



University of New England Armidale Water Management Plan 2023 – 2030

October | 2023

Acknowledgement of Country

The University of New England respects and acknowledges that its people, courses and facilities are built on land, and surrounded by a sense of belonging, both ancient and contemporary, of the world's oldest living culture. In doing so, UNE values and respects Indigenous knowledge systems as a vital part of the knowledge capital of Australia. We recognise the strength, resilience and capacity of the Aboriginal community and pay our respects to the Elders past, present and future.

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**University of New England, Armidale
Water Management Plan
2023 – 2030**

**Estate and Built Environment
(EBE)**

October 2023

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1. Introduction

The University of New England (UNE) is committed to the environmental sustainability and conservation of natural resources. As one of the larger water-users in the Armidale Regional Council (ARC) Local Government Area (LGA), UNE has a responsibility to manage water consumption in a sustainable manner and demonstrate leadership in drought resilience through operations, research and teaching.

Recent events in NSW have demonstrated how vulnerable water sources can be, and the

need to better prepare for a future where water sources will come under even greater stress. This includes being able to respond to changes in water availability, due to both natural variability in seasonal cycles and climate change.

This Water Management Plan (WMP) provides an overview of how UNE will optimise water consumption practices and procedures, reduce reliance on potable town water, and guide water resource planning for the future.

1.1. Background

During 2019-2021, the Armidale region experienced severe and prolonged drought conditions, with falling dam capacities, continued below-average rainfall and above-average temperatures triggering the introduction of level 5 water restrictions in October 2019. In response to these restrictions, businesses, community and industry across the Armidale region were required to adopt aggressive water conservation measures in order to preserve water supplies for as long as possible.

As part of these water conservation measures, and with the added incentive to reduce operational costs and risks associated with a significant

reliance on town potable supplies, UNE actively engaged with staff, students and ARC to improve water efficiency and decrease water consumption across the campus. Through measures such as leak detection, capture of rainfall and run-off, targeted educational and demand management strategies, UNE was able to significantly reduce water consumption. By integrating key lessons learnt throughout the response to the drought, this WMP will ensure UNE is better prepared for water conservation and future droughts.

1.2. Scope

This WMP is specific to the main UNE campus in Armidale, with consideration being given to adjacent SMART Farms: Laureldale, Clarks, Trevenna, Toombs and Maxwellton, as these are connected to the town potable water supply. UNE's other locations (UNE Parramatta, UNE Tamworth, UNE Taree and the regional centres)

are leased facilities with limited water use other than typical office requirements, although the sustainability principles of this plan apply to these locations. The Kirby, Newholme, and Tullimba SMART Farms manage surface and groundwater as part of day to day farm operations and are therefore excluded from the scope of this plan.

2. Purpose and Aims

The purpose of this plan is to set out a pathway towards sustainable water use at UNE, with the aim of improving drought resilience and water consumption efficiency into the future; and reduce the significant operational costs and risk associated with the current reliance on town water supplies:

The aims for water management at UNE are:

- To ensure water supply security to support critical operations, particularly relating to research, teaching and learning;
- Diversify water sources to reduce reliance on potable water supply;
- Provide on-site aquatic teaching, learning and research resources;
- Incorporate water conservation and efficiency measures into University operations;
- Reduce the risk to business continuity relating to water supply availability;
- Reduce operational costs;
- Comply with Local Government water restrictions;
- Align with the NSW Water Strategy 2022; and the NSW North Coast Regional Water Strategy, 2022;
- Promote environmental conservation and enhancement; and
- Demonstrate UNE's commitment to environmental sustainability and resilience.

3. Targets

Using 2018 as the baseline year measure, UNE has set the following goals for water sustainability:

Short term, to be implemented by 2025:

- Target a 25% reduction in potable water consumption from baseline
- All new buildings to incorporate minimum 4 star WELS rating
- Toombs Pasture Technology Field Site to be disconnected from potable town water
- 50% Sport UNE irrigation to be from non-town water sources

Long term, to be implemented by 2030:

- Target a 40% reduction in water consumption from baseline;
- Additional surface or ground water storage at Laureldale, Trevenna, Clarks and Maxwellton SMART Farms;
- All new buildings and retrofits to incorporate minimum 4 star WELS rating fixtures;
- 50% of irrigation undertaken using non-potable sources;
- Construction of additional onsite water storage/s as an irrigation source for the Armidale campus; and
- Improvement in surface water quality of onsite water storages and waterways.

4. Stakeholders, Roles and Responsibilities

There are a number of key stakeholders involved in the management of UNE’s water. Roles and responsibilities are outlined in Table 1:

Stakeholder	Role	Responsibilities
Chief Operating Officer	Owner of the WMP	Oversees the implementation of the WMP
Director, Estate and Built Environment (EBE)	Operator of the WMP	<ul style="list-style-type: none"> Oversees the implementation of the WMP on the Bellevue Campus, Academic Campuses and Wright Village
EBE Operational Services (including Civil Works, Grounds Maintenance, Trades and cleaning)	Ensure sufficient water supply to the academic and college campuses; maintain water quality; manage water used for irrigation; identify and rectify leaks; and manage water infrastructure on campus	<ul style="list-style-type: none"> Ensure irrigation is being carried out in accordance with the Landscaping Technical Design Standards Maintain irrigation systems and water infrastructure in good working conditions so as to avoid leaks or unnecessary losses Scheduled leak detection of water infrastructure Ensure compliance with ARC Water Restrictions Manage maintenance and cleaning contractors Ensure contractors adhere to local government water restrictions
EBE Capital Asset Management Team	Oversee campus master planning, capital development, and management of construction contractors	<ul style="list-style-type: none"> Ensure all new builds incorporate water sustainability measures including a minimum WELS rating of four stars for water fixtures Identify opportunities for water harvesting on new and existing buildings Identify opportunities for new surface water storages Ensure water quality during construction through the implementation of erosion and sediment controls in accordance with the Blue Book

Stakeholder	Role	Responsibilities
UNE Life Director	Maintain the Sport UNE playing fields and aquatic centre	<ul style="list-style-type: none"> • Undertake irrigation using non-potable water stores • Monitor climate forecasts to ensure sustainable irrigation • Ensure playing fields are suitable quality for the planned sporting event • Utilise pool blanket to minimise evaporation losses
SMART Farms Director	Operator of the WMP	<ul style="list-style-type: none"> • Oversees the implementation of the WMP on the SMART Farms and Centre for Animal Research and Teaching facility • Monitor water trough for leaks or overturned troughs • Monitor and report water leaks to EBE; • Ensure sustainable water application for pasture trials • Prioritise surface or ground water use over potable water for farming activities such as watering stock and new planting
Academic, Research and Technical Staff	Manage water used in research, teaching and learning	<ul style="list-style-type: none"> • Incorporate water sustainability into research planning for projects with water requirements • Ensure labs and equipment are maintained in working order to prevent leaks and unnecessary system losses • Encourage sustainable water use for students and staff • Identify opportunities to reuse water where possible
College Heads	Manage college facilities and students	<ul style="list-style-type: none"> • Encourage and promote water savings as part of an overall culture of sustainability embedded in the colleges
Armidale Regional Council	Manage potable water supply and implement Water Restrictions	<ul style="list-style-type: none"> • Monitor water supply levels and implement water restrictions at key trigger points

Table 1: WMP Stakeholder Roles and Responsibilities

5. Strategic Alignment

Future Fit is the overarching strategy for the University along with the global drivers of the United Nations Sustainable Development Goals (UN SDG's) and the Talloires Declaration. The WMP sits beneath the EBE Sustainability Strategy, which is informed by the Future Fit and the Campus Master Plan.

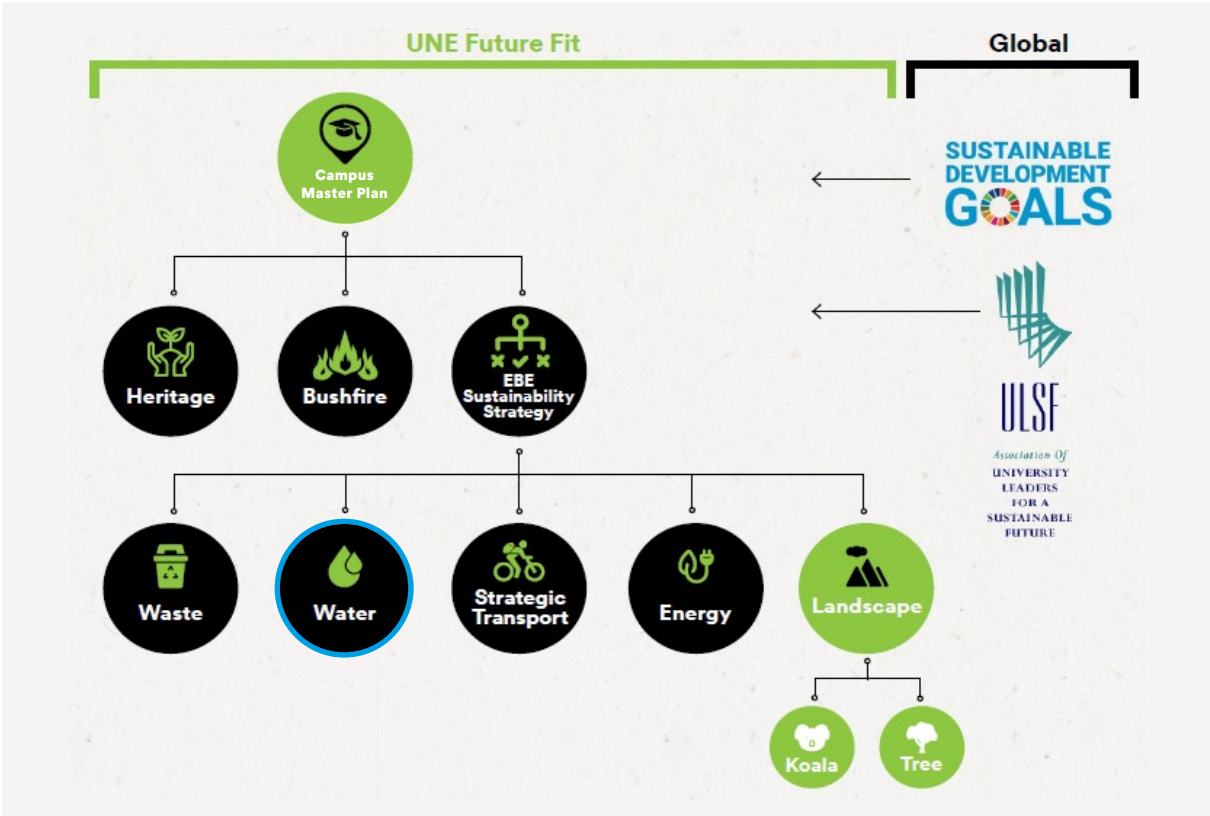


Figure 1: Strategic Alignment

5.1. Future Fit

Sustainable management of UNE resources will enable UNE to deliver on its commitment to its staff, students, communities and partners. In turn, a commitment to the environmental sustainability of our campus and business processes will enable us to deliver on a commitment to a greener planet. A sustainable UNE will be a more resilient UNE, one that is ready for future challenges and meets adversity and opportunities head on.

Through the creation and sharing of knowledge we are empowering the University community to become more sustainable and resilient. By demonstrating our commitment to water conservation we can contribute to the sustainable management of our region’s resources and demonstrate our commitment to the environment.

5.2. United Nations Sustainable Development Goals

This plan aligns with seven of the seventeen United Nations (UN) Sustainable Development Goals (SDG's) as outlined below:



SDG 6: Clean Water and Sanitation

Ensure access to water and sanitation for all



SDG 11: Sustainable Cities and Communities

Make cities and human settlements inclusive, safe, resilient and sustainable



SDG 12: Responsible Consumption and Production

Ensure sustainable consumption and production patterns

5.3. Talloires Declaration

This plan aligns with three of the goals of the Talloires Declaration.

2. Create an Institutional Culture of Sustainability

Encourage all universities to engage in education, research, policy formation, and information exchange on population, environment, and development to move toward global sustainability.

5. Practice Institutional Ecology

Set an example of environmental responsibility by establishing institutional ecology policies and practices of resource conservation, recycling, waste reduction, and environmentally sound operations.

7. Collaborate for Interdisciplinary Approaches

Convene university faculty and administrators with environmental practitioners to develop interdisciplinary approaches to curricula, research initiatives, operations, and outreach activities that support an environmentally sustainable future.

5.4. Campus Master Plan Strategic Asset Management Plan

The campus is the outward, physical face of the University and the Strategic Asset Management Plan's (SAMP) purpose is to identify the elements required to successfully manage and maintain the assets that provide the unique and diverse personality of the physical spaces. The SAMP will provide flexibility and adaptability to align with the future aspirations of the university and, the vision and strategies from the University's Strategic Plan and business requirements.

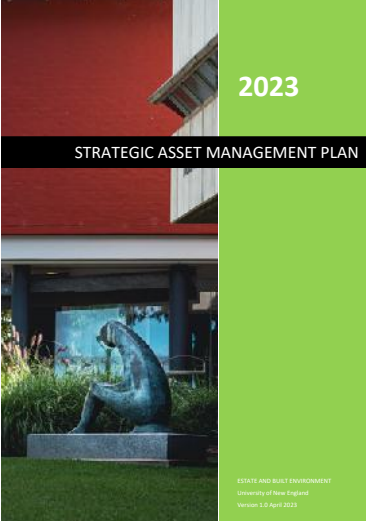


Figure 2: Strategic Asset Management Plan's (SAMP)

5.5. Armidale Regional Council Drought Management Plan 2020

The ARC Drought Management Plan provides guidance to staff when managing drought events; informs the community of the issues associated with drought management and the community's role during drought; extends water security to

Council's customers as long as operationally possible while maintaining water standards to Australian Drinking Water Guidelines; and optimises water security for residents and businesses.

5.6. NSW Water Strategy 2022

The NSW Water Strategy takes a strategic and integrated approach to looking after the state's water. This strategy is the first 20-year water strategy for all of NSW to improve the security, reliability, quality and resilience of water resources over the long term. It sets the priorities and outlines the implementation plan to delivering on these outcomes.

The NSW Water Strategy sets the overarching vision for 12 regional and two metropolitan water strategies, tailored to the individual needs of each region in NSW. Together, the strategies will improve the resilience of NSW's water services and resources.

5.6.1 North Coast Water Strategy 2022

Armidale falls within the North Coast Region under the NSW Strategy. The secure, reliable and resilient water sources are critical to regional communities in NSW. The best and latest climate

evidence, along with a wide range of tools and solutions, has been used to chart a progressive journey for our water needs for the next 20 years and beyond.

6. Water Consumption at UNE

UNE currently sources approximately 90% of its water supply from potable town supply and the remainder from non-potable water sourced from onsite surface water storage and rainwater tanks.

6.1 Water Supply

Armidale's potable water supply originates from Malpas Dam, the major water storage for the region. Operated by ARC, the dam currently has a capacity of 13,000 ML however in July, 2022 ARC announced a \$27M project to upgrade the dam to 26,000 ML capacity by raising the dam wall by a height of 6.5 metres.

There are two water feeds to the campus, one supplying the Bellevue Campus, and the other supplying the academic campus. On the academic campus water is currently pumped to three water tanks, totalling 558 kL. Water is gravity fed to the academic campus, and when the tanks fall below 65%, capacity an alarm alerts UNE so EBE staff can respond.

6.1.1 Lake Zot

Lake Zot is the primary non-potable water source on campus, used for irrigating the Sport UNE playing fields and utilised by the academy for teaching and learning. Lake Zot was constructed in the late 1950's as a fire water reserve, following a fire that destroyed the Bellevue Science Department.

In 2020 a project to remediate the Lake Zot was undertaken which involved the removal of

decades of sediment build up, and lining the wall to prevent seepage and loss of water. The lake captures runoff from the central portion of the academic campus, channelling it over 500m through grassed overland drainage channel before entering the lake. There is a small sediment dam beyond the spillway to treat overflow before it enters Dumaresq Creek. The capacity of the lake is approximately 65 ML.

6.1.2 Dumaresq Creek

UNE has a Water Access Licence that allows for 41.5 ML of water to be pumped from Dumaresq Creek each year for irrigation. The Licence specifies that the discharge rate at the NSW Water Commissioners Waters Station #206008

must be at least 1 ML/day, and that the creek must be flowing on UNE land. Water was previously monitored via manual pump readings, however metering and telemetry were installed during 2021, allowing the water use to be monitored remotely.

6.1.3 Rainwater Harvest

UNE has number of rainwater tanks, the capacity totalling approximately 1 ML. The main use of rainwater tanks is at the Centre for Animal Research and Teaching (CART), where rainwater harvested from the Sheep Unit is used in the Beef Research Unit.

6.2 Historical Water Consumption and Baseline

Prior to the 2019-21 drought UNE did not actively implement measures to reduce water consumption, as historically Armidale had never faced water shortages or water restrictions. In 2018 (baseline year) UNE consumed over 283,000 KL of water, the majority (70%) on the academic campus, followed by Sport UNE (15%), the colleges (9%), Wright Village (6%), and the SMART Farms (1%). 2018 has been selected as the baseline year, as subsequent years were affected by the severe drought, then the COVID-19 pandemic, and were therefore not representative of a typical year of operations.

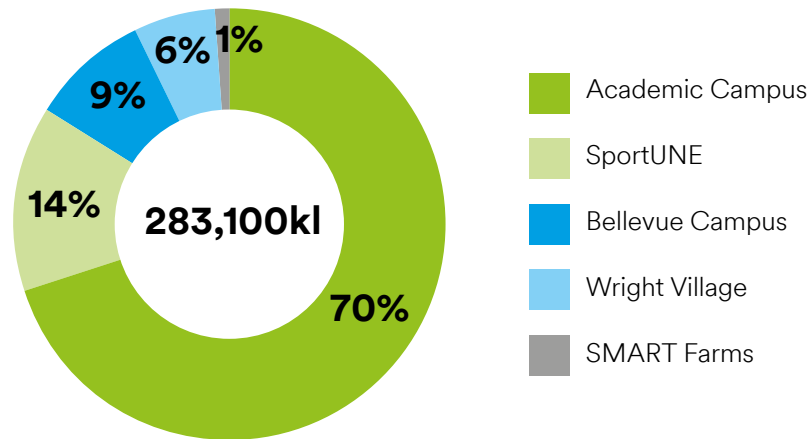


Figure 3: Breakdown of Baseline Water Consumption (2018)

6.3 Current Water Demand

The key water demand areas are as follows:

Academic Campus

- General water consumption (basins, toilets, showers, cleaning);
- Academic campus grounds irrigation;
- Vehicle washing at Fleet and Logistics;
- Mechanical services (cooling towers);
- Research applications such as filling tanks for animal experiments;
- Experiments and laboratory practicals (including cleaning and sterilisation of equipment);
- Supplying water to animals housed in the Centre for Animal Research and Teaching (CART) and other animal experiment facilities;
- Sprinkler systems in glass houses and shade houses; and
- Fire services.

Residential (Colleges and Wright Village)

- General water consumption on the residential Bellevue campus and Wright Village (basins, toilets, showers, laundry, cooking and food preparation, cleaning);
- Irrigation; and
- Fire services.

Sport UNE

- Sport UNE facilities irrigation;
- Sport UNE Aquatic Centre pool;
- General water consumption (basins, toilets, showers, cleaning); and
- Fire services.

SMART Farms

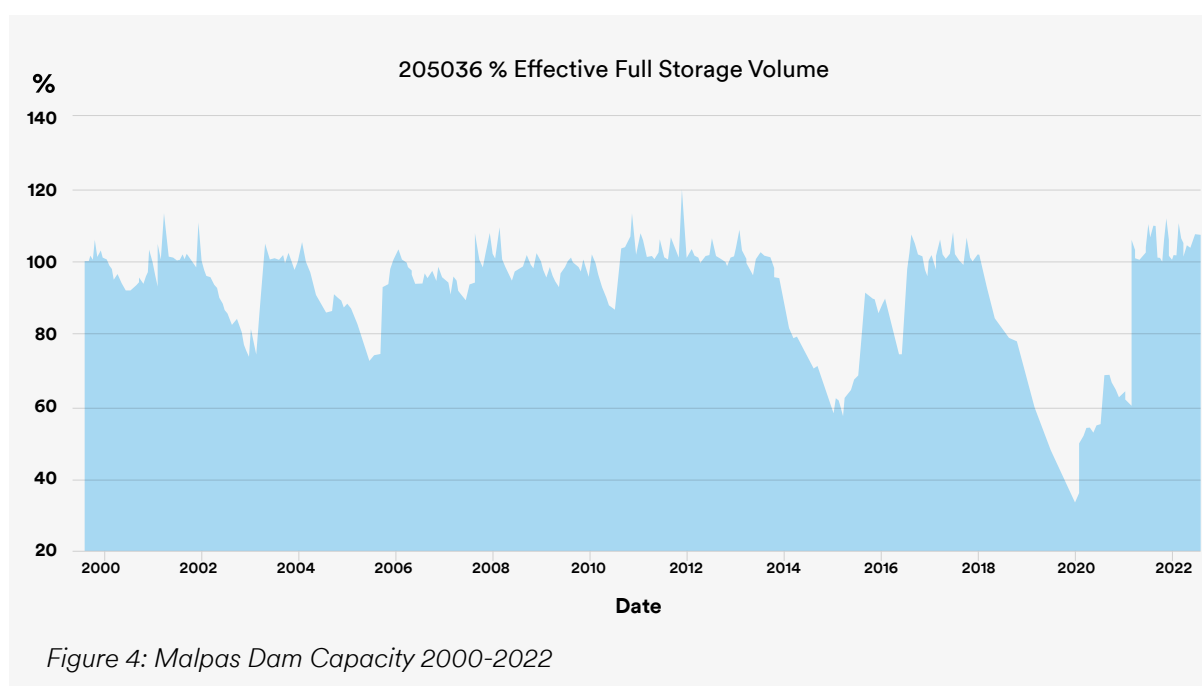
- Irrigation of trial agricultural pasture plots at Toombs SMART Farm;
- Watering stock on surrounding SMART Farms;
- Residential supply to farm properties; and
- Fire services water.

7. Severe Drought 2019-2021

At the height of the drought, in 2020 Malpas Dam fell below 33% and three “day-zero” triggers were implemented by ARC along with strict daily water consumption targets. Day Zero referred to the day when modelling indicated the town water supply would be exhausted.

ARC implemented a series of water restrictions as dam levels continued to decline and a wide range of activities became prohibited, with exemptions required under special circumstances e.g. water that was critical for ongoing research projects, water to commission the upgraded aquatic centre, and washing vehicles travelling between SMART farms for biosecurity.

While dam levels rose back to around 60% during late 2020/early 2021, it was not until a period of prolonged, heavy rain at the end of March 2021 that the dam filled completely and began to overflow.



7.1 Lessons Learned from 2019-2021 Drought

The severe drought experienced by much of the state during 2019-2021 was unprecedented for both UNE and the broader Armidale community. A number of key lessons were learned, which inform the action plan in the following section:

- Guaranteed water supply was taken for granted and Armidale water users, including the UNE community, with Armidale consuming 30% more per person compared to the NSW average;
- Leak detection identified deficiencies in the water infrastructure causing significant losses that were unaccounted for;
- EBE had limited oversight of the various water users, which became apparent when water use exemptions were required;
- Water monitoring relied largely on ARC water invoicing, with limited internal water metering;
- Communication and engagement with staff and students was essential in raising awareness, particularly early on during this period when many people were unaware of the issue; and
- Water restrictions impacted many aspects of operations that UNE was unprepared for, e.g. the tradition of holding Graduation on the lawns of Booloominbah had to be relocated indoors due to the grass dying when irrigation was prohibited; similarly Sport UNE were forced to relinquish high profile sporting events due to the deteriorated condition of the playing fields.

8. Constraints

The following constraints relating to water management have been identified:

- Aging water infrastructure, leading to regular leaks and reactive maintenance;
- Climate instability and higher risk of more frequent and severe droughts;
- Lack of redundancy due to only one potable water feed into the academic campus - if supply on this line is disrupted, the academic campus is at risk of losing water supply;
- Inability to retrofit water efficient devices to dated fixtures;
- Limited network of water metering on campus;
- Surrounding SMART Farms supplied via UNE's water mains;
- High intensity water requirements for animal research;
- Water Access Licence only permits water extraction during certain conditions;
- Substantial costs associated with securing planning approvals for new dams;
- Steep topography of the campus putting additional pressure on fibro water mains;
- Achieving water quality standards from rainwater harvesting that meet research requirements in an economical manner;
- Increasing cost of potable water (31% increase in cost/kL from 2018 to 2023); and
- Developing water education material that is relatable to the diverse University community.



9. Action Plan

In order to achieve the targets listed in section 3, the following actions areas have been identified

Focus Area 1: Identify and prioritise water users

- Establish procedures for researchers to identify water quantity and quality requirements so that EBE has a comprehensive understanding of water consumption, and is better prepared to seek exemptions for water use in future drought events
- Install additional metering on the campus to enable EBE to better understand water consumption patterns on the academic campus
- Monitor Malpas Dam levels and ARC water restrictions to ensure compliance with each trigger level
- Identify high priority grounds maintenance areas to target for limited irrigation in accordance with water restrictions
- Identify operational water use activities that would require an exemption in future droughts.

Focus Area 2: Diversify water sources to optimise potable water use

- Invest in additional infrastructure so that non-potable water can be used as an alternative to potable water for activities such as targeted irrigation, dust suppression and watering stock
- Commission pipeline from Clarks Farm Dam to Toombs Farm and remove access to potable town water at the trial agricultural pasture plots
- Install additional pumping and irrigation infrastructure to enable more areas of the campus to be irrigated using non-potable water
- Ensure all new builds incorporate rainwater tanks
- Investigate additional rainwater harvesting infrastructure at the CART Facilities to use for cleaning animal holding pens
- Undertake hydrological assessment of SMART Farms to identify opportunities for storage dams, and groundwater bores with the view of disconnecting these sites from potable mains
- Investigate the feasibility of grey water harvesting from the laundry facilities at the colleges and Wright Village
- Install water infrastructure to allow Bellevue Rugby Field and Bellevue AFL Oval to irrigate directly from Lake Zot
- Identify opportunities for water reuse.

Focus Area 3: Incorporate drought resilience into operations

- Review irrigation schedule to determine whether watering can be undertaken at a lower frequency and rate
- Continue to undertake regular leak detection and encourage staff and students to report leaks to EBE
- Replace aging, leak prone galvanised pipelines to/in paddocks
- Monitor rainfall forecast to prevent unnecessary irrigating prior to rainfall event
- Identify areas that are suitable for drip irrigation
- Select native, drought resilient vegetation for new plantings (excluding heritage zones where plant selection is dictated by NSW Heritage)
- Utilise pool cover at Aquatic Centre to minimise evaporation losses
- Utilise non-potable water during construction for dust suppression
- Determine whether there are activities that use water that could be modified, such as manually sweeping rather than using water for cleaning.

Focus Area 4: Increase onsite water storage capacity

- Increase the catchment of Lake Zot through the construction of swales and drainage structures to capture runoff from the western carpark
- Identify locations for additional storage dams, focussing on capturing runoff from hardstand areas (refer to Appendix 1 for map showing surface water flow on campus)
- Ensure all new builds incorporate rainwater harvesting, where appropriate
- Increase Water Access Licence volume to allow for additional pumping from Dumaresq Creek when licence conditions are met
- Increase the capacity of SMART Farm dams and groundwater bores with a view to disconnecting these sites

Focus Area 5: Enhance onsite water quality

- Support inclusion of Aboriginal peoples' interests and expertise in water management, and the achievement of cultural outcomes, including access to water
- Investigate feasibility of water aerators in Lake Zot
- Install additional habitat features such as floating wetlands and nesting islands for native wildlife
- Ensure drainage channels are properly lined and maintained; check after storm and rainfall events
- Ensure gabion baskets are used at major stormwater outlets to prevent excessive scouring and displacement of gabion
- Monitor the sediment dam beyond the spillway of Lake Zot to determine whether maintenance is required after overflow events
- Establish a surface water quality monitoring regime for Lake Zot and Dumaresq Creek to establish baseline conditions and monitor over time
- Ensure all construction and civil works include sediment and erosion controls in accordance with the Blue Book to minimise impact to surface and groundwater
- Undertake staged removal of exotic trees from a 40 m buffer along the entire reach of creek, and replace with native species
- Stabilise the banks of Dumaresq Creek with rock rubble to reduce erosion until vegetation becomes established
- Seek approval from NSW Water and Fisheries to remove the narrow pipe culvert crossing at Dumaresq Creek to allow freer movement of turtles and other aquatic species between upstream and downstream reaches.

Focus Area 6: Research and innovation

Through the UNE Water Research and Innovation Network (WRaIN):

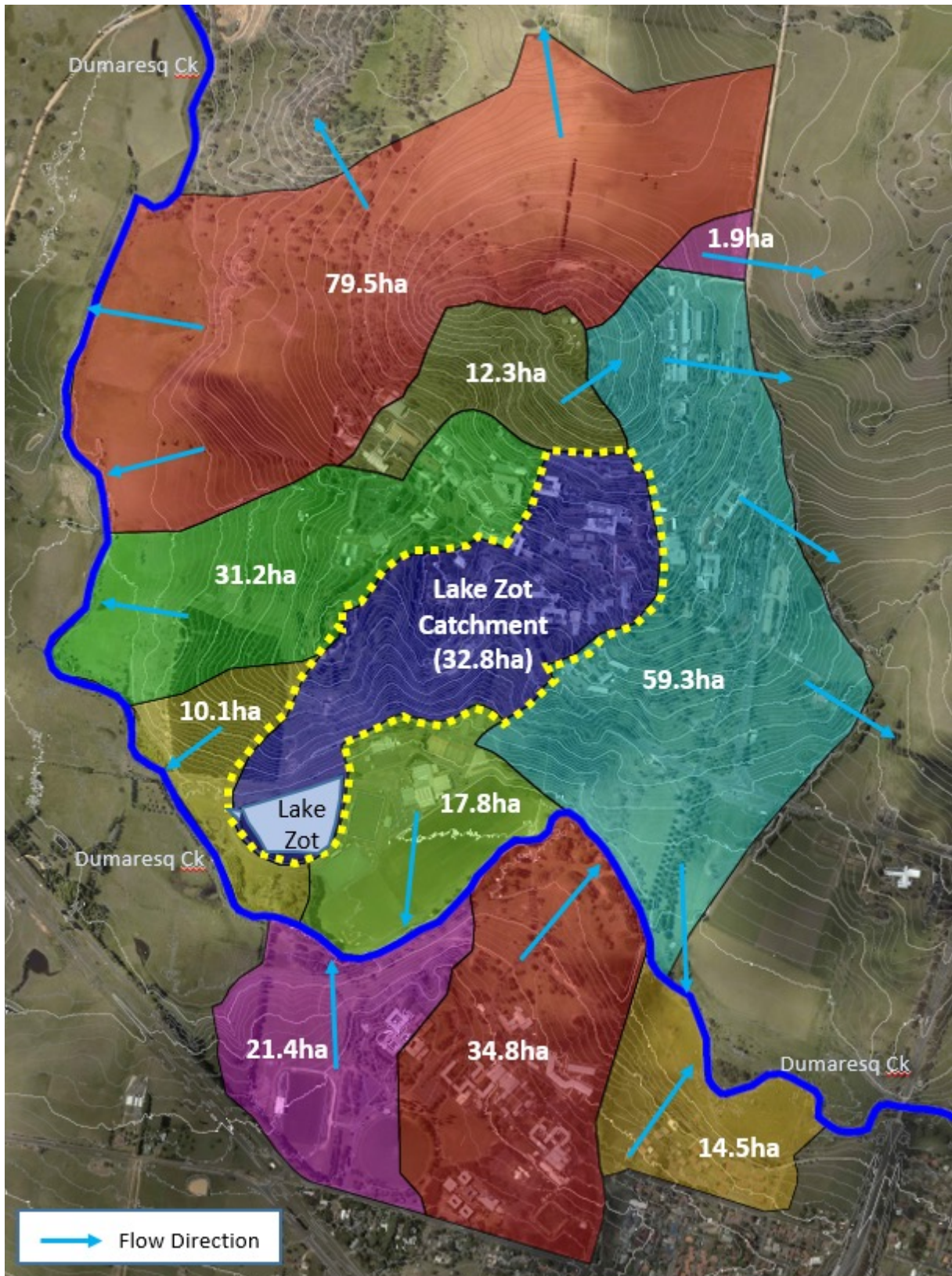
- Achieve high impact results by carrying out research relevant to communities and current water research agendas;
- Establish, maintain and strengthen links with regional and rural industries and communities by incorporating research results into tools and systems for sustainable water management;
- Develop education programs that integrate the environmental, policy and cultural evidence for sustainable water management;
- Bring the disciplines together for interdisciplinary research conducted within our identified research themes:
 - Improving the process of structural adjustment of rural and regional communities, agriculture, economies and environments to build community confidence in water management;
 - Developing models for good governance that include decision-making processes, designing institutions, integrated policy, planning and policy, community confidence, social license, evaluation and auditing; and
 - Water wisdom – to use the best available scientific knowledge to inform debate on the sustainable levels of water extraction, entitlements and allocation.

Focus Area 7: Foster a culture of sustainability throughout the university

- Encourage sustainable water behaviour, even when not in drought, as part of an overall effort to improve sustainability in areas such as waste management, energy use, product stewardship and carbon footprint
- Ensure all new staff complete the Environmental Sustainability Induction
- EBE to attend college orientation events to address water consumption and sustainability in general
- Build confidence and capacity through engagement with the UNE community by implementing public reporting against water targets
- Continue to provide shower timers throughout the college
- Engage staff, students and visitors through visual educational campaigns such as the following materials developed by UNE Marketing.

10. Reporting and Review

Water consumption is reported to the Senior Executive Team on a monthly basis via the monthly Environmental Sustainability Report and annually through the Annual Environmental Sustainability Review. An update on progress towards the identified actions will be included in subsequent Annual Reviews. This plan will be reviewed on a three yearly basis, and as required in response to changes in legislation.



Appendix A: Surface Water Movement on Campus

