Annual Catchment Management Report 2024

WaterNSW

Executive Summary

Water NSW must manage and protect the Declared Catchment Areas, maintain a program of research for each Declared Catchment Area and undertake an educative role in the community on its activities and functions. It must also respond to the recommendations or findings of the Operational Audit (Appendix B), Catchment Audit (Appendix A), and carry on research or monitoring programs to meet Water NSW's research objectives.

Under its Operating Licence WaterNSW must report by 30 November each year on the above. This report provides details of WaterNSW's catchment management and protection activities, including its community education and catchment research activities, relevant to the Declared Catchment Areas carried out in FY2024.

The key achievements in FY2024 included:

- Two research collaborations were recognised for research excellence; the swamp modelling project with Water Research Laboratory won the NSW Water Association R&D Excellence Award, and the data analytics for raw water treatability won the iAward for innovation in the NSW Sustainability and Environment category.
- Priority councils have all improved their water sensitive ratings, with an average improvement of 5.32% (target 5%) compared with baseline assessments.
- WaterNSW responded to 292 proponents and councils on developments and activities potentially impacting WaterNSW land, assets and infrastructure.
- WaterNSW responded to 65 planning proposals, Growth Area precinct planning, Housing Strategies, Development Control Plans (DCP) and Flood Studies.
- The Board approved the new Rural Program and strategic direction – Nature based solutions for source water quality (FY25 & FY26).
- Ludwidgia longifolia and Kidney-leafed Mud-plantain (KLMP) eradication program continued around Lake Yarrunga. No new infestations of KLMP have been detected.
- WaterNSW engaged and informed local communities and stakeholders throughout the Greater Sydney region on seven programs and projects of interest including Western Sydney Pumped Hydro (part of the Renewable Energy Storage Program) and the Town Water Risk Reduction Program.

Introduction

Purpose of this Report

Under, Clause 2.2.1 of its Operating Licence (Licence), Water NSW must manage and protect the Declared Catchment Areas. Under clause 2.7.1 of the Licence, Water NSW must maintain a program of research for each Declared Catchment Area, in accordance with the requirements of the Licence. Further, under Clause 6.11.1 of the Licence, Water NSW must undertake an educative role in the community on its activities and functions in Declared Catchment Areas consistent with its objectives under section 6(1)(c) of the Act, and report on its activities in accordance with the Reporting Manual.

Water NSW must submit an annual compliance and performance report to IPART (for each financial year) on its catchment management and protection activities (This Report). The report must cover Water NSW's catchment management and protection activities, relevant to the Declared Catchment Areas only.

Water NSW must submit the Annual Report on Catchment Management to IPART by 30 November after the end of the financial year. Water NSW must also publish this report on the internet.

This report provides details on WaterNSW's catchment management and protection activities, including its community education and catchment research activities, relevant to the Declared Catchment Areas.

Vision

Our vision is:

A healthy catchment that can continue to deliver safe, clean water through world-class source water protection and shared responsibility across the community.

The Australian Drinking Water Guidelines (2011) recognise that source water protection is an essential part of the multi-barrier approach to providing drinking water.

Source water protection is also firmly established in the regulatory framework governing Sydney's drinking water catchment[i] (the Catchment). WaterNSW is legislatively required "to protect and enhance the quality and quantity of water in declared catchment areas" under the *WaterNSW Act 2014*.

The Source Water Protection Strategy (SWPS) sets the vision, the priorities, and the goals for source water protection in the Catchment over the next 20 years (**Table 1**). These will be delivered through annual programs of work outlined in the Catchment Protection Work Program. The included activities and outcomes in the Catchment Protection Work Program 2021-2022 were arranged around the priorities for source water protection outlined in the strategy. The report is arranged in chapters that mirror the SWPS.

The program also identifies where actions are addressing recommendations of Catchment Audits, Operating Licence Audits, or research and monitoring.

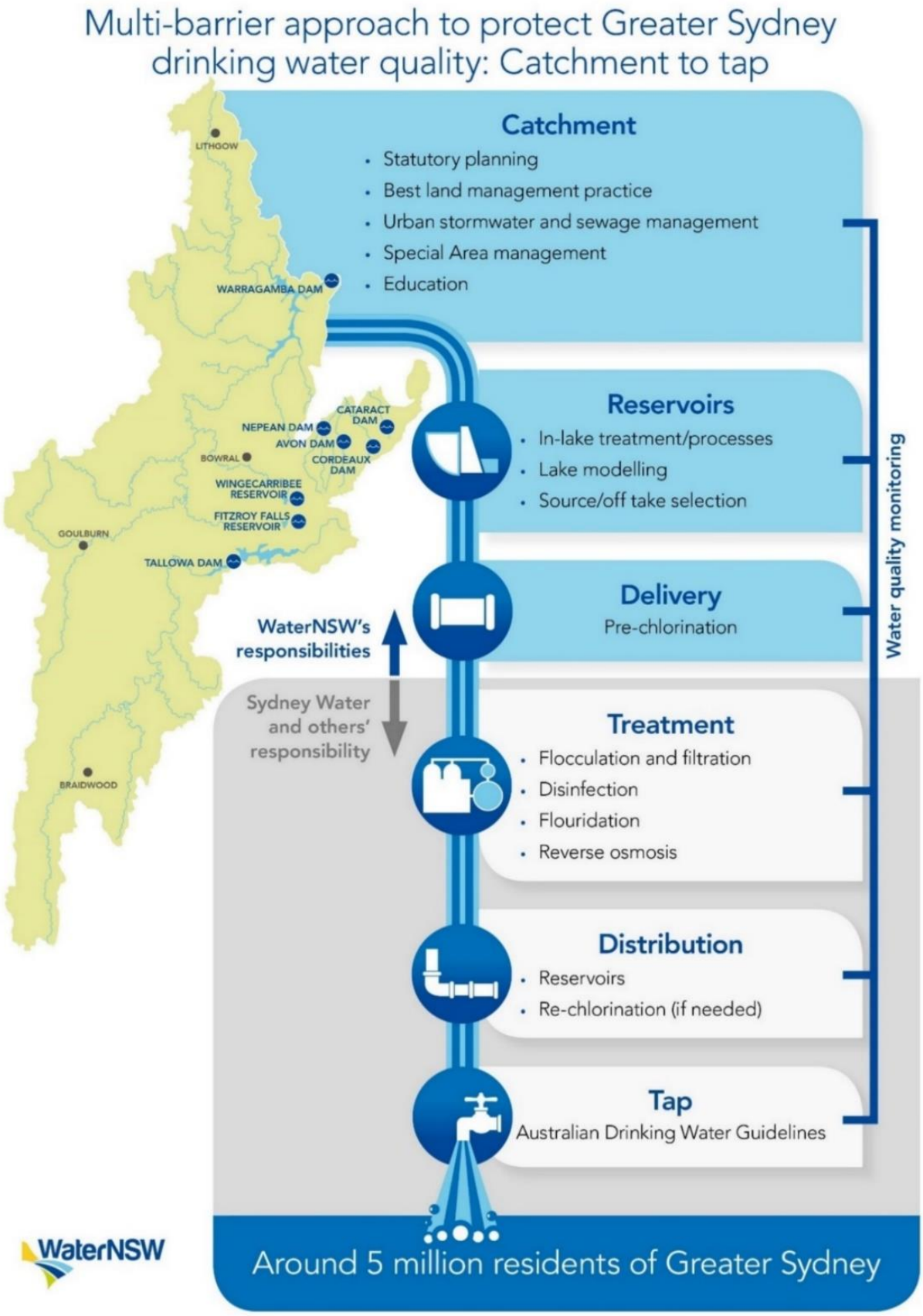
The program fulfils WaterNSW's responsibilities for water quality protection and management and the results of the program are reported in this Report.

Figure 1 shows the relationship between WaterNSW activities that help manage water quality risk.

Table 1: Source Water Protection Strategy Priorities and Goals

Priority	Goal
Leveraging the best available science	Undertake scientific research into water quality risks and emerging issues in the catchment
Creating water sensitive towns	Improve the urban water practices of 5 major councils to a 'water sensitive city' score of 70%
Ensuring water quality compatible development	All new developments have a neutral or beneficial effect on water quality
Integrating water quality policy and practice	All councils and major developers formally commit to source water protection
Increasing regenerative agriculture	1000 landholders managing healthy waterways and regenerative grazing practices
Fulfilling land management responsibilities	Demonstrated reduction in water quality risks from fire and pests in the Special Areas
Enforcing catchment protection laws	Reduce unauthorised activities in Special Areas and pollution incidents in the catchment
Educating and Engaging Communities	Educate the community about WaterNSW activities and functions in the Sydney Catchment area

Figure 1: Activities to manage water quality in the Catchment



Scientific approach

As part of the WaterNSW Science Program, WaterNSW collects a wide range of scientific and spatial information to undertake risk assessments and investigations, increase understanding and insight about pollutants and their behaviour, improve monitoring and analysis, and prioritise actions to promote catchment health and water quality.

The Science Program is an adaptable program of research that is aligned with business priorities and objectives, comprising of long term and short-term projects tackling complex research questions. Ongoing development of new projects that addresses business needs and take advantage of collaborative opportunities is critical to providing an agile program. We work with the customers, water industry, government agencies, research partners, and the community, to ensure that we use the best scientific evidence available.

The current 2021-2025 Science Program focuses on priority research themes of catchment resilience and integrated water management.

Planned Outcomes

Planned Outcome	Actual outcome
WaterNSW is a recognised for excellence in key areas of science impacting on its core business, aligned with the 2021-2025 Science Program priorities	At the end of the financial year the catchment health and water quality research portfolio had 12 of the 27 projects being delivered in house by our expert research team to target unique WaterNSW business needs. WaterNSW staff have published in peer reviewed journals, presented at national and international conferences and have been invited as guest speakers to share their knowledge and expertise on catchment and water quality science. A list of publications and conference presentations are included in the Appendix. Two research collaborations were recognised for research excellence; the Swamp modelling project with Water Research Laboratory won the NSW Water Association R&D Excellence Award, and the Data analytics for raw water treatability won the iAward for innovation in NSW Sustainability and Environment category.
WaterNSW has participated in research partnerships that provide access to new science that may impact on its business, and incorporated relevant learnings to improve business outcomes	WaterNSW partnered in 15 collaborative research projects with a range of research partners including 9 industry consortiums led by Water Research Australia and 2 ARC funded collaborations. We have an extensive collaboration network through Water Research Australia and engage directly with Universities, Research Hubs and Cooperative Research Centres.

WaterNSW has strong, evidence-based science to support the positions it takes on land management practices and regarding existing and proposed mining developments in the declared catchment	Significant advancement has been made in understanding the impact to swamps and streamflow in mining impacted catchments through the development of the award-winning swamp water balance model and a novel data driven stream flow trend methodology being developed for assessing impacts to streamflow in mining impacted catchments.

Activities

Strategy and Communication

The research undertaken as part of the Science Program is only successful when it is adopted by the business or communicated properly to customers and stakeholders who need the knowledge generated by the research. As such, working with customers and stakeholders, industry leaders and research experts ensures that the outcomes of the Science Program are relevant to business and avail the business of the best available science and expertise to develop sound evidence-based improvements in water quality and catchment management. Extensive customer consultation, good peer relationships within industry and collaborative research engagement are the foundations of success.

Planned Activities	Actual Activities
Engage and consult with internal stakeholders, industry peers, professional bodies and research providers to keep abreast of the latest scientific advancements that could provide valuable business improvements at WaterNSW.	WaterNSW is an active member of Water Research Australia with 14 active collaborative research projects. We participated in the WSAA Research and Development Network and the Innovation Communities of Practice. Granted ARC funding to assess the ecological impacts of bushfire fighting chemicals with Chantal Lanctot (Griffith Uni). Participated in the Bulk Water Innovation Partnership.
Represent WaterNSW at conferences and events, presenting scientific research outcomes from the WaterNSW Science Program.	WaterNSW scientists presented outcomes of research on swamp water balance and cyanobacteria dynamics at Freshwater Sciences Conference in Brisbane in 2023. Presented catchment futures scenario project outcomes at the ISF Industry Futures Forum in Nov 2023.
Engage and consult with internal and external stakeholders to identify opportunities to align research with ongoing strategic planning (Source Water Protection Strategy, Climate Change Risk and Adaptation Plan, Water quality objectives, Greater Sydney Water Strategy).	Prospect water quality review published and the research findings were used to support planning and assessment of future uses of Prospect Reservoir Assess the implication of the development of catchment specific water quality objectives by DCCEEW to support catchment water quality and management.

	Feed into WaterNSW Climate Adaptation Roadmap and assess research opportunities such as nature positive CRC participation.
Maintain transparency and strategic alignment of the evolving research portfolio by developing and evaluating delivery strategic roadmaps for priority program goals.	Commenced a review of the benefits of the 2021-2025 Science Program and consultation pathway for developing the 2026-2030 Science Program.
Implement WaterNSW student research scholarships to support catchment health research and training of next generation of scientists.	WaterNSW and UTS have applied for PhD funding through the National Industry PhD Program.

Catchment Resilience

The Science Program theme of 'catchment resilience' focuses on scientific research towards the following outcomes:

- Review and develop WaterNSW specific catchment health indicators, to understand how the catchment is changing under different climatic and anthropogenic pressures (CR1)
- Catchment health future state, to identify top risks (that meet a threshold for action) to catchment health due to changing climate and anthropogenic pressures (CR2)
- Develop an understanding of the impacts of wildfire on water quality and what is effective fire remediation to protect water quality (CR3)
- Understand the impacts of extended drought on catchment health and water quality (CR4)
- Understand the impacts of mining on catchment health and water quality (CR5)

Planned Activities	Actual Activities
Apply updated tools and metrics to assess and communicate catchment health status to support catchment planning and management.	Industry project commenced to develop a catchment health assessment framework. Interviews and survey conducted to gather catchment planning information needs. Water Quality pollutant load calculation method trialled for catchment sites. Special Areas indicators developed for State of Special Area report.
Identify risks, opportunities and strategic planning needs arising from potential future scenarios of climate and anthropogenic changes to the Sydney Drinking Water Catchment.	Catchment future scenarios were developed in collaboration with Institute for Sustainable Futures. Workshop was held to identify potential risks, opportunities and strategic planning needs from future scenarios with stakeholders from WaterNSW strategic planning and operational teams.

	Board updated on findings of the future scenario exercise.
Investigate causes of poor water quality at priority sites identified in the Sydney Drinking Water Catchment Audit 2019-2022[ii].	Project Management Plan and Project Scope documentation completed.
Continue to improve our capability to quantify the relative water quality risk from different landscape fuel attributes and fire management practices.	Was able to sample ash following Summit Tank wildfire from 9/9/23. No other fires occurred.
Review the modelling decisions and update generalised methodology to detect trends in stream flow using probabilistic approaches.	A hierarchical generalised linear model was developed as a statistical analysis approach and practical tool to identify and quantify hydrological changes and trends caused by mining subsidence.
Continue monitoring and assessing available data to develop/refine water balance model for Swamps 7, 14 and Leech to assess the impacts of mining on swamps (WRL).	Ongoing downloads of field data are continuing and working with current PhD student to transfer model to WaterNSW.
Continue to analyse the indicator datasets for mining pressure and develop a summary report for the catchment outlook report.	Summary report of mining indicator datasets completed.

Integrated Water Management

The Science Program theme of integrated water management focuses on scientific research towards the following outcomes:

- Understand the relationship between lake ecology and water quality and the impact of supply security strategies (IWM1)
- Develop and improve inputs required for the WaterNSW Water Quality model, supporting decision making and reducing uncertainty (IWM2)
- Improved understanding of cyanobacteria bloom formation and strain dominance to increase ability to predict blooms (CY1)
- Improve the efficiency of cyanobacteria monitoring (CY2)

Planned Activities	Actual Activities
Continue development of an integrated water quality model to quantify the source water influences on reservoir and supply water quality under changing conditions and current operating conditions.	External review and update of water quality models for Avon & Cataract, with testing of outputs. Ongoing development of lake models and testing of draft model applications for Burragorang. Development of automated processes for integration of catchment and lake models.

Finalise quantitative microbial risk assessment modelling best practice guidelines and contribute towards an industry pilot application, through an Australia-wide collaborative process (WaterRA).	Best practise guidelines final report completed.
Continue field and laboratory studies to understand ecological interactions between lake water quality, macrophytes and cyanobacteria in Lake Prospect (UTS).	Field microcosm incubations completed, data analysis complete and preliminary findings presented. Laboratory studies completed.
Continue to investigate the types of planktonic species responsible for unusual taste and odour issues in lakes and the chemicals they produce and develop a chemical analysis screening test beyond geosmin and MIB. Two PhD students at UNSW through a WaterNSW/Sydney Water WaterRA scholarship. Additionally review the behaviour of planktonic derived taste and odour events.	One PhD student completed thesis. Two papers published and a third in review. Presented outcomes at three conferences this year. Second PhD student optimised method to detect 20 odour compounds – has tested on real samples and isolated algal strains suspected of generating odour for further characterisation.
Review the performance of fDOM fluorescent sensors as a surrogate for DOC within Nepean reservoir and make recommendations on optimising for operational decision making.	Stage 1 of the review completed. Ongoing process to adopt corrections within in SCARMS/code and report the relationship between colour and fDOM. Abstract submitted/published at the IWA Symposium in 2024
Continue to work with RMIT on the project; augmenting water bodies with highly treated recycled water to develop guidance for assessing environmental thresholds and a framework of management for recycled water discharges into the environment (WaterRA).	Work package 1; literature review on factors influencing the augmentation of water bodies with highly treated recycled water completed. Work package 2; looking at influence of highly treated recycled water quality on ecosystem health on lakes and rivers in progress.
Undertake a desktop data analysis to assess the long-term impacts on water quality from existing inter-basin transfers from the Shoalhaven system into the declared catchment.	Review summarising available literature on inter-basin transfer has been completed. Data analysis was conducted on the long-term impacts on water quality from existing inter basin transfers from the Shoalhaven system completed.
Develop a guidance manual for the use of cyanobacteria toxin gene assay. A Literature review addressing gene testing, guide for incorporation in bloom management, and a cost-benefit analysis of major cyanotoxin gene testing methods. A criteria-based matrix will be developed to compare difference technologies and rank them accordingly. (WaterRA)	Review summarising available molecular platforms for the detection and quantitation of cyanotoxin gene and a cost: benefit analysis for routine assessment of cyanobacteria toxins has been completed. List of studies utilising PCR-based genetic testing, immunological (ELISA/PPIA) and analytical assays (HPLC/LC-MS) to determine the potential toxicity of the cyanobacterial blooms.
Develop a satellite remote sensing approach for calibration of the WaterNSW hydrodynamic water quality	Literature review of the utility of satellite remote sensing for water quality modelling. This review forms the first

model. This includes a literature review for applying remotely sensed data in water quality models, algorithms for estimating total suspended solids, coloured dissolved organic matter and chlorophyll-a from remotely sensed data, a method to calibrate the Integrated Water Quality model, focusing on water temperature and then applying it to chlorophyll-a data. (UNSW/WaterRA)	stage of the UNSW Water Research Australia (WaterRA) research project into how remotely sensed data may be used to validate and inform the Integrated Water Quality Model currently being developed by WaterNSW for Lake Burragorang. Time series of analytes completed. Proof of concept delayed due to external dependence on the development of AEM3D model and simulations

Science Advice

The expertise within the Science Program can get drawn upon for advice and support for operational activities, monitoring and evaluation support, incident response, and addressing audit recommendations. Areas of advice include mining impacts, drought impacts on aquatic organisms, monitoring and evaluation of interventions, special monitoring methodology during water quality events, advice on emerging contaminants, investigation and review to address audit recommendations, and supporting fire, heavy rainfall, and contaminant event response.

Planned Activities	Actual Activities
Provide ad hoc advice and investigations to support the business to make management decisions and assess catchment health and water quality impacts in response to events and operational needs.	Supported the 2022 Catchment Audit. Annual WaterNSW Approved Fire Fighting Chemicals List. Advice to Catchment Operations regarding proposed hazard reduction burns. Macroinvertebrate monitoring program co-ordination. Support data provision and review DCCEEW Water Quality Objectives for drinking water catchment. Support catchment to customer risk assessment reviews. Investigate microbiological drivers of taste and odour events in water sources. Undertake eel monitoring to create baseline data for eel passage in Warragamba catchment.

Risks and Opportunities

Along with the core research themes of catchment resilience and integrated water management, the Science Program is responsive to emerging risks and business improvement opportunities that new research and technology advancement provides. WaterNSW scans for risks and opportunities, and undertakes scientific research that identifies emerging technologies, management techniques, and mitigation options for these potential risks to catchment health and water quality. Horizon scanning is a function of the science program. Emerging risks and new technologies are investigated and where relevant scientific research is undertaken to ensure WaterNSW has the best available science to assess new risks and can take advantage of innovative methods for managing catchment health and water quality.

Planned Activities	Actual Activities
Validate gut-on-a-chip detection and infectivity assays for *Cryptosporidium* and adenovirus (ARC - Murdoch University).	Project has been completed in line with ARC funding requirements with two journal articles published and two additional articles in preparation/under review on the progress on developing a viable methodology for developing this technology as a viable method for culturing and detecting public health impact from Cryptosporidium and adenovirus.
A literature review on the capability of satellite remote sensing to monitor water quality and catchment health as a component of the SRS Project.	Review completed (publication released), provides a state-of-the-art summary of recent trends and the up-to-date literature in satellite remote sensing to evaluate the existing capabilities and currently available tools as they apply to water authorities. Manuscript published titled *Empowering Water Utilities: Crafting an End-User Friendly Reliability Ranking for Evaluating Satellite Remote Sensing Advances through Literature Insights*.
Continue to collaborate with water industry peers on the newly formed Cooperative Research Centre for Solving Antimicrobial Resistance in Agribusiness, Food, and Environments.	The WaterRA water industry consortium has overseen the scoping of two water related project proposals that were submitted to CRC SAAFE for inclusion in the work program on risk assessment and monitoring methodology development.
Continue to increase data science capability within WaterNSW and develop data science solutions for water management through calibration with our partners from the Industrial Transformation and Training Centre for Data Analytics and Environment.	WaterNSW continued to support the training and development of data scientists for the water industry by hosting PhD student internships. A schedule under the agreement was set up for the delivery of WaterNSW specific research to develop a data science tool to investigate streamflow changes in mining impacted catchments. WaterNSW CEO Andrew George joined the DARE advisory board.

Investigate opportunities for greenhouse gas emission quantification and mitigation within water storage reservoir.	Trial was completed in evaluating methods to determine methane fluxes from storages.
Investigate solar powered aeration to improve water quality and reduce cold water pollution.	Review was completed to identify renewable energy aeration opportunities for improved water quality, reduced cold water pollution
Collaborate on the cyanotoxin update by food crops project, comprising (1) a comprehensive review of scientific literature to determine current understanding of the issue (2) testing of cyanobacterial toxins in food crops and soils irrigated by recycled water containing cyanotoxin from South Australia and potentially interstate sites. (WaterRA)	Literature reviews completed. Collaboration with stakeholders to identify suitable research sites for wastewater treatments on food crops (ongoing). Field and laboratory study methods developed, and initial experiments conducted.
Conduct a hydrocarbon monitoring trial in collaboration with Sydney Water to determine best technology for critical control monitoring of contaminant risk.	Field trial of four products is under way at Orchard Hills Water Filtration Plant with preliminary results for some hydrocarbons.

Creating water sensitive towns

Issues

Over 130,000 people live in urban areas in the Sydney catchment area. Risk analysis studies have identified that the highest loads of pollutants come from the largest urban centres located across five local government areas.

Goal

Improve the urban water practices of the five major local councils to a 'water sensitive city' score of 70%.

Planned Outcomes

Planned Outcome	Actual outcome
Priority councils in the declared catchments have improved their water sensitivity ratings by 10 percent for 2030 (from 2020 baseline)	The most recent assessment with the Rapid Water Sensitive Cities (WSC) benchmarking tool demonstrates each of the five target Councils are embedding more water sensitive practices into their operations, compared to baseline scores. Priority councils have all improved their water sensitive ratings, with an average improvement of 5.32% compared with baseline assessments. All Councils have met the 5% improvement target for 2024, through initiatives under the Urban Program partnership.

Activities

Catchment Program - Urban

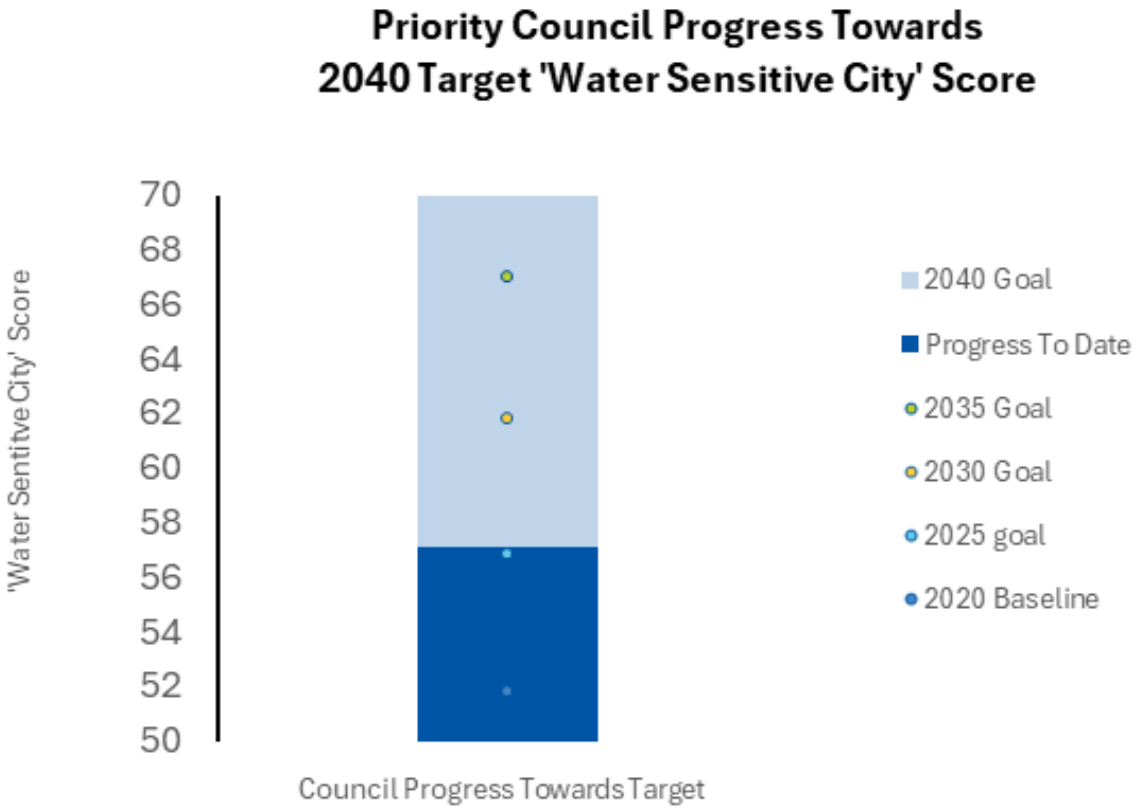
After heavy and intense rainfall, runoff can wash pollutants from industrial and urban areas including overflowing sewage treatment plants and septic tanks into storm water drains and waterways. The pollutants of most concern are phosphorus and nitrogen (from animal excreta and industrial, business, and residential waste), protozoan pathogens (in overflows of untreated sewage and malfunctioning on-site sewerage systems), and sediment (erosion of natural waterways from high velocity runoff).

WaterNSW is partnering with local government to identify sources of stormwater pollution in high-risk areas, to support and encourage councils to integrate water sensitive design into policy, and to co-fund the implementation of water sensitive projects in target areas.

Planned Activities	Actual Activities
Work in partnership with five priority councils on water sensitive projects to support council's transitions to water sensitive towns.[iii]	The Urban Program 2022-2024 has worked with five priority councils on collaborative water sensitive projects. Research, compliance and education initiatives continue to be developed between councils and WaterNSW. Nine projects with a combined value of over $1,6M are in progress with works due to be completed by June 2025. A highlight in FY2024 was one onsite sewage management project carried out by Wollondilly Council which was a finalist in the local government excellence awards.
Support delivery and development of education programs to improve urban water literacy and celebrate implementation of water sensitive practices.[iv]	This year, delivery of the 'Get the Site Right' erosion and sediment education and compliance campaign occurred across three Councils, targeting community building and development practices. This year, four Council webinars have been delivered to involving over 50 Council staff to encourage cross promotion of learnings and skill development. Blue Mountains City Council is working with WaterNSW to develop a Stormwater Engagement and learning module, to support other councils to celebrate and encourage water literacy initiatives.
Collaborate with priority councils to identify location and audit stormwater treatment systems and embed maintenance schedules into council asset management systems[v].	Three of five priority councils have conducted audits on existing stormwater assets. This has led to strategic, engineering and asset management changes occurring within these councils to support capital works, development approval and maintenance process improvements. The other two councils have been signed up to carry out audits in FY25.
Strategic and business planning for program delivery in 2026-2030.	Strategic and business planning commenced in FY2025 with a legal review of the partnership agreements and consultation with partner councils.
Renewing partnerships agreements with priority councils to 2030.	The current partnerships were extended to June 2025.

Measuring progress

Measure	Result
The WaterNSW Rapid WSC Benchmarking Tool will be applied biannually to benchmark the progress of each of the councils.	Priority Councils have all improved their water sensitive ratings, with an average improvement of 5.32% compared with baseline assessments. All Councils have met the 5% improvement target for 2024, through initiatives under the Urban Program partnership.



Ensuring water quality compatible development

Issues

New residential, commercial, and industrial developments can potentially impact water quality in local waterways and groundwater if not designed and managed to contemporary standards and practices.

Goal

All new developments have a neutral or beneficial effect (NorBE) on water quality.

Planned Outcomes

Planned Outcomes	Actual outcomes
Councils in the declared catchments improve their use of NorBE Tool in their assessment process.	The Catchment Protection team requested DA-related datasets from the Department of Planning, Housing and Infrastructure (DPHI) to enable the team to initiate the NorBE Tool audit in November 2023. The process has been delayed in the endorsement stage within DPHI. The dataset was eventually received on 4 July 2024, and as a result, there is no outcome to report regarding the NorBE Tool audit. Nonetheless, there are outcomes are expected in FY24/25.
WaterNSW advocacy regarding potential risks to our values (water quantity, water quality and ecological impacts) has influenced decisions and consent conditions on mining developments in the declared catchment.	Ongoing consultation with controlled area councils re: activities impacting controlled areas – Development Applications referred to WaterNSW and conditions incorporated into consents. We have also made strong representations to DPHI expressing WaterNSW's concerns regarding the unacceptable impacts caused by underground mining to the Sandy Creek Road 21 site.

Activities

Development Application Assessment

Consent authorities (local councils, planning panels and the Minister for Planning and Public Spaces and their delegates) cannot approve development unless satisfied the development under Part 4 of *Environmental Planning and Assessment Act 1979* (EP&A Act) would have a neutral or beneficial effect (NorBE) on water quality.

Part 6.5 of the *Biodiversity and Conservation State Environmental Planning Policy 2021* (the SEPP) states that development consent must not be granted to development on land in the Sydney Drinking Water Catchment unless the consent authority is satisfied the development is consistent with the NorBE Guideline. The NorBE Guideline in turn requires that all proposed development and activities should incorporate WaterNSW's current recommended practices or equivalent.

As of April 2023, there were 38 current recommended practices addressing a range of land uses and phases including stormwater and wastewater management.

Planned Activities	Actual Activities
Support councils with development assessment tools and guidelines including the Neutral or Beneficial Effect Tool	Three NorBE training workshops were provided catchment councils. Phone and email support was also provided to assist councils and consultants using the tool to undertake individual assessment. 20 new consultancies were registered as new NorBE Tool users. Council user registrations occur within each individual council without reference to WaterNSW.
Audit council use of the NorBE tool and institute actions to improve compliance with requirements[vi].	The Catchment Protection team requested DA-related datasets from the Department of Planning, Housing and Infrastructure (DPHI) to enable the team to initiate the NorBE Tool audit in November 2023. Therefore, there is no audit result for this FY.
Provide advice to proponents, councils and determining authorities on high risk and state significant developments to ensure WaterNSW interests are protected.	WaterNSW provided 292 responses to proponents and councils on developments and activities potentially impacting WaterNSW land, assets and infrastructure (198 for development proposals and activities along the Upper Canal and Warragamba Pipelines) 93 responses to DPIE/DPHI on state significant developments (SSDs and SSIs). No concurrences were withheld Advice was provided to councils on high-risk development applications (DAs) as follows: • 122 concurrences • 37 to amended applications before approval

	• 42 to modify applications after approval • 20 covenants were placed on properties (s. 88B) • 45 were provided on other matters related to development • 21 given to DPIE/DPHI on state significant developments.

Mining Assessment

WaterNSW review mining proposals and provide comments and advice to regulators, agencies and mining companies as the partial owner and joint manager of the Special Areas. We seek to influence the planning decisions, ensuring mining operators are accountable for all impacts that may significantly harm our values (principally water quantity, water quality and ecological integrity). WaterNSW has no legal powers to control or stop mining in the declared catchments.

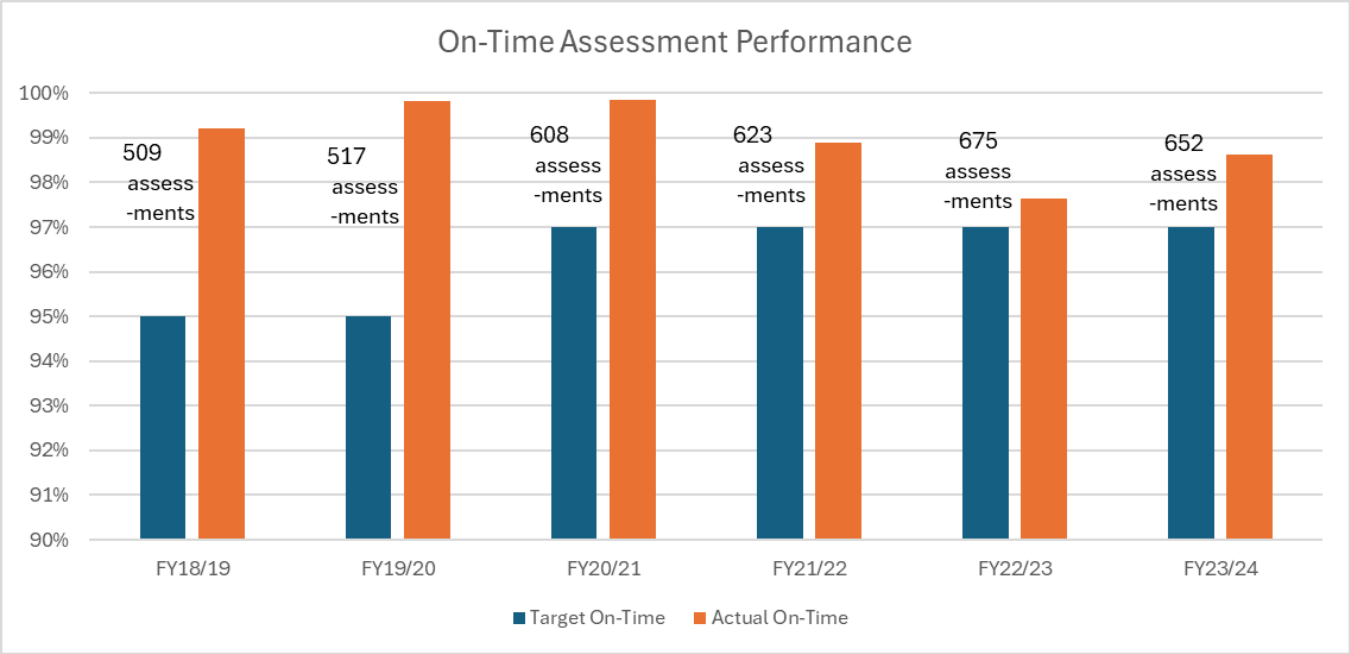
WaterNSW's Mining Principles underpin WaterNSW's decision making in relation to managing mining impacts in the declared Sydney catchment area and on catchment infrastructure.

Planned Activities	Actual Activities
Advocate WaterNSW's mining principles in relevant written advice and submissions	There were nine responses to mining regulators advocating WaterNSW's mining principles on various matters including section 50 notices, long wall modifications, extraction plans and environmental audits.
Provide advice to the Department of Planning, Housing and Infrastructure (DPHI) on post mining impact assessments and applications, including subsidence management plans, extraction plans, impact reports, environmental monitoring and management plans	This activity was initially undertaken in 2021 and continued through 2024.
Review Mining Research Roadmap and re-prioritise research needs to obtain definitive estimates of mining impacts.	This is an ongoing work in collaboration with the Analytical Modelling and Infrastructure team since October 2023.

Measuring progress

Measure	Result
Percentage of DAs using the NorBE online assessment tool	No result as data was not received in time to complete assessment in FY2024
Percentage of DAs completed correctly in the NorBE online assessment tool	No result as data was not received in time to complete assessment in FY2024

Percentage of activities and developments complying with conditions of consent	No result as data was not received in time to complete assessment in FY2024
Mining matters where WaterNSW has influenced DPHI decisions to reduce impacts	Nil. Longwall 23 modification is under assessment with suggestions from WaterNSW regarding conditions of approval.
Assessments that were informed by research or where research outcomes have been implemented	Nil in 2024. Research paper on swamp impacts has been published and stream flow has been drafted for submission. These papers will inform 2025 assessments.



Integrating water quality policy and practice

Issues

The health of a drinking water catchment is dependent on ensuring new land uses are compatible with the condition and capability of the land to sustain those uses. Poor strategic urban and land use planning can compromise the long-term protection of water quality by inappropriate uses being allowed in areas of greatest water quality risk.

Goal

Planning instruments, supporting practices, policies and guidelines protect water quality and water supply infrastructure.

Planned Outcomes

Planned Outcome	Actual Outcome
Water quality and key infrastructure assets are protected in strategic land use planning decisions.	Overall legislative provisions for the catchment have been sustained or improved.

Activities

Policy - Catchments

WaterNSW works with the Department of Planning, Housing and Infrastructure (DPHI) and local councils to provide advice on land use zoning and strategic land use planning for urban and regional development under the *Environmental Planning and Assessment Act,* 1979. This guidance ensures that the plans, policies and frameworks guiding new developments and activities have specific provisions to maintain and protect the drinking water catchment and water supply infrastructure.

Planned Activities	Actual Activities
Advise local councils on planning proposals (including rezoning), local growth strategies, rural land strategies and housing strategies, and Development Control Plans/Local Environment Plans.	65 responses provided to local councils on planning proposals, Growth Area precinct planning, Housing Strategies, Development Control Plans (DCP), Flood Studies and various council strategies and studies.
Influence DPHI to seek to improve the regulation of developments in the vicinity of the Upper Canal and Warragamba Pipelines.	Consultation with DPHI on e.g. Infrastructure Guidelines, Low- and Mid-Rise Housing and Appin Part Precinct Structure Plan and DCP.

Hold regular meetings with councils: • assessing development applications adjacent to Controlled Areas and key WaterNSW infrastructure. • developing strategic planning documents affecting the declared catchments and Controlled Areas.	Bi-annual meetings with Camden, Campbelltown, and Liverpool Councils (Upper Canal), and Penrith and Blacktown Councils (Warragamba Pipelines), and Greater Sydney Parklands (Upper Canal and Warragamba Pipelines).
Influence DPHI on key changes to planning law, policies, planning instruments, regional growth plans and tools that affect the catchments and water supply infrastructure	Nineteen responses provided to DPIE/DHPI on Planning Proposals and Strategic Plans, and e.g. Affordable Housing, Complying Development, Improving Planning Processes and others.
Work with Sydney Water and the Department of Health to give effect to the Joint Policy - Recreational Access to Water Supply Storages, Special and Controlled Areas in the Sydney Catchment	Recreational Access Working Group met several times during the FY to discuss and respond to requests for access, however most of the group's effort was directed to numerous meetings and workshops (internal and external) relating to the Government's proposal to open Prospect for recreational access, including potentially swimming.

Measuring progress

Measure	Result
Extent of statutory planning and policy documents that contain positive improvements for water quality and water resource protection.	WaterNSW provided feedback on 92 statutory planning and policy documents, including 52 planning proposals. Overall strategic and policy provisions for the catchment have been sustained or improved.

Increasing regenerative agriculture

Issues

Agricultural land use stretches across 38% of Sydney's drinking water catchments and is the largest source of sediment, nutrients, and pathogens in the catchments. Stock access to waterways and continuous grazing have also led to vegetation decline and accelerated erosion. Poor land management also diminishes the resilience of the catchment to extreme climatic events such as droughts, floods and bushfires.

This is important to WaterNSW as there is a direct relationship between the health of the landscape, managements practices, and the quality of water in rivers and reservoirs.

Regenerative agriculture is a term increasingly used to describe an assemblage of practices that support healthy, productive agriculture and a healthy environment. WaterNSW is supporting individuals, groups, and organisations (government and not-for-profit) in their endeavours to repair and regenerate waterways and landscapes.

Goal

1000 landholders managing healthy waterways and regenerative grazing practices.

Planned Outcome

Planned Outcome	Actual Outcome
Long term trends of phosphorus, nitrogen, pathogens, and sediment have a downward trajectory. To achieve this, our Rural Program is looking for evidence of landowners excluding stock from waterways with fencing, increased riparian vegetation in protected areas, significant erosion treated, improved hydrological connections between land and water, and rotational grazing practice integrated into the broader landscape.	Outputs and outcomes of sixteen landholder projects from the Rural Landscape Program were assessed and the results presented in a monitoring report. Progress was assessed at each project against five key objectives using a traffic light system. Key conclusions: overall program design and project outputs are on the right track to make a difference to waterway health and water quality, but more can be done to achieve long-term vegetation outcomes and benefits. The program needs to give more time and support to landholders to accomplish outcomes. Results affirm policy changes proposed for future programs in FY25 and beyond.

Activities and outcomes

Rural Program

WaterNSW partners with different government and not-for-profit organisations. The partnerships drive change by supporting landholders and graziers to improve farming practices, landscape and waterway conditions, and water quality in creeks and rivers.

Regenerative farming embraces a wide spectrum of practices and outcomes that support water quality, builds resilience at a local and sub-catchment scale, and demonstrates compatible aims between farming and environmental outcomes.

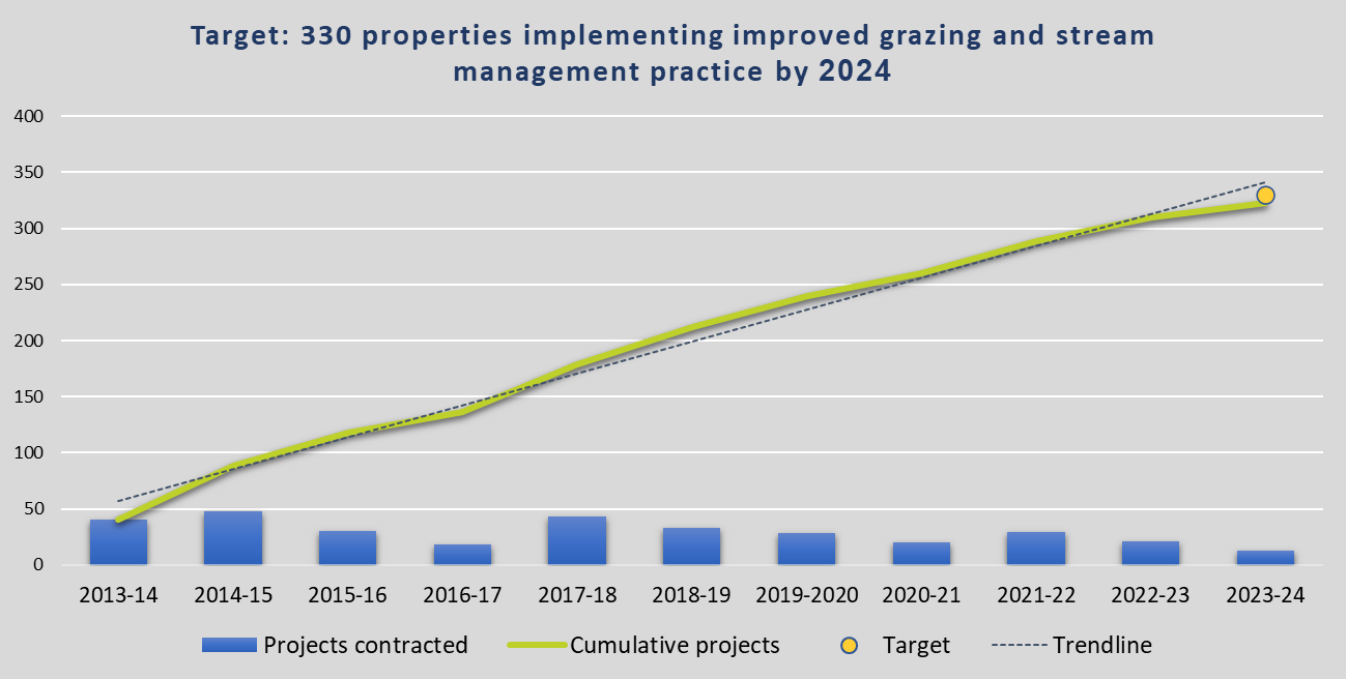
Our partnerships focus on nature repair by increasing diverse riparian vegetation, managing uncontrolled stock access to waterways, treating gully and streambank erosion, and implementing sustainable grazing practices. We are now looking to integrate landscape rehydration: focusing on works that help reconnect land and water, improving groundcover, increasing biodiversity and soil stability, and overall climate resilience.

Planned Activities	Actual Activities
Negotiate and establish partnerships for the delivery of programs and projects in agricultural landscapes[viiviii].	South-East Local Land Services (SELLS) and the Australian River Restoration Centre (ARRC) worked with WaterNSW to deliver the Rural Landscape Program (RLP) and the Rivers of Carbon – Source Water Linkages Program (ROCSWL).
Support partnerships and landholders to repair nature in agricultural landscapes by: • Fence the exclusion of stock from waterways providing riparian buffers. • Build, repair, and conserve natural and functional waterway conditions important to the local setting including hydrologic connections, vegetation structure and biodiversity, and gully, bank, and channel stability, and • Introduce and manage rotational grazing practices adjacent to riparian land that supports improve soil conditions and groundcover.	RLP activities included the completion and acquittal of projects with landholders (erosion and construction), an evaluation of a selection of projects, and landholder workshops. During this financial year SELLS decided to end their long-term partnership with WaterNSW. Since 2013, SELLS have supported 248 projects with landholders for riparian protection, erosion treatments, and rotational grazing. This includes regeneration of over 475 km of riparian length. ARRC engaged landholders with 11 new agreements with plans to protect 20.9 km of riparian length with an area over 4,800 ha in a variety of stream catchments.
Undertake workshops, field days and events, social media, and other communication activities to engage with landholders about waterway rehabilitation and sustainable grazing.	SELLS held three workshops for landholders each with a different focus: Healthy Farms, Understanding your Soils, and Introduction to Revegetation. ARRC maintained and promoted a range of web resources, guides, and articles accessible on the Rivers of Carbon website via social media campaigns and newsletters. This includes the NSW Stock and Waterways guide.

Investigate and explore the available options, costs, and pathways for delivery of programs to support nature repair of waterways in agricultural landscapes	The Dairy Program was completed. Seven landholders were engaged, five completed projects, one partially completed, and one withdrew due to a change of property land use. The program has supported dairy farmers to upgrade and maintain effluent management infrastructure to help protect waterways and water quality. WaterNSW has supported dairy farmers with the establishment, maintenance, assessment, and upgrades of effluent systems since 2001.
Commence strategic and business planning for program delivery in 2027-2030	The WaterNSW Board approved the new Rural Program and strategic direction – Nature based solutions for source water quality (FY25 & FY26). Negotiations have begun to establish new partnerships for program delivery.
Evaluation and improvement activities including the 'Strategic Evaluation of the Rivers of Carbon – Source Water Linkages Program'.	An explanatory document was produced about the Rural Program and its goals and measures within the Source Water Protection Strategy 2040 (response to Audit Recommendation 7). Strategic planning for the Rural Program has responded to Catchment Audit recommendations, strategic evaluation of past programs, industry changes, and insights and lessons learned from the past. These changes have been embedded within new program policies and helped shape new program directions in negotiation with partners.

Measuring progress

Measure	Result
Number of grazing properties implementing and integrating recommended practices	13
Riparian and waterway length with controlled or excluded stock access	23,024 m
Number of head cuts and stream bank erosion treated	4
Number of hectares under rotational grazing practice	0
Number of dairy farms with best practice effluent management	There are currently 16 active dairy farms in the declared catchment. Of those 11 farms have had their effluent management infrastructure assessed. Six farm systems meet design criteria (or are maintained) to meet industry best practice. Other farms are undergoing land use change, require maintenance, or need system upgrades.


Target: 330 properties implementing improved grazing and stream management practice by 2024
400
350
300
250
200
150
100
50
0
2013-14
2014-15
2015-16
2016-17
2017-18
2018-19
2019-2020
2020-21
2021-22
2022-23
2023-24
Projects contracted
Cumulative projects
Target
Trendline

Fulfilling land management responsibilities

Issues

WaterNSW has various land management responsibilities across Sydney's drinking water catchment, including the Special Areas, Controlled Areas, public recreation areas and a range of leased or licensed land. Fulfilling these responsibilities demands both high level strategic planning and complex daily operations, with an underlying focus on the ongoing protection of water quality. The key risks to water quality are from bushfire, pests and weeds, and erosion, particularly within the Special Areas, which surround the reservoirs.

Goal

Maintain the long-term ecological values of the Special Areas consistent with water quality protection.

Planned Outcomes

Planned Outcomes	Actual Outcomes
Fire management has minimised risks to life and property, critical infrastructure, water quality and ecological integrity.	Wildfire early detection and response has been maintained and mitigation works implemented (both mechanical and burning). These works were planned to minimise risks to life and property, critical infrastructure, water quality and ecological integrity
Biosecurity has been managed to minimise, prevent and eliminate risks to water quality and supply and ecological integrity.	Control has continued with significant and sustained effort on aquatic weed incursion in Lake Yarrunga, Prospect and Warragamba catchment.
Recreation areas are managed to provide public facilities sympathetic to their location and to protect water quality, natural and heritage values.	Facilities have generally been improved. Additional tree safety and exclusion fencing work has been completed to ensure public safety.

Activities

Fire Management

Fire mitigation and suppression works are implemented to minimise the impacts of wildfire on WaterNSW land, assets, the ecology and water quality. This includes representation on key district bushfire management committees, hazard reduction burns, mechanical asset protection zones, early detection (fire towers) and fire suppression crews.

Wildfire in the Special Areas can reduce vegetation coverage, and contaminated runoff associated with post-bushfire rainfall events can increase sediment and ash transport into rivers or reservoirs and impact water quality. Every 7-10 years major fires have been experienced in the bushland areas surrounding reservoirs in the Sydney Catchment Area. Large fires occurred in the Warragamba and Shoalhaven Catchments in 2019/20.

Fire risk is increasing under a changing climate, and rapid-fire response is a critical management tool to reduce the likelihood of catastrophic impacts from fires spreading.

Planned Activities	Actual Activities
Collaborate with RFS and NPWS to ensure tenure neutral approach to fire management including active participation at Bush Fire Management Committees[i, ii]	WaterNSW and NPWS collaborated on fire planning through their Fire Technical Reference Group. They collectively represented proposed programs at bushfire management committees.
Conduct 10 priority hazard reduction burns hazard reducing at least 4,000 ha.	20 hazard reduction burns were completed reducing fuel over 1714 ha. Burns completed were at Nepean Office, Warragamba 18th & 19th streets Warragamba and WT9, Cataract Helipad, Warragamba Conference Centre, Mort St Cascades, Cataract Manor, Cataract Depot, Cataract Picnic Area, Avon Dam, Blackheath Catchment South, Bullio Tunnel, Forest Creek, Halliday's Road, Katoomba Catchment West, Lakesland East Stage 1, Little Crater Stage 2, Little Crater Wollondilly, Mount Lindsay, Nepean East and Tourist Road Oval. In addition, six pile burns were undertaken at Woronora, Warragamba (2), Nepean, Fitzroy Falls, & Cordeaux dams.
Implement hazard reduction program including maintaining fire breaks (380 km / 550 ha).	Vegetation along 358 km of fire trails was treated effecting mechanical reduction of 1,242 ha of asset protection zones (APZ). An APZ was reinstalled at Weir Road Warragamba to protect dwellings from fire.
Maintenance of 180 kms of fire trails.	Planned works were delayed by flood recovery works. 51 km of road repairs were completed.
Implement Bushfire Management Plans for Sydney Catchment Area lands and maintain data sources that drive these plans.	Bushfire Management Plans for Sydney Catchment Area lands and associated data sources that drive these plans, were maintained.
Maintain early detection and rapid response capability and preparedness in accordance with the Bushfire Operational Protocol.	WaterNSW has maintained its detection and response capabilities across the 2023/24 fire season by: • Stood up fire towers for 53 high fire-danger days

	• Maintaining a helicopter and crews on standby for 121 hrs and 157hrs respectively • Patrolling the Special Areas for 1200hrs to detect illegal access and reduce the risk of bushfire
Respond to wildfires within targeted timeframes within the stand-up protocol and contain at least 80% of fires to less than 10 ha.	Rapid response (heli-based) firefighting crews were ready for immediate deployment (standup) during elevated fire danger for 29 days over the season. Twenty-one of those days occurred during September and October. Two fires exceeded the 10 ha containment target. Neither of these had a noticeable impact on water quality

Biosecurity

Landowners have a biosecurity duty to manage pests and weeds under the Biosecurity Act 2015. WaterNSW works with the NPWS, Local Control Authorities and, Local Land Services through Regional Pest and Weed committees to plan and implement pest and weed control programs.

Planned Activities	Actual Activities
Control priority vertebrate pests including pigs, rabbits, dogs, deer, goats, horses, cattle and foxes in Special Areas and Braidwood lands in accordance with LLS Regional Pest Plans.	Pigs, deer and goats were controlled using aerial and ground-based shooting across the Special Areas and Braidwood lands with 740 pigs, 173 deer and 235 goats taken. Cattle program removed 72 head within the reporting period. Foxes and wild dogs were targeted using baiting with 232 baits taken. These activities were undertaken to assist in the protection of for Bristlebird and Koala populations. Baiting to support Brush-tailed Rock-Wallaby populations adjacent to the Shoalhaven Special Area were delivered in partnership with NPWS and DCCEW. 38 baits were taken.
Control priority weeds including aquatic weeds in Prospect Reservoir and Lake Yarrunga, willow and blackberry in Wingecarribee Swamp (20 ha) and Warragamba, regional priority weeds in Braidwood.	Ludwidgia longifolia and Kidney-leafed Mud-plantain (KLMP) eradication program continued around Lake Yarrunga. No new infestations of KLMP have been detected. Ludwidgia continues to be found in identified hotspots. High water levels have assisted control efforts by making plants more accessible to boat crews. WaterNSW controlled 1.4 ha of Ludwigia peruviana at Prospect Reservoir. WaterNSW completed 10 ha of primary control of willow and blackberry on Wingecarribee Swamp, with a further 18 ha of follow up spraying completed on previously controlled areas.

	Willow and poplar control along the 34 km of the Wollondilly River.
Actively participate in the Greater Sydney and Central Tablelands LLS, Southeast LLS Regional Weed and Pest Committees.	WaterNSW participated in the following meetings: • Shoalhaven Illawarra Wild Dog Working Group Meeting (x2) • South-East Regional Strategic Pest Plan Review • South-East Regional Weeds Committee • Greater Sydney Regional Weeds Committee
Develop an aquatic weeds risk assessment process and biosecurity plan template to improve prioritisation of pest and weed control effort.	Aquatic weed risk assessment process was finalised. Biosecurity operational plans for weed species have been drafted for Declared Drinking Water Catchment Areas.
Continue to implement a research program to determine patterns of deer movement in Metropolitan Special Area.	Deer movement research has concluded, with results currently being complied into a report to be shared with stakeholders.
Prepare assessment of the population of targeted priority pest species across the Warragamba Special Area.	National Parks have continued developing baseline estimates of pig populations in the Warragamba Special Area.

Recreation Areas Management

Every year over 600,000 people visit recreation areas in Greater Sydney and National Parks in the Special Areas. Recreation areas are highly valued by the community. The NSW government has a social responsibility to provide a safe, clean, and welcoming environment for visitors to enjoy the dams, camping areas, and surrounds.

Planned Activities	
Implement inspection program to maintain public safety and inform maintenance activities.	98% of planned inspections were completed, with 94% on time.
Maintain recreation areas to provide pleasant, accessible, and safe facilities for the public, in accordance with Conservation Management Plans.	86% of Identified corrective works were complete within the reporting period. Key works included site fencing improvements to protect public safety, tree hazard inspections and playground inspections. Additional works were required at Bendeela camping ground following floods during the year.

Supporting Activities

There is a network of unsealed roads throughout WaterNSW land. This network is important for fire management including suppression and for safe access to key infrastructure. Upgrades, repairs, and

maintenance of the network is aligned with construction guidelines and achieves standards required under the *Rural Fires Act 1997*, helps prevent erosion, and meets the safe operational needs of all users.

Barriers, fences, and gates are required to provide a safe space and protect people, the environment and assets They also deter unauthorised access into restricted areas.

There are many natural, historic, and Indigenous heritage places throughout the Special Areas and broader Sydney Catchment Area. WaterNSW works with landholders, the community, local and state government, and Traditional Owners and representatives to identify, protect, and manage the values of heritage owned and operated by WaterNSW or found on WaterNSW land.

Planned Activities	Actual Activities
Implement inspection program of 400 km unsealed roads and carry out repair and upgrade of prioritised works on trails and drainage features.	259 km of unsealed roads were inspected resulting in 14.8 km of trail repairs being undertaken. The 9F, 15M, 15I, 15H, 15J trails were had drainage systems repaired and cleaned.
Continue to repair trails damaged during flood events during 2021 and 2022 and 2024.	46 km of trails damaged in the 2021, 2022 and 2024 floods were repaired. This included works along 6D, 7E, 15A, 15G, 9F, 9H, 9G and 9J.
Treat two priority erosion sites within the Declared Catchment, if present.	No erosion sites were repaired as road repairs were prioritised.
Install and maintain barriers, fences and signs with a focus on where unauthorised access is contributing to environmental damage.	Improvements and repairs to fences and barriers were made to the Museum toilet block and Cataract Dam, spillway fencing at Avon Dam, Spring Farm fencing damaged by tree fall, additions to exclusion fencing at Wingecarribee Dam and fencing repairs at Tallowa Dam. Signage across the Shoalhaven Recreation Area was refreshed.
Progressively update Special Area enforcement signs.	Signs have continued to be replaced as required, however a large scale replacement program was delayed to enable modifications to the WaterNSW brand to be incorporated.
Maintain and protect significant heritage items.	Annual inspections and maintenance works to address white ants were undertaken on the Granary and Windmill Hill.
Support programs to monitor and protect ecological communities.	WaterNSW participated in and supported strategic and operational programs for protection of ecological communities within Special Areas, by providing access. Programs are undertaken in collaboration with NPWS and DEEWCC. Foxes and wild dogs were targeted to assist in the protection of for Bristlebird and Koala populations.

	Baiting to support Brush-tailed Rock-Wallaby populations adjacent to the Shoalhaven Special Area were delivered with NPWS. Weed control undertaken around Bombay Bossiaea in Braidwood area.
Consult and support Traditional Owners of the Special Areas.	WaterNSW continued representation on the Gundungurra ILUA Consultative Committee. Key matters included environmental flows from Warragamba Dam, renewable energy projects, cultural access process, and First Nation engagement with WaterNSW RAP.
Develop erosion management decision support tool for the Special Areas[ix].	A draft GIS model and criteria for a decision support tool have been developed. This will be compiled into an operational tool over the next year.

Measuring progress

Planned Outcomes	Actual Outcomes
Asset condition profile for fire trails and fire blocks are consistent with desired condition.	85% fire trail and 100% slash breaks and HR blocks were consistent with desired condition on 30 June 2024. See graph below.
Percentage of strategic fire and biosecurity management plans that are current on 30 September each year.	100% of strategic fire management plans were current on 30 September 2023. Biosecurity management plans will be developed in 2024-25.
Percentage of bushfire incidents responded to within the agreed response matrix.	All (100%) of incidents were responded within the agreed response matrix.
Number of wildfires that exceed 10 ha annually.	Two of the four fires exceeded our target of less than 10 hectares. These fires all occurred early in the season in isolated areas, with dry conditions making it difficult to contain the fires to a small area. The fires also occurred on days when the helicopter was not on standby due to low fire danger ratings. None of the fires resulted in a noticeable impact on water quality.
Percentage of planned fire preparation works completed.	Seventeen out of 18 planned hazard reduction burns were prepared ready for implementation (94%). However, wet conditions meant that only five were able to be carried out.
Percentage of the Special Areas within vegetation specific fire thresholds.	At the end of FY2024, 83% of the Special Areas (total area 360,000ha) was within ecological thresholds, with 2.5% too frequently burnt and 5.0% too long unburnt.

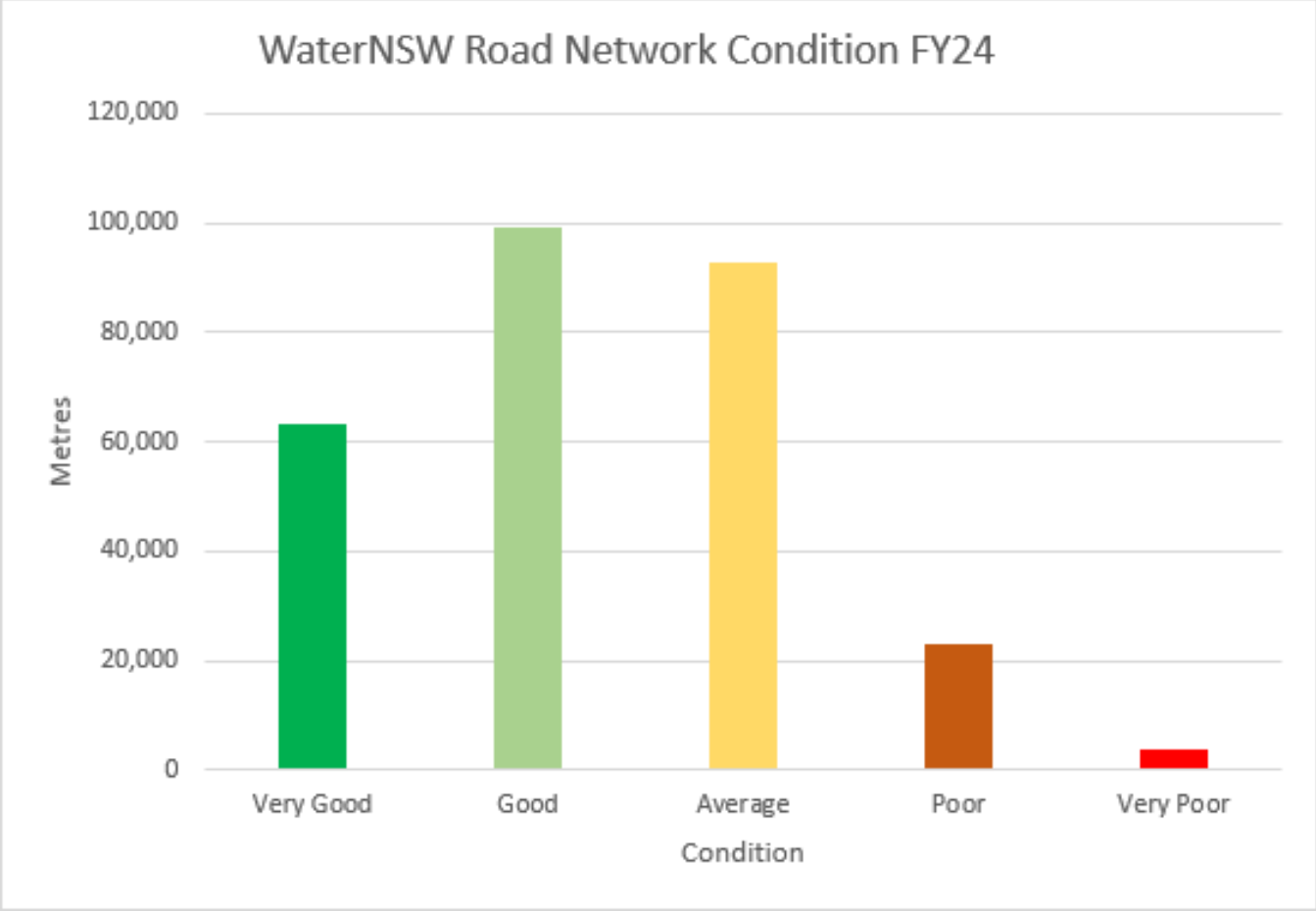
The goal of this priority is to "maintain the long-term ecological values of the Special Areas consistent with water quality protection". The key threats to the ecological and water quality values of the Special Areas arise from unplanned fire, incursions of pest and weed species and an inability to access key areas for management.

The measures we use to assess our progress are based on carefully planning our fire and biosecurity management. We implement those plans to ensure we are controlling pests and weeds, we have sound road infrastructure for management and incident response and have strategic fire management zones ready for bushfire season. And we also respond to outbreaks of fire quickly to prevent their spread. Finally, we track whether vegetation communities are adversely impacted by fire. We note that vegetation within fire thresholds is deemed to be in the healthy range.

In 2024 we have current plans across all Special Areas for bushfire. Biosecurity plans are programmed for preparation in 2025.

85% of the fire trails (see figure below) and all of our strategic fire advantage zones in the Special Areas are 'fit for purpose', with maintenance planned for those roads that are currently out of service.

Whilst 50% of the unplanned fires exceeded the 10 ha thresholds, they were unusual as they occurred outside the normal fire season, when we had no rapid response capacity. Despite that and the 2019/20 bushfires, over 83% of the vegetation in the Special Areas remains within fire thresholds.



Enforcing catchment protection laws

Issues

WaterNSW has responsibilities under the *Water NSW Act 2014,* the *Water NSW Regulation 2020* and the *Protection of the Environment Operations Act 1997* to protect water quality in the Sydney Catchment Area, including the Special Areas. Illegal and unauthorised activities can compromise the integrity of the Special Areas and the broader catchment area and threaten water quality and management objectives.

Goal

Maintain an active presence and use strategic intelligence to mitigate illegal and unauthorised actions and minimise adverse water quality impacts across Sydney Drinking Water Catchment.

Planned Outcomes	Actual outcomes
Access to Special and Controlled Areas is consistent with the Regulation and our authorised access policy.	Access consent have been processed according to policy and statutory requirements.

Activities

Compliance

Planned Activities	Actual Activities
Deliver education to members of the community using social media relating to the importance of protecting Special or Controlled Areas.	There are five reported activities undertaken during the reporting period.
Social media education campaign targeting high risk groups in Local Government Areas impacting on the catchment, encouraging the local community's support[x] Provide education and support for other regulatory bodies within the Declared catchment.	Nil. Other compliance activities took precedence over this action during a period of significant resource constraints.
Assess and determine access consent applications and grant consent with appropriate conditions, or document clear reasons for refusal[xi].	WaterNSW granted access for 52 individuals or groups in the Special Areas in FY2024.
Audit 10% of access consents granted for compliance with conditions.	Other compliance activities took precedence over this action during a period of significant resource constraints.

Work collaboratively with Targeted Operations with external stakeholders relating to deter unauthorised activities impacting on the Special Areas.	One joint operations was carried out in FY2024, with NPWS and NSW Police (Rural Crimes).
Conduct 1,500 hours of Special Area and Controlled Area surveillance[xii].	A total of 1466 hours (or 98% of target hours) was conducted.
Ensure Electronic Surveillance (trail cameras) are installed within identified hot spots for a period greater than 250 days per year.	For the 2024 reporting year a suite of cameras has been deployed over various hotspot areas for the entire year (365 days). 34 hot spot locations were targeted for compliance activities. The six Biosecurity monitoring cameras also recorded compliance related events as secondary recordings to their primary deployment.
Undertake regular inspections and interactions with councils bordering Special and Controlled areas to ensure compliance with development consent conditions.	WaterNSW completed six joint inspections with council or the developer of development sites that had issues with implementation of development consent conditions. WaterNSW has meetings with the 20 councils bordering the controlled and special areas. The meetings discuss strategic development, consent conditions for new developments and how they are enforced and environmental compliance actions.
Investigate reports of activities contravening the *Water NSW Act* 2014 and *Regulation* 2020 and the water quality provisions of the *Protection of the Environment Enforcement Act* 1997 in the declared catchment[xiii].	There were 19 notices issued under *Water NSW Act 2014* and *Protection of the Environment Operations Act 1997* during the reporting period.
90% of PINS are finalised through Revenue NSW or Court based enforcement. [xiv]	There are 2 PINs issued during the reporting period and finalised.

Measuring progress

Measure	Result
Number of Special Areas access consents processed.	52
Outcome of community and stakeholder engagement as a part of relevant compliance actions (i.e., training/education/advisory letters).	Community and stakeholder consultation was constrained by resourcing in FY2024
Number of unauthorised activities detected in the Special and Controlled Areas (Investigations).	201
Number of high-risk sites likely to have active development.	Methodology under development in 2023-2024

Number of infringement notices issued in the Special Areas.	2

The Goal in this priority is to "maintain an active presence and use strategic intelligence to mitigate illegal and unauthorised actions and minimise adverse water quality impacts across Sydney Drinking Water Catchment".

In the Special Areas we maintained active surveillance through regular patrols (1,266 hours) as well as deploying remote cameras and monitoring social media. We detected 201 breaches of our Regulation and issued 2 infringement notices. Our issued infringements 2024 were curtailed due to resource constraints.

We continue to review requests for legal access to the Special Areas. In 2024 we approve 52 activities that complied with our access policy. We also continue to check that authorised users of the Special Areas comply with our conditions of entry.

We also monitor remote surveillance cameras and social media to gain intelligence around potential illegal activities in the Special Areas.

In 2025 we will increase our surveillance of development sites to seek to curtail pollution emanating from disturbed development sites.

Educating and engaging communities

Issues

WaterNSW is required to undertake an educative role within the community under the *Water NSW Act 2014* and the *WaterNSW Operating Licence.* As part of this role, and to support the long-term management of source water, WaterNSW works and engages with residents and landholders, community organisations, schools, businesses, local councils, and government.

We use a range of communication and education tools including the Visitor Centre at Warragamba Dam, website, publications and media articles, targeted community education programs, community engagement and interpretation structures at our dams and recreation areas. The Warragamba Dam excursion program offers primary, secondary and tertiary students from across the catchment and Sydney area the chance to explore all aspects of modern water supply, and to learn about water through hands-on activities in the onsite Visitor Centre. The primary and secondary program is linked to the requirements of the NSW syllabus for the National Curriculum, with supporting education resources for teachers and students online.

Goal

Undertake an educative role in the community on WaterNSW activities and functions in the Sydney Catchment area.

Planned Outcomes

Planned Outcomes	Actual Outcomes
Surveyed participants have an increased knowledge and understanding of the role of WaterNSW, catchment management and risks to water quality and quantity in the Declared Catchment	Post excursion evaluations completed in FY2024 reported that 100% of teachers and lecturers who participated in the excursion program either 'agreed' or 'strongly agreed' that both they and their primary, secondary or tertiary students had an 'enhanced knowledge and understanding of the role of WaterNSW, water catchments, catchment management and Warragamba Dam'.
Communities are informed about WaterNSW projects and potential impacts	Communities, key stakeholders and property owners were provided with timely information by phone, email and letterbox drops to prepare them for any impacts from WaterNSW projects, and measures were taken to reduce the impacts of our projects wherever possible.

Activities

Community and School Education

Planned Activities	Actual Activities
Deliver the Warragamba Dam school excursion program to around 3,500 students. [i]	In FY2024, over 3,700 pre-school, primary, secondary, and tertiary students and educators participated in the face to face, curriculum linked excursion program at Warragamba Dam. This included a pilot industry connections program co-designed with the NSW Government Regional Industry Education Partnership, to introduce Year 9 and 10 students to STEM careers at WaterNSW. An additional 160 primary students and their teachers participated in hands on catchment and water quality activities and lessons at an environmental education event run in conjunction with Wingecarribee Shire Council in the Declared Catchment. A further 300 primary students and teachers from the Declared Catchment participated in a pilot incursion program with WaterNSW educators delivering content and activities in person at their schools.
Host approximately 80,000 visitors at the Warragamba Dam Visitor Centre. [ii]	The Warragamba Dam Visitor Centre hosted over 71,000 visitors in FY2024. These numbers were slightly impacted by the closure of the Visitor Centre due to flood operations, total fire ban days and a film production on site.
Deliver temporary exhibitions and supporting activities at the Warragamba Dam Visitor Centre. [iii]	Resources to support visitor experiences and learning were developed and delivered during FY2024, with themes such as First Nations cultural heritage and public safety at our sites and around waterways. In September 2023, WaterNSW partnered with the Powerhouse Museum for Sydney Design Week, delivering events in and around the Visitor Centre.
Develop and support community education programs in the Declared Catchment	Community education activities were delivered in the Declared Catchment as part of 2.1 Catchment Program (Urban), 3.1 Assessments (Catchments), 5.1 Catchment Program (Rural) and 7.1 Compliance, with details found in these respective sections.

Community Engagement

Planned Activities	Actual Activities
WaterNSW will engage with local communities on projects and activities that impact them.	WaterNSW engaged and informed local communities and stakeholders throughout the Greater Sydney region on programs, projects and activities that interest and impact them. Methods of communication included notification letters, project updates, FAQ, media releases, door knocking activities, stakeholder emails, webpage updates, social media, print and digital media, stakeholder meetings and briefings, diagrams and video. Communication and stakeholder engagement plans (strategies) have also been developed for all works. In FY24 WaterNSW engaged on the following projects: • Western Sydney Pumped Hydro, part of the Renewable Energy Storage Program • Camden and Sharpes Weir – optioneering consultation • Tallowa Dam Road repair works • Warragamba Pipeline Valves and Controls Upgrade • Kangaroo Valley Pipeline Renewal • Town Water Risk Reduction Program – Metropolitan • Tallowa Dam overshot gate maintenance Engagement strategies have also been prepared for the following projects, with stakeholder outreach planned to commence in FY25: • Long Duration Storage Program • Warragamba e-flows • Warragamba Dam Resilience program • Oberon Dam Intake Tower Valve Replacement Works • Tallowa Dam Fish Lift Reliability upgrade • Theresa Park Weir Access Road Flood Remediation • Nepean weirs erosion remediation & renewal • Potable drinking water in WaterNSW recreation areas

Budget

Operational Budget

Project Name	Budget ($'000)	Actual ($'000)
Scientific approach	2,051	1,925
Creating water sensitive towns	998	704
Ensuring water quality compatible development	1,641	1,480
Integrating water quality policy and practice	598	438
Increasing regenerative agriculture	1,851	1,423
Fulfilling land management responsibilities	13,417	12,351
Enforcing catchment protection laws	944	529
Educating and engaging communities	1,355	880
Total	**22,855**	**19,761**

Capital Budget

Project Name	Budget ($'000)	Actual ($'000)
Catchment infrastructure asset renewals	446	141
Catchment upgrade and replacement of plant and equipment	850	179
Fencing – Declared Catchment	566	661
Water quality modelling	2,160	1,132
Roads and trails	305	19
Total	**4,327**	**2,127**

Note 1: Budgets exclude overheads
Note 2: Source – Power BI Report on ACMR (budget year FY24)

OPEX Variances

Scientific approach was under budget by $126K because lower than expected research contracts were engaged in due to prioritisation of program review in the lead up to the final year of the 2021-2025 Science Program.

Creating water sensitive towns was under budget by $296K as delivery timeframes were extended timeframes for council projects to assist WaterNSW to meet overall budget saving targets to stay within its IPART allowance.

Ensuring water quality compatible development was under budget by $161K from an underspend in salary and wages, due to an expected vacancy rate.

Integrating water quality policy and practice was under budget by $160K to assist the business to live within it IPART allowance.

Increasing regenerative agriculture was under budget by $428K because WaterNSW stopped approving new farm improvement projects under the Rural Landscape Program after SELLS decided to conclude its involvement at the end of FY2024.

Fulfilling land management responsibilities was under budget by $1,066K to assist the business to live within it IPART allowance.

Enforcing catchment protection laws was under budget by $415K as WaterNSW revised its operating model and deferred recruitment of replacement staff pending decisions on the revised needs.

Educating and engaging communities was under budget by $475K due to subsequent revisions of the budget, which reduced the final funding available.

CAPEX Variances

Catchment infrastructure asset renewals was under budget by $305K as work was delayed by other major project work – Woronora spillway bridge and Tallowa Dam Road closure due to flood damage.

Catchment upgrade and replacement of plant and equipment was under budget by $671K due to supply chain delay in deliver of two front end loaders.

Fencing – Declared Catchment was over budget by $95K because we prioritised public safety fencing in recreational areas.

Water quality modelling was under the start of year budget by $1,028K primarily due to resourcing and market constraints limiting availability of dedicated project resources.

Roads and trails was under budget by $286K because we concentrated on flood repairs.

Appendix A - Catchment Audit Recommendations

The 2022 Catchment Audit was tabled in Parliament on 22 June 2023. Status update as at 30 June 2024.

	Climate change mitigation and adaption				
#	**Recommendation**	**Responsible**	**Timing**	**Status**	**Comments**
1	Future Catchment audits to review climate data, climate impacts and NSW Government climate change policies, strategies and activities relevant to Catchment health.	Catchment auditor (WaterNSW lead)	Dec-25	In progress	The requirement to review climate data, climate impacts and NSW Government climate change mitigation policies, strategies and activities relevant to Catchment health will be included in the next catchment audit.
2	Identify major sources of greenhouse gas emissions from the Catchment.	DPE (lead) OECC, EPA	Dec-23	No update provided	
3	Demonstrate how major sources of greenhouse gas emissions in the Catchment are being reduced or eliminated.	OECC (lead) EPA, DPE	Ongoing	No update provided	
4	Demonstrate how potential major sources of greenhouse gas emissions in the Catchment are being avoided or minimised.	DPE (lead) EPA	Ongoing	No update provided	
	Minimise impacts from climate-driven events				
5	Develop a Catchment disaster mitigation plan to support monitoring and management of Catchment health.	WaterNSW (lead) NSW Reconstruction Authority, NPWS, RFS and DPE	Jun-25	In progress	WaterNSW already has well-established procedures for ensuring the continuity of access to data from water monitoring sites during natural disaster events. The output from the Climate Change Risk Assessment and Adaptation Plan (currently in progress) which identifies key assets at risk from climatic events such as increased flooding, bushfires and storms and identifies actions to be taken to mitigate against the risks will be integrated in to future processes. By June 2025 a disaster mitigation plan will be prepared and implemented which details critical water monitoring and management infrastructure (i.e., water gauging stations, water monitoring stations/sites and associated access trails) and outlines what is monitored or used, where, how, by whom, and for what purpose.
6	Inform sustainable use of groundwater by utilising non-government bores.	DPE	Dec-24	No update provided	

	Progress towards Source Water Protection Strategy Goals				
7	Clarify goals and performance measures for the Source Water Protection Strategy, document methods for measures, establish a baseline and report annually against the established baseline.	WaterNSW	Dec-23	Behind schedule	Baseline reports and methods are available for all strategies apart from 'Enforcing Catchment Protection Laws' (Source Water Protection Strategy 2040). Reporting on all strategies will be included in the Annual Catchment Management Report 2024.
8	Increase regenerative agriculture in priority reaches of the Catchment through refinements to WaterNSW rural programs.	WaterNSW (lead) LLS	Jun-25	Completed	Rural Program 2025-26 approved by WaterNSW Board in April 2024. Business case incorporated increased scale and coverage of regenerative agriculture initiative.
9	Make locations and types of government-funded land management programs in the Catchment available via spatial datasets on SEED.	DPE (lead) WaterNSW, NPWS, LLS, Environmental Trust, councils	Jun-25	No update provided	
10	Improve annual NSW vegetation mapping using satellite imagery to show native and non-native vegetation formation classifications, and areas of no vegetation.	DPE (lead) WaterNSW, LLS, NPWS	Dec-24	No update provided	
11	Review the suitability of applying a 60 m buffer to assess potential mining impacts to swamps and streams.	DPE (lead)	Dec-24	No update provided	
12	Improve access to data for organisations involved in assessing wetland significance, risk and impacts, as well as stream health and impacts.	DPE (lead) EPA, Resources Regulator	Jun-24	No update provided	
	Update guidelines and methods to assess water quality				
13	Consider the implications of DPE's 2023 review of water quality objectives and the associated technical report for assessment and reporting of water quality in the Catchment by WaterNSW.	WaterNSW (lead) DPE, IPART	Jun-24	In progress	Action will be completed by June 2024 - DPE Environment and Heritage Group advised that the delivery timeframe for the revised water quality objectives has been extended to the end of 2024.
14	Review methods for measuring aluminium, including sampling and analysis, to determine toxicity risk to aquatic ecosystems.	WaterNSW (lead) DPE, IPART	Jun-24	Completed	WaterNSW is required by IPART through our reporting manual to assess total Aluminium against the against ANZECC/ARMCANZ (2000). A review of information behind the guideline and alternative methods for assessing Aluminium toxicity has been completed. WaterNSW is adequately and appropriately

					measuring Aluminium in accordance with ANZECC/ARMCANZ (2000).
Reduce erosion and sedimentation risk					
15	Develop and implement an erosion management decision support tool for the Special Areas.	WaterNSW (lead) NPWS (partner)	Dec-24	In progress	The erosion management decision support tool aims to provide a structured process assess the feasibility of installing erosion control measures after a bushfire. Erosion control measures include in-stream barriers and coir log terracing of exposed slopes. The tool uses GIS based information, to assess erosion potential, fire intensity /severity and accessibility/practicality of installing interventions to reduce or limit erosion and sedimentation into waterways. Progress to date includes: • Key Information for decision making has been identified. • Methodology has been developed. Still to complete: • GIS layers and processing still to complete: compiling the information and process into an operational tool that is easily explained to allow for rapid post fire assessments.
16	Undertake detailed analysis and mapping of erosion and sediment loss.	WaterNSW (lead) LLS, DPE	Jun-24	Completed	Evaluation of remote sensing methods completed. Methods effective at lot scale but not economical at catchment scale for regular monitoring.
	Reduce risk from sewerage				
17	Upgrade sewage treatment plants in Wingecarribee LGA and comply with environment protection licences.	Wingecarribee Council (lead) EPA	Jul-24 (Bowral)	No update provided	
18	Review integration of the 2023 on-site sewage management system guidelines into councils' compliance and enforcement policies and programs to inform the need for future guidance and regulatory reform.	OLG (lead) Councils, EPA	Jun-25	No update provided	

19	Audit stormwater management assets dedicated to council to determine if they are maintained to achieve NorBE objectives.	WaterNSW (lead) Councils	Jun-25	In progress	Currently WaterNSW is working with councils within the Sydney drinking water catchment and conducting the audits for stormwater assets owned by council. Initial audit for gross pollutant trap and water sensitive urban design audits for Wingecarribee Shire Council were completed in 2023. Recommendation for each asset has been provided to Council. Similar is being planning in Goulburn Mulwaree Council. Based on these reports in Wingecarribee Shire Council, WaterNSW will monitor the stormwater assets over the next couple of years. Currently, selection of the stormwater assets is being finalised and the tender process for monitoring work will commence shortly.
	Developments achieve NorBE				
20	Audit Module 1 and 2 development applications, assessments and determinations against NorBE requirements.	WaterNSW	Dec-24	In progress	WaterNSW requested the data form the NSW Planning Portal operated by the Department of Planning, Housing and Infrastructure (formerly DPE) in March 2024. The dataset is crucial for the audit, but the process is being delayed in the endorsement stage, due to the delay of data being received from the department. WaterNSW is planning to set a Data Services Agreement (DSA) next year to continue more targeted and frequent audits rather than this big scale audits. In the meantime, the team is looking to conduct small sets of NorBE Tool audits (shorter time period) without full sets of data from the Department.
21	Expand collaborative pollution control programs and campaigns in high-risk areas of the Catchment.	EPA (lead) Councils, WaterNSW	Dec-24	No update provided	
	Improve management of poor water quality				
22	Investigate causes of poor water quality at priority sites so that management can be targeted to the root cause.	WaterNSW (lead) EPA, Councils & EPL holders	Jun-25	In progress	Following initial consultation with WaterNSW stakeholders, a project plan has been developed to address the recommendation. A desktop review of impacted sites and has begun ahead of site visits to the sites and sub-catchments. Further review of data sets and statistical analysis will follow.

23	Develop educational/promotional material on innovative stormwater management practices in the Catchment.	WaterNSW (lead) BMCC	Jun-24	Completed	WaterNSW is has created educational content to promote innovative stormwater management practices. Further work is continuing a program to enhance the current content.
24	Identify and map sources of mine and quarry water discharges in the Catchment, including licenced and legacy premises.	EPA (lead) Resources Regulator	Jun-25	No update provided	

Note: Shaded recommendations are secondary.

Appendix B – Operating Licence Audit OFIs and Recommendations

There were no identified Operating Licence Recommendations or Opportunities for Improvement identified in FY2022 related to catchment management.

Appendix C – Publications and presentations

Journals

Cairns et al (2024) https://authors.elsevier.com/sd/article/S0022-1694(24)01131-4

Luong, H., A., Rohlfs A., Facey, J.A., Colville A. & Mitrovic S. M. (2024) Long-term study of phytoplankton dynamics in a supply reservoir reveals signs of trophic state shift linked to changes in hydrodynamics associated with flow management and extreme events, Water Research 121547 https://doi.org/10.1016/j.watres.2024.121547.

Ramanathan, T., Ollivier, Q., Rahman, A., Hamilton, L., Arumugam, S. 2024 Long-term dissolved organic carbon changes in Woronora drinking water system in Australia, Chemosphere, Volume 364, 143047 https://doi.org/10.1016/j.chemosphere.2024.143047

Zhu J, Stuetz RM, Hamilton L, Power K & Tamburic B (2023) Odour management in drinking water systems fed by mixed water supplies. Journal of Water Process Engineering, 56, 104329. https://doi.org/10.1016/j.jwpe.2023.104329

Conferences: Freshwater Sciences 2023

Davie, A.W, et al. 2023, Developing a water balance model in longwall impacted upland swamps of the Sydney drinking water catchments. Freshwater Sciences 5 June, Brisbane.

Rohlfs A. & Krix D., 2023, 'Unravelling multiple drivers of cyanobacteria blooms following a catastrophic lake regime shift", Freshwater Sciences, 4th June, Brisbane

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[i] Source water protection in the Sydney Declared Catchment is governed and directed by our responsibilities under the Water NSW Act (s. 6(1)(c), 7(1)(g), (h) and (j), and 47(2)), SEPP 2011 (Sydney Drinking Water Catchment SEPP), the Australian Drinking Water Quality Guidelines 2011, and requirements of NSW Health.
ii Included in response to Recommendation 22 of the 2022 Catchment Audit.
iii Included in response to recommendations 19 (assisting priority Councils to carry out audits of stormwater quality improvement devices (SQIDs) 21 (embedding the Get the Site Right (GTSR) program into the Urban Program with priority councils) of the 2022 Catchment Audit.
iv Responding to Recommendation 23 of the 2022 Catchment Audit by assisting Blue Mountains Council to promote excellence in stormwater management practices.
v Included to gather data required to respond to Recommendation 19 of the 2022 Catchment Audit
vi Included in response to Recommendation 19 of the 2022 Catchment audit
vii This program will include selective monitoring of erosion control works using drone and Lidar technologies in response to Recommendation 16 of the 2022 Catchment Audit.
viii Included in response to Recommendation 8 of the 2022 Catchment Audit.
ix Included in response to Recommendation 15 of the 2022 Catchment Audit.
x Budget for education program incorporated into 8.1 Community Education
xi Includes processing outstanding applications carried forward from FY23
xii Hours spent on joint agency operations by partner agencies are excluded from this figure
xiii Hours spent on joint agency operations by partner agencies are excluded from this figure
xiv Fines may not be paid however, Revenue NSW will utilise other tactics such as licence or registration cancelation until the person pays, or payment plans and this can be an extended process.