot spots and high risk areas; • are in areas with erosion susceptible soils; and • are located in riparian areas (including those with threatened species) and are not required for management purposes. **Rating: Achieved**	0–3 years (2009)	PCL in consultation with Icon Water

Evidence: 'Roads were clearly identified as the single most significant cause of sediment movement in the LCC ... [which] was driven by the Forestry plantation operations'.

Progress reporting against the *Roading and Sediment Control Implementation Plan 2007–2011* occurred in 2006–07 and 2007–08. There has been no further formal high-level reporting against the plan since the 2007–08 report.

The 2006–07 progress report stated that over 50 km of roads had been upgraded and over 37 km of redundant roads had been closed. The 2007–08 progress report was unclear about the number of roads upgraded, but identified the closure of a further 69 km of roads. This report stated that, in total, approximately 121 km of roads had been identified for removal and 15 km of roads were scheduled to be closed in 2008–09, but that this had been delayed due to pending construction of the new Cotter Dam. The 2007–08 report also identified that several roads were to be closed for public vehicle access in 2008–09 by

use of gates.

The Stinson Report stated that road closures, rehabilitation and upgrading had been 'the main focus of works over the last two years and it is expected that this action alone will have a substantial effect on reducing sediment movement within the LCC'.

Action	Time Frame	Agency
4.1.3.e Identify in-stream sediment loads and develop a remediation plan to capture and retain sediment e.g. wetlands and sediment basins. Assess existing constructed wetlands and sediment basins. **Rating: Partly Achieved & Ongoing**	0–2 years (2008)	PCL with Icon Water

Evidence: As per the *Conservation Management Plan: Blundells Flat and Shannons Flat*, the revegetation and restoration of Blundells Flat and Shannons Flat including the development of an associated conservation management plan (see also 4.4.3.g) demonstrates an effective restoration program in a sensitive wetlands and riparian zone area.

The Stinson Report stated that 'significant engineering works including in-stream gabion, sediment basins and appropriate drainage ditches have been constructed. These structures require constant monitoring'.

The Falconer Report identified sediment control structures, for example, the Pierces Creek Dam—the effectiveness of this pondage as a sediment management structure has been impaired. Dr Falconer stated, 'sedimentation ponds are particularly important in the lower section of catchments, where potential sediment loads are high and the slope is reduced. The ponds seen were effective, but need regular inspection as heavy rain can cut through the earth dam wall and empty the contents in the reservoir, reversing the benefit of retention'.

This management action has been rated as 'Partly Achieved, and ongoing' (notwithstanding the timeframe of 1–2 years) as significant work has been done, but there is a serious problem with ensuring adequate ongoing monitoring and maintenance of important sediment control structures to ensure the continued effectiveness of these structures.

Action	Time Frame	Agency
4.1.3.f Develop a program of in-stream vegetation management and restoration. **Rating: Achieved**	0–5 years (2011)	PCL

Evidence: The *Vegetation Management Implementation 2007–11* provided objectives and priorities for the management of weeds and the restoration of native vegetation over a long period of time. The plan also provided priorities for the first three years until 2008–09. There were two annual progress reports, 2006–07 and 2007–08.

The 2006–07 report stated that blackberry spraying had occurred over 150 ha, including high conservation value wetlands at Blundells Flat. Also, planted pines were removed around the Cotter Reservoir foreshores and other areas where they conflicted with the objective of restoring riparian zone buffers.

The 2007–08 report identified blackberry spraying over 47 hectares within high conservation value wetland areas and road sites. Formal reporting against this plan does not appear to have occurred after 2007–08.

The *ACT State of the Environment Report 2011* stated that a number of sphagnum bogs burnt in the 2003 fires in the Cotter Catchment have been rehabilitated.

Blackberry is a significant weed in the Lower Cotter Catchment; the aim has not been to eradicate but to contain the population. Dr Falconer stated that 'blackberry control will continue to be needed particularly in riparian zones'.

The *ACT Weeds Strategy 2009–19* lists blackberry as a weed to be contained and further planting is prohibited; pinus radiata is to be contained. The Environmental *Weeds Operations Plan 2012–13* rated

blackberry as a very high risk weed; the weed management activity is aimed at containment. Twenty-three percent of the 2012–13 weed control budget was spent on blackberry control.

The *Vegetation Monitoring Program* reported on a few riparian areas; however the selected sites were ones where little rehabilitation activity had occurred. The ecosystem recovery has been better than expected, but in these cases this is not the result of a vegetation management program. For example, the *LCC Vegetation Monitoring Program Report 2011* monitored one riparian area around Condor Creek and noted: 'Regrowth area on steep slope adjacent to Condor Creek. Many blackberries and unburnt pine log heaps upstream. Fallen logs and dense patches of shrubs. The ground cover is patchy but is appearing to be stabilising. In 2011, the shrubs had significantly grown and there was increased ground cover'.

For the Cotter River area the report stated: 'In 2011, there had been significant growth of the understorey shrubs and an increased level of ground cover, including leaf litter resulting in less evidence of sheet erosion, with the development of soil crusts in some areas. The trees had improved in health' (*LCC Vegetation Monitoring Program Report* June 2011).

This management action has been rated ' Achieved', as action has occurred and natural recovery has exceeded expectations. However the lack of continued formal reporting against the plan after 2008 has made measuring the outcomes more difficult.

Action	Time Frame	Agency
4.1.3.g Plan and implement a coordinated program of environmental monitoring (particularly of water quality and quantity and biodiversity recovery) throughout the study area. **Rating: Achieved**	0–2 years for plan (2008) ongoing monitoring Regular reporting	PCL with Icon Water
Evidence: See: 4.4.3.a (i – ix)		
Action	**Time Frame**	**Agency**
4.1.3.h Prepare an access management plan for management, community and other access requirements. **Rating: Partly Achieved**	0–2 years (2007)	PCL with Icon Water
Evidence: See 4.3.3.f.		

Strategy 2: A landscape and ecosystem approach to management

Management Goals: 3. Stable catchments & natural ecosystems

Action	Time Frame	Agency
4.2.3.a Analyse ecosystem function with a priority on erosion hotspots to determine the most practical and cost effective measures for ecological restoration. **Rating: Achieved**	0–2 years (2008)	PCL

Evidence: An analysis of erosion hotspots has informed the development of the *Roading and Sediment Control Implementation Plan 2007–2011*; this document also contained a map showing the location of erosion hotspots.

This initial work has been followed up by the *Landloch Report 2008*, which was commissioned to 'provide additional information and guidance with respect to erosion control and land remediation options'.

Action	Time Frame	Agency
4.2.3.b Conduct botanical surveys to gather baseline vegetation data. Assess native vegetation recovery and options using pre-1750 vegetation models to identify suitable dominant species. For pre-1750 vegetation types see Map 5 and Appendix E [Strategic Management Plan]. **Rating: Achieved**	0–3 years (2008)	PCL with partners

Evidence: An ongoing vegetation monitoring program the *Cotter Catchment - Landscape Analysis* has been implemented by Icon Water and TAMS for the Lower Cotter Catchment. An inspection in 2007 determined the monitoring sites for this program.

Baseline data were reported in the *TAMS LCC Vegetation Monitoring Program,* May 2008 and Icon Water's August 2008 report *Cotter Catchment - Landscape Analysis for the EIS for the Enlarged Cotter Dam;* NB. Lees Creek and Pierces Creek areas were identified as high erosion areas.

Action	Time Frame	Agency
4.2.3.c Continue to restore native vegetation and landscape function using cost-effective measures and by harnessing natural processes to stimulate natural restoration and revegetation. For example: **Rating: Achieved & Ongoing**	0–50 years (ongoing)	PCL with partners

Evidence: The landscape organisation, a measure of stability, and the landscape function analysis— which includes stability, infiltration and nutrient recycling, showed overall progressive improvement from 2008, 2010 to 2014.

Action	
4.2.3.c (i)	(i) manage weeds where regeneration is occurring naturally; **Rating: Achieved & Ongoing**

Evidence: Weed management is guided by the *ACT Weed Strategy 2009–2019* and the annual Environmental Weeds – Operations Plan.

The Falconer Report observed that 'major pine wilding removal has been undertaken since 2003, with something over 6 million removed to date'.

The Falconer Report further observed that 'Blackberry control has continued since infestation following the 2003 fire. The program of control from 2009–2012 shows extensive control activity, particularly along riparian zones but much of the area is still affected'.

Action	
4.2.3.c (ii)	(ii) consider the use of prescribed fire to eradicate pine wildings before or soon after they reach sexual maturity (5–7years) in areas where this is the most feasible measure; **Rating: Achieved & Ongoing**

Evidence: Action has been taken as evidenced by TAMS annual BOPs from 2008-14 which show planning for 8–10 controlled burns in the LCC. However, for example, plans for the Blue Range were made but where not implemented because of rain prior to the planned burns and other higher priorities emerging elsewhere in the land managed by TAMS.

Action	
4.2.3.c (iii)	(iii) on steep, eroding slopes or areas where there is a high risk of erosion, retain weedy vegetation cover until it is feasible to undertake revegetation and restoration work; **Rating: Achieved & Ongoing**

Evidence: The restoration of the vegetation in the Lower Cotter Catchment is guided by the *Vegetation Management Implementation Plan 2007-11* that provides a strategic approach to the restoration based on vegetation type, amount of natural regeneration, recent management and the amount of weed infestation. The subsequent implementation reports 2006–07 and 2007–08 against the vegetation implementation plan show that ecological considerations informed the choice of revegetation areas; these considerations resulted in areas where spot cultivation was undertaken.

Action	
4.2.3.c (iv)	(iv) promote native vegetation regeneration within existing pine plantations and following their removal; **Rating: Achieved & Ongoing**

Evidence: TAMS entered a MOU with Greening Australia, in 2006, to support the revegetation of the LCC. Greening Australia planted native vegetation as a means to improve water quality and increase resilience to future fires. NB. the timescale is up to 50 years.

Action	
4.2.3.c (v)	(v) undertake direct seeding and planting in erosion prone areas where the soil is bare as a high priority; **Rating: Achieved**

Evidence: The *Vegetation Implementation Plan 2007-11* provided a strategic approach to set the priorities for restoration based on vegetation type, amount of natural regeneration, recent management and the amount of weed infestation. This document shows the importance of the correlation between catchment stability and ground layer vegetation. Greening Australia's *Regreening the Cotter* report states that the priority setting for work in the LCC was, among other things, based on the amount of naturally regenerating native vegetation.

TAMS employed contractors for reseeding and commenced in priority areas. This is also observed in the ACT *State of the Environment Report 2007-08* which stated: 'Major revegetation works in 2006-07 saw thousands of native seedlings planted in strategically important areas of the Lower Cotter Catchment by contractors and hundreds of volunteers in a large community-based project led by Greening Australia'.

Action	
4.2.3.c	(vi) ensure weed management addresses weeds in native forest particularly adjacent to

(vi)	Namadgi National Park; **No rating assigned to this action – insufficient evidence**

Evidence: The *ACT Weed Strategy 2009–2019* and the subsequent annual Environmental Weeds Operations Plans set out the framework for weed management; TAMS is responsible for coordinating the implementation of this strategy. ACT-wide priorities are set through annual weed operational plans that are developed by the ACT Government agencies in collaboration with the Land Managers' Weeds Working Group and the ACT Weeds Advisory Group and are monitored by the ACT Weeds Working Group. Weed strategies applied in the ACT can range from prevention, eradication, containment to asset based protection.

The ACT Weeds Strategy 2009-2019 shows that blackberry is a Weed of National Significance which is prohibited in the ACT and needs to be contained; pine is a declared pest plant in the ACT and must be contained. However, the *Invasive Plant Control Plan 2012-13* does not mention pine as a species that needs to be managed.

It is difficult to assess the success of weed management in the Lower Cotter Catchment, as this area is a disturbed area and therefore more susceptible to infestations of weeds, in particular blackberry as a result of previous pine plantations. There is evidence that shows that weed management has occurred in the Lower Cotter Catchment, for instance as mapped on the ACT PCS Weeds Atlas.

Action

4.2.3.c (vii)	(vii) areas that are stable with a grassy or shrubby vegetation cover may be left until resources are available for seeding or planting programs to augment structural diversity; **Rating: Achieved & Ongoing**

Evidence: This strategy has been applied as priority was given to areas located in riparian zones and areas with unstable soils. Greening Australia focused on two specific areas, Uriarra Forest which had the longest history of intensive land use and Pierces Creek with highly erodible soil.

The 2006-07 and 2007-07 reports against the *Vegetation Management Implementation Plan 2007-11* show that a phased approach was taken:

- in 2006-07, small areas of plantation were removed to create eight 'islands' within plantation areas;
- 200 ha of pines planted in 2005 were removed in 2007-08; and
- planting to replace the removed pine plantations at Bullock Paddock was set for spring 2008.

Action

4.2.3.c (viii)	(viii) an exotic or native grassy understorey may be planted if it is the most feasible option for woodland areas; **Rating: Achieved**

Evidence: Native grass recovery has been better than expected as can be observed from the ongoing vegetation monitoring reports developed under the Vegetation Monitoring Program.

Action

4.2.3.c (ix)	(ix) continue to restore native vegetation and landscape function by harnessing natural processes to stimulate natural restoration and revegetation, and using local provenance plant material if possible, recognising that species selection is dependent upon availability of seed and cost effectiveness; **Rating : Achieved**

Evidence: Natural recovery has occurred to a greater extent than anticipated. Local provenance plant material has been used; considerable effort went into balancing availability of seed with cost effectiveness.

Action	
4.2.3.c (x)	(x) use sterile grasses where possible and avoid using non-sterile grasses in, or adjacent to areas with good native vegetation cover; **Rating : Achieved**
Evidence: Grasses have been carefully managed to avoid introduction of non-sterile grasses.	
Action	
4.2.3.c (xi)	xi) consider suitable control programs where impacts from feral animals are shown to be detrimental to recovery of the LCC; **Rating : Achieved**
Evidence: Local ranger knowledge has been used to implement strategies for feral animals including the *Vertebrate Pest Operational Plan*. In practice, much of the animal control programs are conducted in Namadgi National Park to avoid water contamination. The *ACT Pest Animal Management Strategy 2012–22* considers the Cotter (river/ catchment) and its strategies for control of feral horse, carp, redfin perch and eastern gambusia fish. The *State of the Environment Report 2011* does not mention specific issues in relation to the fauna in the LCC.	
Action	
4.2.3.c (xii)	xii) consider the role of fauna in improving landscape function and their habitat requirements; and **Rating : Achieved**
Evidence: This has been considered, and is illustrated by the planning effort to introduce bettongs into the Lower Cotter Catchment.	
Action	
4.2.3.c (xiii)	(xiii) monitor the success of restoration techniques. **Rating : Achieved**
Evidence: The success of the restoration is monitored through an extensive Landscape and Vegetation Monitoring Program.	

Action	Time Frame	Agency
4.2.3.d Prepare a vegetation restoration plan that also addresses integrated weed management strategies. The vegetation plan will be based on landscape units and sub-catchments. Ideally restoration work will commence in upstream areas where there is good native vegetation cover progressing to areas with poor cover. Source expertise on restoration and weed management from relevant organisations such as CSIRO, ESA, Icon Water and other organisations. **Rating : Achieved**	0–2 years (2007)	PCL
Evidence: A *Vegetation Management Implementation Plan* was endorsed by the LCC Management Group in April 2008. This vegetation management plan addressed integrated weed management strategies and defined and identified priority areas and species for weed control. This plan also identified specific monitoring and research strategies to inform weed management operations.		

Action	Time Frame	Agency
4.2.3.e Identify opportunities for habitat enhancement and connectivity to support the recovery or reintroduction of rare, threatened or unusual species. **Rating : Achieved**	Years (2007)[153]	PCL

Evidence: Icon Water, as part of the work for the Enlarged Cotter Dam has done significant work through its Enlarged Cotter Dam Fish Management Program on improving outcomes for the Two-spined Blackfish (which is declared vulnerable), and the Macquarie Perch (which is declared endangered).

The ACT *State of the Environment Report 2011* noted that 'the populations of Two-spined Blackfish and Macquarie Perch in the lower Cotter River (below Bendora Dam) appear to be recovering, indicating improvements in habitat quality at regulated sites following the 2003 fires. This is likely to result from environmental flow releases mitigating the effects of the drought'.

The ECD Fish Management Program won the 2013 Australian Water Association National Award for Program Innovation which recognises significant and innovative environmental or sustainability programs within the water industry.

Also considerable planning effort has been undergone which may guide the re-introduction of Bettongs in the LCC.

Action	Time Frame	Agency
4.2.3.f Identify opportunities for conducting cultural heritage surveys to support the ongoing research into Aboriginal occupation and movement patterns, and into European settlement in the area. **Rating : Achieved**	Years[154]	PCL

Evidence: A Conservation Management Plan was developed for the Blundells Flat and Shannons Flat, located in the LCC.

The Falconer Report stated:

'The *Heritage Act 2004* sets up a register for identification, registration and conservation of cultural heritage. In the LCC nearly 300 aboriginal artefact scatters have been located, largely below the high water line for the Enlarged Cotter Dam. These scatters are mainly on low promontories facing the Cotter River and have been surveyed and objects collected for study, with subsequent burial of those not needed for investigation. The burial ceremony was conducted by elders, with a smoking ceremony, and the burial site hidden.

There are also two aboriginal rock shelters, and one scarred tree in the catchment.

During the restoration work following the fires, a two year program the "Yurung Dhaura Aboriginal Land Management Team ACT", was set up to train and employ seven young Aboriginal adults. They received training in Aboriginal natural resource management, cultural leadership, interpretation of cultural heritage, and conservation and land management. They formed a highly capable bush-regeneration team, which was awarded the national Indigenous Land Management Award from Landcare Australia in 2014. Some members have now obtained employment in related activities, including in Greening Australia'.

[153] The Strategic Management Plan is not specific with the time frame.

[154] The Strategic Management Plan is not specific with the time frame.

Strategy 3: A risk management approach

Management Goals: 4. Access & use is consistent with delivering clean water & healthy landscapes

Action	Time Frame	Agency
4.3.3.a Identify hazards and assess risks to water quality throughout the catchment and prepare a risk management plan to reduce the likelihood of hazardous events or activities impacting on water quality. **Rating: Partly Achieved**	0–2 years	PCL with Icon Water and ESA

Evidence: The Stinson Report stated 'it is not readily evident that there is a single [risk management] plan in place. ... it is important that an integrated approach to risk assessment be put in place and cumulative impacts analysed'. This continues to be the case to date. An important coordination task is to develop a LCC risk management plan which is agreed and shared between the major agencies.

Icon Water developed *the Cotter Catchment Water Quality Risk Management Plan* in December 2009. The two highest risks in the Plan were bushfires (high) and recreation access (moderate).

The *Strategic Bushfire Management Plan Version 3 2014* (SBMP v.3) identifies a significant risk of catastrophic fire in the catchment.

The *Blue Range Rehabilitation Plan 2014–2025* identifies the fire risk in the Blue Range as extreme.

TAMS developed a draft *Recreation Management Strategy 2010* which is risk based, but it needs to be finalised and incorporated in the Plan of Management. TAMS develops risk management plans for specific activities in its individual Works Plans.

Icon Water's, Water Group Risk Register dated February 2014 has lowered the risk for fire in the catchment from high to medium—not in alignment with the SBMP, and based upon a much lower rating of the likelihood of fire.

The Icon Water risk analyses have not carried over into the thinking of TAMS or EPD or the Directors-General Water Group in highlighting and managing the Lower Cotter Catchment—an important water asset. For example, 'recreational management in the LCC is a critical part of source water protection for drinking water supplies. It needs cooperation between the land manager [TAMS] and ACTEW'. In this context: the Plan of Management is not completed, enforcement powers in the LCC which lapsed in 2008 will recommence in mid-2015, and signage to guide the public could be improved at Vanitys Crossing.

Action	Time Frame	Agency
4.3.3.b In consultation with relevant stakeholders including NSW agencies, review the Fire Fuel Management Zones and a prepare fire management plan for the LCC to take into account water quality goals, restoration measures and other objectives for fire management such as the protection of life and property, infrastructure and natural and cultural heritage assets. **Rating: Achieved**	0–1 year or when the review is being undertaken	ESA, PCL with Icon Water

Evidence: On the 26th of April 2008, the LCC Management Group endorsed the *Fire Management Implementation Management plan 2007–11* (FMIP). The plan reviewed the fire management zones in the LCC as required by the Strategic Management Plan. The then *Strategic Bushfire Management Plan* (January 2005) identified most of the LCC as either Land Management Zone or Outer Asset Protection Zone reflecting the prior land use of plantation forestry. The FMIP established an alternative zoning and proposed that parts of the LCC become Asset Protection Zones, Landscape Division Zones and Landscape Management Zones. Reporting against the FMIP occurred for 2006–07 and 2007–08. There is no evidence of subsequent

reporting.

The *Strategic Bushfire Management Plan Version 3 2014–19* identifies two fire management zones for the LCC: some parts are Strategic Fire-fighting Advantage Zones (SFAZ) and the larger part is a Landscape Fire Management Zone. 'The SFAZ have the objective of reducing the intensity and spread of fires across large landscape units, which will contribute to the success of fire fighting under moderate weather conditions. In addition to assisting to suppress bushfire, these fuel reduced areas will reduce the impacts of unplanned fire on catchment values [water yield and quality] by reducing the size and intensity of fire in these areas. Planned fire will be used as the principal management tool to reduce bushfire fuel levels ... this will reduce the impact of bushfire.... as well as impacts on water catchment and environmental values'. 'The location and timing of fuel reduction activities in SFAZs over the 2014 to 19 [period] are identified in Regional Fire Management Plans'.

The 2009 Water Quality Risk Management Plan stated that in 2003, 'the Australian Alps National Parks Liaison Committee and the Australian Alps Ministerial Council agreed to adopt fire management principals to guide fire management planning throughout the Australian Alps protected area system'.

The Stinson Report stated 'it does not appear that high level discussions with NSW on this topic [fuel reduction activities managed on adjacent lands] have been initiated and this has the potential to affect the progress and investments to date'.

However since 2008, progress has been made, *the SBMP v3 2014* indicates that formal arrangements are in place with NSW agencies to provide for integrated and efficient cross-border response arrangements. These include Memoranda of Understanding with NSW Rural Fire Service, NSW Office of Environment and Heritage - National Parks and Wildlife, and an interstate assistance agreement with NSW Fire and Rescue. Appropriate high-level forum and operational coordination arrangements for planning, fuel management and reporting have been developed.

Action	Time Frame	Agency
4.3.3.c Undertake bushfire mitigation measures in accordance with the Strategic Bushfire Management Plan and Bushfire Operational Plans. **Rating: Partly achieved**	Ongoing	PCL with ESA and Icon Water

Evidence: *The Strategic Bushfire Management Plan v3 2014* (SBMP) is the overarching policy. Underneath the SBMP there are Regional Fire Management Plans (RFMP) including an RFMP for the Cotter Dam precinct, including the LCC. The *Cotter Dam RFMP 2009–19* and draft *Cotter Dam RFMP 2013–19* were examined. The RFMP's illustrate the major fuel management, fire access management and fire infrastructure management strategies for implementation to meet the requirements of the SBMP.

'BOP [Bushfire Operational Plans] detail the specific timing, type and location of fuel reduction, access and infrastructure activities proposed to be undertaken in the ACT' . These annual BOPs show that ongoing planning for bushfire mitigation in the LCC area has occurred.

It is more difficult to assess whether planned interventions actually have occurred. The RFMP's for the Cotter pre and post 2014: version 2, 2013–19, and then draft version 3, 2013–19 showed that only three of either eight or ten planned controlled burns had occurred in the LCC.

The research reports for the Prescribed Burn Monitoring Program by Conservation and Planning (EPD) describe the difficulties in conducting the BOP controlled-burn activities during three of the last four years due to above average rainfall in the autumn burn seasons where the forest fuels were wet and unable to be burnt: 2010–11; 2011–12; and 2013–14. The 2012–13 season allowed three small autumn prescribed burns.

Similarly, the management of the Blue Range area in the LCC has demonstrated difficulties in achieving planned prescribed burns due to autumns where it was too wet to burn, or a time when other fire management issues were considered a higher priority.

In autumn 2015, the Fire Management Unit had completed five planned controlled burns in the LCC [this included the greater LCC area including parts within the National Park and outside the catchment areas

reserved under 'pg' in the *Territory Plan 2008*.

The *Strategic Bushfire Management Plan 2014* also identifies a specific action item for the LCC:

> 'Recommendations concerning land use and fire management will be developed for previous plantation areas within and surrounding the Lower Cotter Catchment. Recommendations will determine the cost-effectiveness and risk-reduction issues associated with the options developed, which may include commercial plantation operations. Outcomes of this review will inform the development of the Plan of Management for the Lower Cotter Catchment'.

BOPs and burn outcome monitoring, are cited as a major control by Icon Water in its 2009 Cotter Catchment Water Quality Risk Management Plan. The ESA is currently following up on recommendations provided by the Bushfire Council for ESA to improve its processes to ensure that the entire BOP is implemented as intended.

Action	Time Frame	Agency
4.3.3.d Ensure that contractors working in the catchment are aware of risk mitigation requirements in relation to soil disturbance, use of chemicals and the potential for accidental fire ignition. **Rating: Partly Achieved**	Ongoing	PCL with Icon Water and others

Evidence: There are two broad authorisations which must be obtained before conducting works that have the potential to damage the environment. They are:

- an Environmental Authorisation under the *Environment Protection Act 1997* section 49 for works that are class A activities as listed in schedule 1 in the Act. e.g. the extraction of 100 m3 of material from a waterway or prescribed burns to reduce the fire hazard
- a Waterway Works licence which covers works in waterway and their banks i.e. riparian zones.

These licences contain conditions such as:

- notification to the Environment Protection Authority (EPA) of the location, method, environmental controls and timing of each Waterway Work activity before work commences
- the licence holder must contact an ecologist from Conservation Planning and Research, EPD for advice before any work involving riparian restoration
- vehicle movement to be restricted to formed roads, or carefully when off formed roads.

TAMS and Icon Water obtained Waterway Works Licences which contain EPA conditions requiring the licence holder to comply with the *ACT Code of Forest Practice 2005.*

The *ACT Code of Forest Practice 2005* defines among other things exclusion zones around specific riparian area based on their characteristics; if works are required within these exclusion zones an approval is required from the EPA. The *ACT Code of Forest Practice 2005* is out of date. Updating it was identified as a priority task in the Strategic Management Plan.

Icon Water and TAMS developed a: *Code of Practice for maintenance works: Practical guidelines and standards for co-operation between ACT Parks, Conservation and Lands & ACTEW AGL, September 2009* (The Code of Practice for maintenance works). The Code of Practice for maintenance works guides Icon Water and TAMS and their contractors when they are conducting inspection and maintenance activities on controlled land. It contains guidelines in relation to soil disturbance, use of chemicals and potential for accidental fire ignition.

The Code of Practice for maintenance works requires that Work Plans developed by one party (TAMS or Icon Water) should be shared with the other party. The Code also requires for both parties to submit their annual operations plan to each other. Icon Water advised that they were not receiving all of the relevant TAMS work plans for the Lower Cotter and that there was no exchange of annual operation plans as required by the Code of Practice for maintenance works.

Parks & Conservation Service Works Plans provide a checklist of activities to be avoided or managed in order to reduce risk. TAMS contracts provide clauses which require contractors to comply with environmental restrictions such as those contained within the *ACT Code of Forest Practice 2005*.

Action	Time Frame	Agency
4.3.3.e Prepare an environmental management plan for works and events that pose a high contamination risk to streams in relation to any of the following: • pathogens; • chemicals; • wild fire; and • erosion and sediment delivery to streams. **Partly Achieved**	As required	PCL with Icon Water

Evidence: As discussed above (4.3.3.d), operations in the catchment that have the potential to cause environmental harm are subject to authorisation by the EPA through Waterway Works Licences and Environmental Authorisations.

Wildfire and erosion control are covered under the *ACT Code of Forest Practice 2005*, which can be included by the EPA as a condition for an Environmental Authorisation. The *ACT Code of Forest Practice 2005*, however, requires updating in several areas and is an important control because EPA uses it as a standard.

Pathogens and chemical management are considered and dealt with by Icon Water by their SWPP and the risk management program in the SWPP's risk management strategy, the *Water Quality Management Prerequisite Program for the ACT Drinking Water Catchments,* March 2013.

While 'ACTEW Water is not directly responsible for land management within drinking water catchments, to reduce the hazards and risks to water quality ACTEW relies on the cooperation of catchment stakeholders. The SWPP ... works to support on-ground activities that protect the drinking water catchment and engages with stakeholders through proactive education programs'.

Parks Conservation Service's Work Plans contain a risk assessment which addresses issues such as chemicals, storage of fuel on site, fire suppression equipment and other hazards.

Action	Time Frame	Agency
4.3.3.f In consultation with the community prepare an access plan that takes into account a risk management framework aimed at protecting water quality. **Rating: Partly Achieved**	0–4 years (2011)	PCL with Icon Water

Evidence: Regarding access and approved activities within the LCC, two draft recreation strategies have been prepared—in 2008 and 2010; however their value has been limited as they remained in draft form.

The current *2010 (draft) Recreation Strategy* expects that this strategy will be finalised in the development of a Plan of Management for the LCC. The Plan of Management is still under preparation as at March 2015, and its finalisation is not expected for some time. Therefore, the effectiveness of the *Recreation Strategy 2010* is limited, many of its statements are proposed changes to manage or control access, so it is not a finalised approved plan that can be used as a completed basis for guidance for public education and signage and for explaining those low-impact activities which are compatible with the goal of protection of water quality.

The draft *2010 Recreation Strategy* has developed a thorough list of low-impact activities which is a good basis for the Plan of Management. The draft *2010 Recreation Strategy* states that it takes into account a risk management framework aimed at protecting water quality and shows a risk-based approach as it defines management zones with associated allowed and prohibited activities; however the underlying risk

assessment is not part of this document.

Regarding community consultation, in the draft *2010 Recreation Strategy* ,TAMS stated 'the previous version of this Strategy was available for community consultation in the second half of 2008 primarily via the TAMS website. Responses to the previous draft were received from the ACT Equestrian Association and from motor sport users. In addition, ACT Health provided some advice pertaining to horse riding. The current draft has been updated in light of these responses'.

Strategy 4: An adaptive and collaborative management approach

Management Goals: 5. Conservation of natural & cultural heritage; 6. Best practice management; 7. An involved & supportive community

Action	Time Frame	Agency
4.4.3.a Develop monitoring programs. **Rating: Achieved**	0–3 years and ongoing (2008)	PCL with Icon Water with partners

Action	
4.4.3.a (i)	(i) water quality (for water quality generally and to measure the success of sediment control programs and); **Rating: Achieved**

Evidence: Dr Falconer reported that, 'ACTEW produces an *Annual Drinking Water Quality Report* which monitors water quality to satisfy the requirements of its Licence to take water from the EPA. Icon Water have carried out water quality monitoring at several sites in the Cotter system, including Condor Creek, Cotter River, and Bendora reservoir and in the Cotter reservoir. Detailed data for rainfall, bacteriological quality, turbidity on a daily basis is available, and nutrients, pesticides and cyanobacteria in the Cotter reservoir'.

Action	
4.4.3.a (ii)	(ii) aquatic ecosystem health; **Rating: Achieved**

Evidence: Dr Falconer reported that, 'The University of Canberra carried out from 2006 to the present, a systematic monitoring project on turbidity and discharge in Condor Creek and Lees Creek in the catchment, with associated biological monitoring. This provides a sequential set of data, which can valuably be consolidated in 2016 to provide a decade overview'. 'The 2009 Autumn report noted that 'a reversal of declining condition of streams within the LCC is largely is dependent on the return of more characteristic rainfall'. The 2012–13 report indicated that turbidity conditions have improved'.

Action	
4.4.3.a (iii, iv, v)	(iii) landscape function & (iv) regeneration of native vegetation following fire and other forms of disturbance such as windrow burning and debris removal & (v) changes in biodiversity; **Rating (iii): Achieved** **Rating (iv): Achieved** **Rating (iv): Achieved**

Evidence: Dr Falconer reported 'The vegetation monitoring program has been highly informative, with reports from Icon Water and Parks, Conservation and Lands.

These reports are:

- *Actew AGL, Cotter fire remediation project* – February 2004, Cotter catchment fire recovery mapping;
- *ACTEW Corporation, Lower Cotter Catchment- Vegetation Assessment*, October 2008;
- *ACTEW Corporation, Cotter Catchment-Landscape Analysis*, August 2008;
- *ACTEW AGL Lower Cotter catchment-2010 Vegetation Assessment;* and
- Parks, Conservation and Lands, *LCC Vegetation Monitoring Program Report* 2014.

These sequential reports provide a good basis for understanding the fire recovery process of the vegetation of the catchment, and demonstrate considerable improvement in most areas, as described in the earlier

section of this report'.

In addition, the Conservation Planning and Research section in EPD conducts an annual monitoring program on the ecological impact of completed controlled burns (*The effect of reduction burning on the fuel array in nature reserves and urban parks in the Australian Capital Territory*).

Each year, CPR reviews approximately ten percent of the burns conducted from BOPs. In 2013-14 they reviewed twenty percent of BOPs.

When burning, the Rural Fire Service or TAMS adopt a 'mosaic' approach to burns to break up the 'equilibrium of a mature forest'—greater diversity equals greater resilience.

CPR is involved in the development of the SBMP the RFMPs and BOPs. CPR Fire Ecology Unit provides advice to the Conservator. For the development of the SBMP: ESA sets the parameters, TAMS drafts it, CPR interacts and provides advice, comment & research, the ESA Commissioner approves it.

CPR have developed a risk assessment based upon the Bushfire Cooperative Research Centre's (CRC) research reported in Nyman & Sheridan 2014; *'Erosion in burned catchments of Australia'*. This research examines LCC and Canberra specific example and developed advice on fire risk and erosion risks assessment and monitoring. It concluded that burns near higher slope streams should be conducted very carefully.

The TAMS Fire Management Unit was the lead end user for this CRC research. This collaborative process across agencies is an excellent example of the practice of 'adaptive management'.

Action	
4.4.3.a (vi)	(vi) fauna; **Rating: Partly Achieved**

Evidence: There has been significant monitoring of the endangered fish in the Enlarged Cotter Dam and of small invertebrates as part of water quality monitoring reflected in the University of Canberra's reports on *Biological response to environmental flows below Corin, Bendora, Cotter and Googong Dams* (*Below the Dams* Reports. No other specific fauna monitoring in the LCC was evidenced.

Action	
4.4.3.a (vii)	(vii) success of planting programs; **Rating: Achieved**

Evidence: Significant measurement of replanting has occurred in the vegetation planting program which is evidenced by the *LCC Vegetation Cover 2008* (Final) map.

Greening Australia's has also monitored and reported on its planting programs—various Greening Australia reports covering the period 2004 to 2015.

Action	
4.4.3.a (viii)	(viii) the success of weed control programs; **Rating: No rating assigned to this action – insufficient evidence**

Evidence: Monitoring of weed control programs is unknown. Dr Falconer reported that the most important weeds were pine wildings and blackberry, and that blackberry control has been extensive and will require ongoing monitoring and treatment. Dr Falconer stressed the 'essential' importance of pine wilding control 'as the most crucial part of weed control in the catchment' because pine have re-established themselves in parts of the LCC and are mature enough to set seed and are now too large for removal by volunteers.

Action	
4.4.3.a (ix)	(ix) fuel hazard and compliance with Strategic Bushfire Management Plan standards; **Rating: Achieved**

Evidence: Compliance with *ACT Bushfire Management Standards 2014*, which is a document under the *SBMP v3*, is, in practice, monitored by the Fire Management Unit of TAMS. The Fire Management Unit supplied several published articles written by unit members which evaluated the success of TAMS's controlled-burning activities, see *ACT Bushfire Management Standards 2014*; and *The effect of reduction burning on the fuel array in nature reserves and urban parks in the Australian Capital Territory*.

The outcome of controlled burns in the BOPs is monitored by ESA through the Rural Fire Service

Action	Time Frame	Agency
4.4.3.b Develop a research plan that identifies experimental trials for a range of techniques to improve landscape function and for ecological restoration. **Rating: Achieved**	0–1 year (2007)	PCL

Evidence: There is a *Monitoring and Research Implementation Plan 2007–11*, which has been endorsed by the Management Group in April 2008.

The objective of this plan was to guide the implementation of the strategic directions identified in the Strategic Management Plan, by identifying and addressing gaps in knowledge and to fulfil the function of monitoring and reporting against this Strategic Management Plan and should have been reviewed after three years.

Action	Time Frame	Agency
4.4.3.c Prepare a prospectus of catchment management research projects for universities and research institutions. **Rating: Achieved**	0–1 year (2007)	PCL with Icon Water with partners

Evidence: There was no formal external document that informed the scientific community about the research needs for the Lower Cotter Catchment; however, TAMS, Icon Water, and ESA fostered relationships with the scientific community, and the implementation of the *Monitoring and Research Implementation Plan 2007–11* showed a significant involvement with the research community.

Action	Time Frame	Agency
4.4.3.d Explore partnership opportunities with the CRC for Weeds, Bushfire, eWater and others to assist with research and monitoring. **Rating: Achieved**	0–1 year (2007)	PCL with ESA and Icon Water

Evidence: The result of this strategy is documented in the *Monitoring and Research Implementation Plan 2007–2011* and is also evidenced through ongoing publications involving the LCC; it can be observed that the scientific community conducted a range of scientific research within the LCC across a range of subjects: plant and fish ecology, soil erosion, fire impact on the chemical constituents in water, and water modelling and monitoring methodology (partnership to assist with research and monitoring).

A recent example is the research work for TAMS Fire Management Unit by the Bushfire Cooperative Research Centre reported in Nyman & Sheridan 2014; *'Erosion in burned catchments of Australia'* (see 4.4.3.a (v) above).

Action	Time Frame	Agency
4.4.3.e Prepare a communications plan that addresses stakeholder and community perceptions in relation to catchment condition and the progress of restoration work and the interpretation of the natural and	0–2 years Regularly	PCL with Icon Water

cultural heritage of the catchment. **Rating: Not Achieved**	review and update	

Evidence: There is no overarching communication plan that addressed or addresses stakeholder and community perceptions in relation to catchment condition, progress of restoration work and the interpretation of the natural and cultural heritage of the catchment.

The need for a communication plan had been identified in Icon Water's internal audit report in 2006, as well as in the Stinson Report in 2008: which remarked that the absence of such a report limited Icon Water's ability to communicate the positive results that were being achieved.

However, it should be recognised that this initiative is stated broadly, and there is evidence that:

- the community has been informed through Greening Australia in its various reports of the progress of plantings
- signage has been developed to inform about the catchment and the Enlarged Cotter Dam and
- communication plans were developed by both TAMS and Icon Water to inform about the closing of Vanitys Crossing.

Action	Time Frame	Agency
4.4.3.f Maintain the community engagement plan and include a prospectus of programs, projects and tasks for community involvement in restoration, research and monitoring programs. The focus for this prospectus is NHT and NAP funding programs and the ACT NRM Strategy. **Rating: Not Achieved**	0–2 years	PCL with Icon Water

Evidence: No evidence was found for a specific community engagement plan that included a prospectus of programs, projects and tasks for community involvement in restoration, research and monitoring programs.

Action	Time Frame	Agency
4.4.3.g Strengthen mechanisms for community consultation and participation in restoration programs with a priority on the rehabilitation of Blundells and Shannons Flats. Restoration activities to take into account the Background Study for the Friends of ACT Arboreta (Butz, 2004). **Rating: Achieved**	Ongoing	PCL

Evidence: The *Conservation Management Plan: Blundells Flat and Shannons Flat ACT* was completed in March 2009 and involved significant public consultation with interested community groups.

There is evidence that community has been engaged in restoration (Greening Australia), research (scientific community) and monitoring (through Water Watch).

Dr Falconer reported that, 'The replanting program from 2005 onwards by Greening Australia has resulted in significant stabilisation of the landscape over a wide and critical area of the Lower Cotter catchment. The magnitude of their achievement can be seen from the outcomes, they report planting of 280,000 native seedlings, in 420 ha of eroding soils, by 11,700 volunteer hours of work over 270 events'.

Dr Falconer also reported that, 'During the restoration work following the fires, a two year program the "Yurung Dhaura Aboriginal Land Management Team ACT", was set up to train and employ 7 young Aboriginal adults. They received formal training in Aboriginal natural resources management, cultural leadership, interpretation of cultural heritage, and conservation and land management. They formed a highly capable bush-regeneration team, which was awarded the national Indigenous Land Management Award from Landcare Australia in 2014. Some members have now obtained employment in related

activities, including in Greening Australia'.

Dr Falconer also stated, 'ACTEW Water have constructed and publicised the new Cotter Dam, with interpretative walks below and above the dam wall, and descriptive literature. These paths are well used by the public which has a continuing interest in the Cotter area, and the new dam and reservoir. The proximity of the Cotter recreational and camping areas to the catchment ensures that the area is well frequented by Canberrans and visitors.

Community involvement, understanding and interest in the Cotter dam and catchment is quite exceptional for a construction project and land area'.

Action	Time Frame	Agency
4.4.3.h Develop and implement a training program for staff addressing catchment management and landscape restoration and other disciplines as required. **Rating: Not Achieved**	1 year with ongoing implementation	PCL
Evidence: No evidence found.		
Action	**Time Frame**	**Agency**
4.4.3.i Develop information systems to manage and support research activities within the LCC. Such a system would be open to all relevant stake holders and would focus on the documentation and tracking of research activities and storage of research outcomes. The system may also be extended to provide research permits to track research activities in the catchment. **Rating: Not Achieved**	2 years (2008)	PCL with Icon Water
Evidence: No evidence found.		

APPENDIX B: SCHEDULE 4, *PLANNING AND DEVELOPMENT ACT 2007*

Development proposals requiring an Environmental Impact Statement

Column 1 Item	Column 2 Development proposal
1	proposal that is likely to have a significant adverse environmental impact on 1 or more of the following, unless the conservator of flora and fauna produces an environmental significance opinion that the proposal is not likely to have a significant adverse environmental impact: (a) a species or ecological community that is endangered; (b) a species that is vulnerable; (c) a species that is protected; (d) a species with special protection status; (e) a species or ecological community if a threatening process has been declared under the Nature Conservation Act 1980, s 38 (4) in relation to the species or community; (f) a species or ecological community if the flora and fauna committee has stated criteria for assessing whether the committee should recommend the making of a declaration under the Nature Conservation Act 1980, s 38 (Declaration of species, community or process) in relation to the species or community; *Note Criteria are specified under the Nature Conservation Act 1980, s 35. An instrument under that Act, s 35 is a disallowable instrument and must be notified, and presented to the Legislative Assembly, under the Legislation Act.* (g) an endangered species, an endangered population, an endangered ecological community, a critically endangered species, a critically endangered ecological community or species presumed extinct under the Threatened Species Conservation Act 1995 (NSW), if the potential impact of the proposal will be on the species or community in New South Wales
2	proposal involving— (a) the clearing of more than 0.5ha of native vegetation other than on land that is designated as a future urban area under the Territory Plan unless the conservator of flora and fauna produces an environmental significance opinion that the clearing is not likely to have a significant adverse environmental impact; or (b) the clearing of more than 5.0ha of native vegetation on land that is designated as a future urban area under the Territory Plan unless the conservator of flora and fauna produces an environmental significance opinion that the clearing is not likely to have a significant adverse environmental impact
3	proposal for development on land reserved under s 315 for the purpose of a wilderness area, national park, nature reserve or special purpose reserve, unless the conservator of flora and fauna produces an environmental significance opinion that the proposal is not likely to have a significant adverse environmental impact

4	proposal that is likely to have a significant adverse environmental impact on— (a) a domestic water supply catchment; or (b) a water use purpose mentioned in the Territory Plan (water use and catchment general code); or (c) a prescribed environmental value mentioned in the Territory Plan (water use catchment general code) of a natural waterway or aquifer
5	proposal that is likely to result in environmentally significant water extraction or consumption, other than a proposal for an urban lake, pond or retardation basin or a wastewater reuse scheme— (a) in an existing urban area or on land that has been designated as a future urban area; and (b) that is designed in accordance with the water sensitive urban design general code under the Territory Plan
6	proposal that is likely to have a significant adverse impact on the heritage significance of a place or object registered under the Heritage Act 2004, unless the heritage council produces an environmental significance opinion that the proposal is not likely to have a significant adverse impact
7	proposal involving land included on the register of contaminated sites under the Environment Protection Act 1997
	Note A development application for a development proposal must include an EIS in relation to the proposal if the impact track applies to it because of a declaration under s 125 (Declaration by Public Health Act Minister affects assessment track).

APPENDIX C: LIST OF ABBREVIATIONS AND GLOSSARY

ACTEW	Australian Capital Territory Electricity and Water
ACTPLA	ACT Planning and Land Authority—part of the Environment and Planning Directorate
AO	Order of Australia
BOIP	Biodiversity Offsets Implementation Plan for the Enlarged Cotter Dam
BOP	Bushfire Operational Plan
Code of Practice	Code of Practice: Practical guidelines and standards for cooperation for maintenance works
Conservator	The Conservator of Flora and Fauna
CR	Conservation Research; a section of the Environment and Planning Directorate
ECD	Enlarged Cotter Dam
EIS	Environmental Impact Statement
EPA	Environment Protection Authority
EPD	Environment and Planning Directorate
ESA	ACT Emergency Services Agency
FMIP	Fire Management Implementation Plan
gigalitre	(GL) one billion litres, or one thousand megalitres
GPS	Global Positioning System
Icon Water	The ACT's water utility, formerly known as ACTEW Water, and ActewAGL (Water Division)
ICRC	Independent Competition and Regulatory Commission
integrated catchment management	the coordinated planning, use and management of water, land, vegetation and other resources on a river or groundwater

	catchment, based on cooperation between community groups and government agencies to consider all aspects of catchment management
LCC	Lower Cotter Catchment
megalitre	(ML) one million litres
MOU	Memorandum of Understanding
NTU	Nephelometric Turbidity Units—a measure of the amount of suspended material in a water column
PCL	Parks Conservation and Land, now PCS
PCS	ACT Parks and Conservation Service
Pg	Public Land category—the protection of water supply
potable water	water that is intended for use as drinking water and should materially meet the *Australian Drinking Water Guidelines 2011*, or equivalent
SBMP	Strategic Bushfire Management Plan, Version 3, 2014
SFAZ	Strategic Fire-fighting Advantage Zones
SWPP	Source Water Protection Program, Icon Water
Strategic Management Plan	Lower Cotter Catchment Strategic Management Plan 2007
TAMS	Territory and Municipal Services Directorate

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