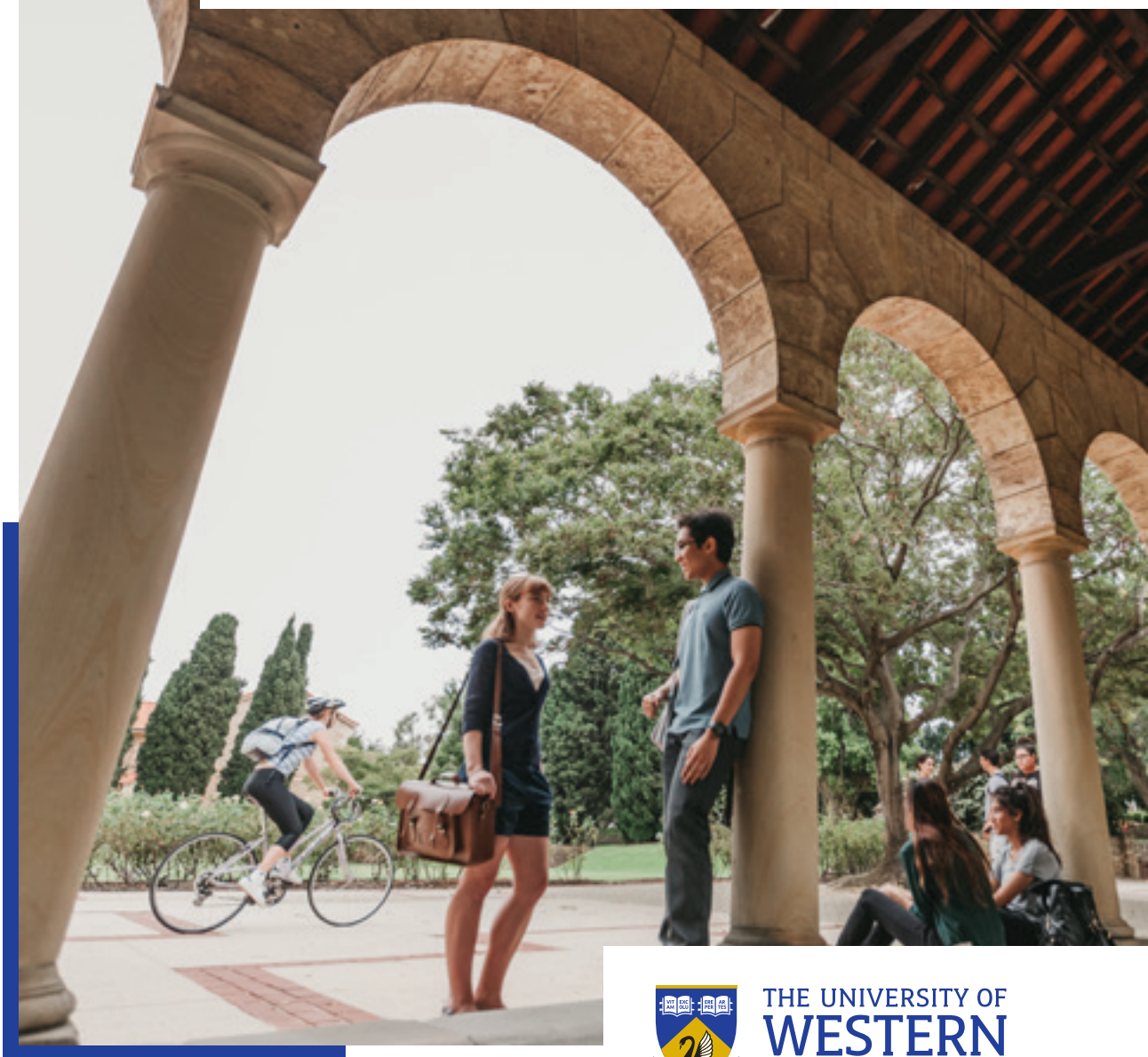
Campus Management

Environmental

Sustainability Strategy 2020



THE UNIVERSITY OF WESTERN AUSTRALIA

From the Director Campus Management

The University of Western Australia is in a unique position to respond to regional and global challenges by driving transformational thinking in future leaders and teachers and supporting technological change through research into future industries.

Now, more than ever, there is acute recognition that the University has a responsibility to drive change towards a sustainable future for our local, regional and global societies. This is articulated in our *UWA 2030* vision and *Strategic Plan 2020–25*, which sets out core values and principles, including to strengthen and advance our sustainability commitment through ambitious goals such as global recognition for leadership in public space sustainability; creating a more clean, green and sustainable campus; establishing workforce plans that reflect inclusion and diversity needs; and expanding our positive influence in the region of the Indian Ocean Rim.

In support of *UWA 2030* and the Strategic Plan, and in recognition of the intrinsic need to embed our sustainability values and commitments into our campus operations, particularly in relation to the climate and the environment, I am pleased to present the *UWA Environmental Sustainability Strategy 2020-25*. In line with our strategic documents, this Strategy sets out equally ambitious goals designed to challenge and inspire our communities, including our students, staff, alumni and partners. The Strategy demonstrates UWA's commitment to addressing our environmental challenges and provides roadmaps of how we intend to do this within various focus areas.

We invite you to review this Strategy and contribute your expertise and experiences within the focus areas of interest so that collectively, we may work towards and realise the goals within. I believe that collaboration between the University's core teaching, research and engagement activities and its campus operations will be a major factor in supporting the goals of the *Strategic Plan 2020–25* and delivering the goals of the *Environmental Sustainability Strategy 2020-25*.

I would like to acknowledge all staff, students and consultants who have contributed to the development of this Strategy. It is hoped that the development, and ultimately, the delivery of the Strategy, will allow us to contribute to the bold vision and culture of the University and share in its successes.

Trevor Humphreys
Director Campus Management
The University of Western Australia

Acknowledgement

The University of Western Australia acknowledges that its campus is situated on Noongar land, and that Noongar people remain the spiritual and cultural custodians of their land, and continue to practise their values, languages, beliefs and knowledge.

Contents

Environmental sustainability at UWA

The effects of climate change currently impacting our nation, our region and our planet are irrefutable. Scorching bushfires, sustained heatwaves and unprecedented flood events are increasingly considered the new normal. While devastating at the time, these environmental impacts have longer term effects on the health, wellbeing and societal conditions of many communities as well as effects on economic prosperity and resources to rebuild and replenish.

UWA has long recognised and responded to these environmental challenges facing humanity by drawing upon its world-class education and research in, for example:

- Our oceans and the marine environment
- Life sciences and building healthy communities
- Environmental science, sustainability and engineering
- Clean energy

This recognition is reinforced by a strong commitment to operate in a sustainable manner as evidenced by this *Environmental Sustainability Strategy 2020–25* as well as preceding strategies, plans and programs. The commitment can be articulated in various strategies and policies, however, it is the University's on-going ambition to embed sustainability in all its actions and behaviours and have it continually reflected in our people and culture.

About UWA

The University of Western Australia (UWA) was established in 1911 as the State's first university. It is situated by the Swan River on Noongar land, and the Noongar people remain the spiritual and cultural custodians of their land, and continue to practise their values, languages, beliefs and knowledge. It was also the first free university in the British Empire, actively promoting equal access to tertiary education for all social classes.

More than 100,000 students have graduated from the University in a variety of fields. UWA is a member of the 'Group of Eight' research-intensive Australian universities and is placed within the top 100 universities in the World University rankings. In 2015, UWA committed to contributing towards achieving the 17 UN Sustainable Development Goals as a member of the United Nations Sustainable Development Solutions Network.

UWA's Strategic Plan 2020–25

In 2019, the University released its *UWA 2030Vision* and *Strategic Plan 2020–25,* which chart an ambitious agenda for the future; one that tests the image of the traditional public research intensive university. It outlines the mission and vision of the University as well as its values and defining characteristics.

This Strategic Plan comprises three positioning strategies: Education, Research and Innovation, and Global Partnerships and Engagement. Achievement of these is supported by plans for Sustainable Environments, People and Culture, and Effective and Sustainable Operations. Building on these values, characteristics and strategies, the University is focused on responding to the grand challenges facing humanity by drawing upon its world-class education and research.

Context

Traditionally, sustainability has been understood within the dimensions of **economic** development, **social** justice, **cultural** sensitivities and **environmental** preservation. In recent times, the United Nations(UN) has prescribed sustainability through the lens of the 2020 Millennium Goals and more recently the 2030 Sustainable Development Goals. There are 17 Sustainable Development Goals (SDGs) which collectively "provides a shared blueprint for peace and prosperity for people and the planet, now and into the future... They recognise that ending poverty and other deprivations must go hand-in-hand with strategies that improve health and education, reduce inequality, and spur economic growth – all while tackling climate change and working to preserve our oceans and forests" [1]

The University recognises that it has a fundamental responsibility to support the goals and principles espoused by the UN to create a genuinely sustainable future. Our strong commitment to sustainability is reflected in all the pillars of our positioning and enabling strategies outlined in *UWA 2030* and our *Strategic Plan 2020–25*. These pillars encompass our educational offerings, research scope, global partnerships, sustainable environments, operational efficiencies and our people and culture.

Within the context of the United Nations SDGs UWA's *Strategic Plan 2020-25*, the *Environmental Sustainability Strategy* addresses the environmental United Nations SDGs within the UWA Sustainable Environments pillar. This Strategy will serve as: a supporting document (for example, within a larger Sustainability Strategy for the University) as well as a keystone document (for example, to underpin the principles of the Campus Masterplan).

While it is recognised the SDGs are a system of interactions and feedback between its social, economic and environmental dimensions [2], for simplicity, this Strategy has been predicated on the 'environment' SDGs of:

	SDG 6 Clean Water and Sanitation
	SDG 7 Affordable and Clean Energy
	SDG 12 Responsible Consumption and Production
	SDG 13 Climate Action
	SDG 14 Life Below Water
	SDG 15 Life on Land

The context of this Strategy, within the wider sustainability activities at UWA, is illustrated in *Figure 1*.

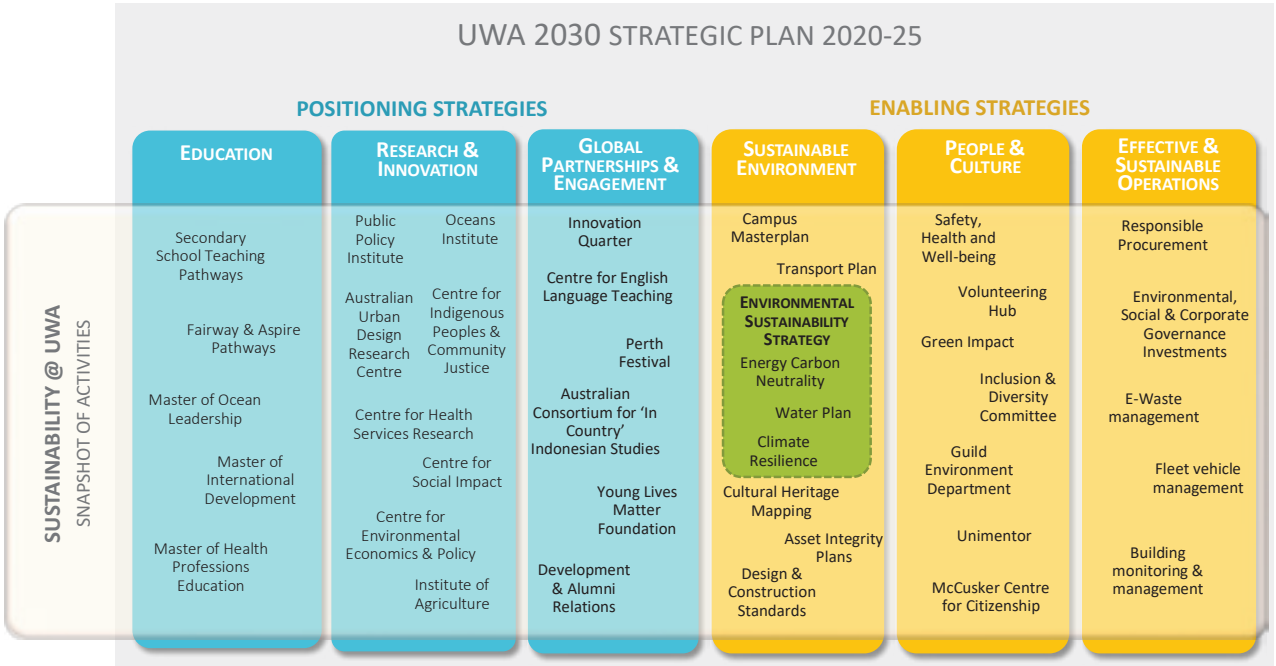


Figure 1: Snapshot of UWA sustainability activities within UWA Vision 2030 strategies

Our sustainability journey

The University has always demonstrated strong leadership in sustainability commitment and planning. In 2011, the University released the Sustainable Development Plan 2011-14 which was developed to formalise many years of sustainability grassroots activity that had been conducted through various University operational teams. The Sustainable Development Plan set out goals and initiatives to 2020 which will be reviewed within this Strategy to understand our journey to date and inform our way forward towards 2025 and beyond.

In addition to the Sustainable Development Plan, the University's high-level commitment to sustainability is illustrated in *Figure 2*.

In 2020 a high-level Sustainability Committee was established to oversee the development of a University wide sustainability strategy. The Committee has also shaped the University's ambitions in the areas of carbon neutrality in campus operations and the Climate Change Grand Challenge in research and education.

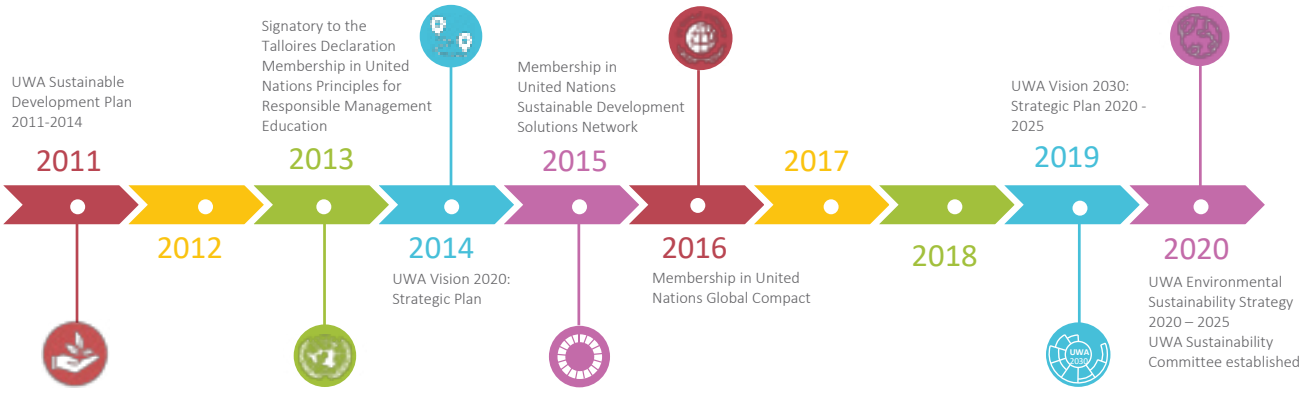


Figure 2: Timeline of UWA sustainability commitment

The Committee recognises that a consolidated strategy for sustainability at UWA, which maps current activities and plans for the way forward. is required. A consolidated approach will allow for knowledge and expertise to be shared, for responsibilities and accountabilities to be assigned and for achievement of goals to be owned by all sections of the University. This strategy, involving all pillars of the University, is to be developed. A proposed roadmap for its development is shown in *Figure 3*.

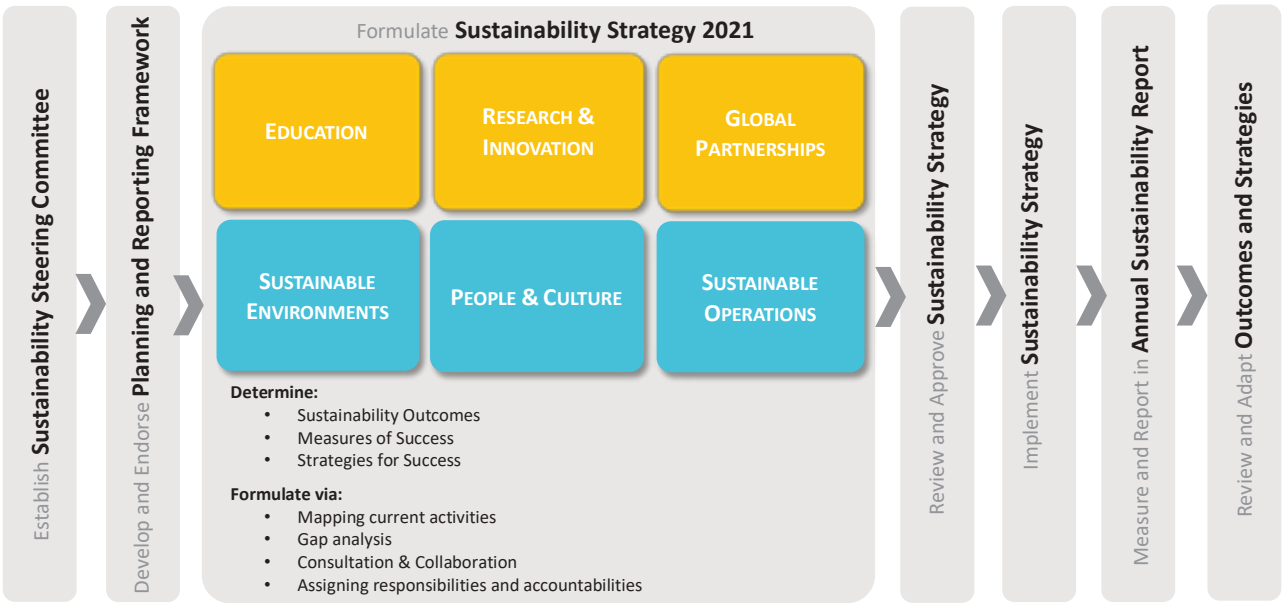


Figure 3: Sustainability Planning Roadmap

Sustainability at UWA

While this Strategy focusses on environmental sustainability within its campus operations, a snapshot of sustainability activities across the University are:

Education

The University prides itself on courses which are progressive, flexible and benchmarked against the world's best. Examples of Masters Programs supporting sustainability related learning outcomes include:

- Master of Agriculture program working on international projects to explore sustainable decision-making frameworks and systems to meet increasing world demand for food
- Master of Public Health program provides a regional and global perspective on health impacts from environmental disturbance, relating to historical, current and emerging perspectives of environmental change
- Master of Ocean Leadership program provides multidisciplinary knowledge and skills that are required to strategically address complex human challenges within ocean systems.

Research

The University is regarded as one of Australia's top research institutions, attracting researchers of world standing across the range of disciplines, with international leaders in many diverse fields. Examples of Research Centres and Institutes dedicated to achieving Sustainable Development Goals outcomes include:

- Centre for Energy Geoscience
- Centre for Environmental Economics and Policy
- Offshore Facilities and Ocean Systems
- Renewable Energy and Microgrids Group
- Centre for Excellence in Natural Resource Management
- UWA Oceans Institute
- Centre for Social Impact

Student and staff activity

The University values student experiences gained through informal and co-curricular interactions while on campus. Examples of enhanced experiences are in the form of:

- Contribution to society in the form of internships and volunteering. Over 120,000 student hours have been contributed to the community via the McCusker Centre Internship Program and Guild Volunteering Hub
- The UWA Student Guild, which provides academic, financial and welfare services for all students and engages in other sustainability activities through its various departments, such as the Environment Department, Access Department, International Student Department and the Welfare Department
- The 'Student Life' and 'Student Experience' portfolios which provide a wide range of services and support for students at the University.

The University adopted the Green Impact staff sustainability engagement program in 2019. Green Impact is an established program running in over 500 institutions globally. It supports staff to collectively undertake meaningful actions to make UWA a healthy and sustainable campus via an online toolkit.

Global partnerships

The University has sought out and fostered strategic partnerships with other forward thinking institutions to enhance our global relevance and impact. Such institutions include:

- United Nations Sustainable Development Solutions Network
- United Nations Global Compact (UWA UNGC Communications on Engagement submitted July 2019)
- United Nations Principles for Responsible Management Education (UWA UN PRME Sharing Information on Progress submitted December 2019)
- Group of Eight universities
- Australasian Campuses Towards Sustainability

Review of our 2020 targets

The *Sustainable Development Plan 2011-2014* sets out 2020 targets from a 2008 baseline for various KPIs. A summary of these targets against our 2019 performance is shown in *Figure 4*.

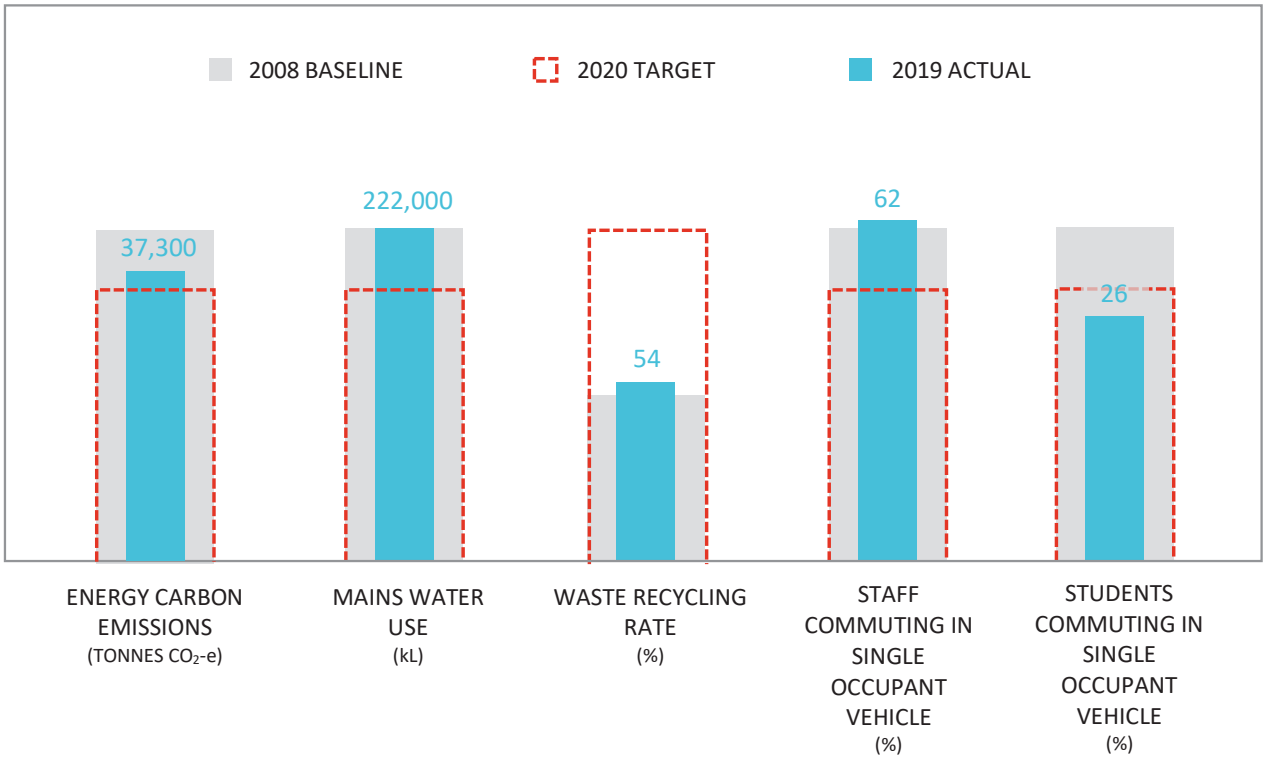


Figure 4: UWA's 2019 performance against sustainability targets indicated in the Sustainable Development Plan 2011–2014 [1]

While several quantitative targets were not met by 2020, there has been progress made in some operational objectives within the *Sustainable Development Plan*. These achievements are included in *Table 1*.

1 Energy carbon emissions are reported in accordance with National Greenhouse and Energy Reporting; Mains water use and Waste recycling rates are reported in accordance with Tertiary Education Facilities Management Australia reporting; Transport data is sourced from UWA staff and student commuting surveys.

OPERATIONAL OBJECTIVES	ACHIEVEMENTS
ENERGY	
Monitoring and reporting of energy consumption for each building.	The majority of buildings on campus are monitored via the Building Management System. Dedicated energy monitoring software, Revata Energy, will be introduced to improve reporting, diagnostic and billing capabilities.
Increasing the percentage of energy produced from renewable sources.	280 kW of solar photovoltaics have been installed on University buildings.
Improving energy efficiency of buildings and equipment.	Approximately 1.3GWh of energy has been saved from lighting retrofit since 2012. The Central Energy Plant has increased its cooling capacity by 20% without an increase in electrical energy demand due to improved efficiency.
WATER	
Monitoring and reporting of water consumption for each building.	The majority of buildings on campus are monitored via the Building Management System.
Increase the percentage of recycled water use.	Approximately 200kL per annum of water is harvested and re-used on site.
Reduce mains water use in buildings and grounds.	Major refurbishment of toilet blocks were undertaken in 2015 with water efficient fittings installed.
RECYCLING AND WASTE	
Ensure efficient waste management operations to maximise recycling and minimise contamination.	Centralised recycling stations and removal of underdesk bins have been implemented in most buildings on campus. Skip bins are managed under the waste management contract with bulk waste collection carried out twice yearly.
Minimise demolition and construction waste to landfill.	Design and Construction Standards for new developments specifies a minimum of 90% construction and demolition waste to be diverted from landfill.
TRANSPORT	
Improve services to encourage active commuting.	Two major end-of-trip hubs were completed in 2015 on the Crawley campus. Additional public transport services, Transperth 950 and 97 buses, were introduced in 2018 and 2019.
Increase local accommodation for staff, students and visitors around Crawley and other major UWA campuses.	Additional 500 bed accommodation was constructed at University Hall in 2013. Forrest Hall postgraduate student accommodation was completed in 2018 with a second stage of additional accommodation due to be completed in 2020.
BUILT FORM	
Ensure sustainability principles are applied comparably across the precincts and campus.	The *UWA Estate Strategy* and *Campus Masterplan* has been deeply grounded around the principles of sustainability and cultural heritage.
Executive endorsement of Built Form related policies and procedures.	The Design and Construction Standards for new developments and major refurbishments were made available online in 2016. These Standards were reviewed in 2020.
COMMUNICATION AND ENGAGEMENT	
Develop strategic partnerships in the area of sustainability.	The Global Partnerships and Engagement pillar develops and supports strategic partnerships, such as with the Sustainable Development Solutions Network, Global Compact Networks Australia and Business Renewables Centre.
Enhance the University's engagement with staff, students and the wider community in the area of sustainability.	The University participates in Green Impact, a global staff sustainability program for higher education institutions. The Sustainability Working Group has representatives from the Guild, students and staff.
Support student research scholarships in the area of sustainable development.	Partnership between Campus Management and the McCusker Centre for Citizenship Internship program ensures students are engaged in research for the advancement of sustainability on campus.

Table 1. Achievements of operational objectives from the Sustainable Development Plan 2011

About this strategy

Strategic alignment

The development of this Strategy is based on the *UWA Strategic Plan 2020–25* Sustainable Environments Priority to *"Embed sustainability and fair-trade principles into the developmental and operational activities of the campus" and its Strategy to "Create a more clean, green and sustainable campus to direct our work"*. One of the key measures of success addressed within this Strategy is the achievement of *"an energy-neutral UWA campus"* by 2025. This Strategy has been formulated with UWA's values of excellence, integrity, innovation, collaboration and equity at the forefront of its thinking.

Development

This Strategy relates mainly to the Sustainable Environments pillar of the Strategic Plan. As such, its development has been led by the Corporate Services division within UWA. The various focus areas of this Strategy has been developed with the assistance of external engineering and sustainability consultants as well as students from the McCusker Centre for Citizenship Internship program and various faculties.

Consultation has been carried out with various students and staff, particularly those involved in teaching, research and operations related to the focus areas. Consultation with the wider community has been carried out in conjunction with the Campus Masterplan Conversations comprising workshops, open days, surveys, etc.

> "The importance of sustainability, to me, stems from recognising the devastation caused by our anthropogenic impacts on the environment. In the wake of such pressures, it is imperative UWA commits to goals such as; net-zero carbon emissions, formulating biodiversity and climate response plans, and reducing water and waste usage with aims of creating a circular economy."
>
> **William Norrish**
> 2020 Guild Environment Officer

This Strategy has been reviewed by the UWA Sustainability Group comprising representatives from the Student Guild, University Club, University Hall, undergraduate and postgraduate students and staff.

This strategy is intended to invite further consultation and collaboration as the goals, ideas and initiatives within are challenged, supported or spearheaded by various internal stakeholders and external partners. It will ultimately form part of a larger Sustainability Strategy to be owned by all of UWA.

Scope

This Strategy addresses how UWA intends to:

- **Preserve** the biodiversity of our grounds
- **Prevent** environmental impacts from our resource use (energy, water and waste)
- **Prepare** for climate change risks through practical business planning and appropriate design of our built forms.

The approach aligns with the more academic pursuits of climate mitigation and adaptation and the corresponding focus areas are:

- Biodiversity
- Energy
- Recycling and waste
- Water
- Climate resilience

A summary of the focus areas within the scope of this Strategy is shown in *Figure 5*.

While the focus areas have been described within distinct boundaries, it is recognised that cross linkages exist and should be considered collectively. Examples include reduced hot water use and energy savings and reduced heat island through urban forest increase.

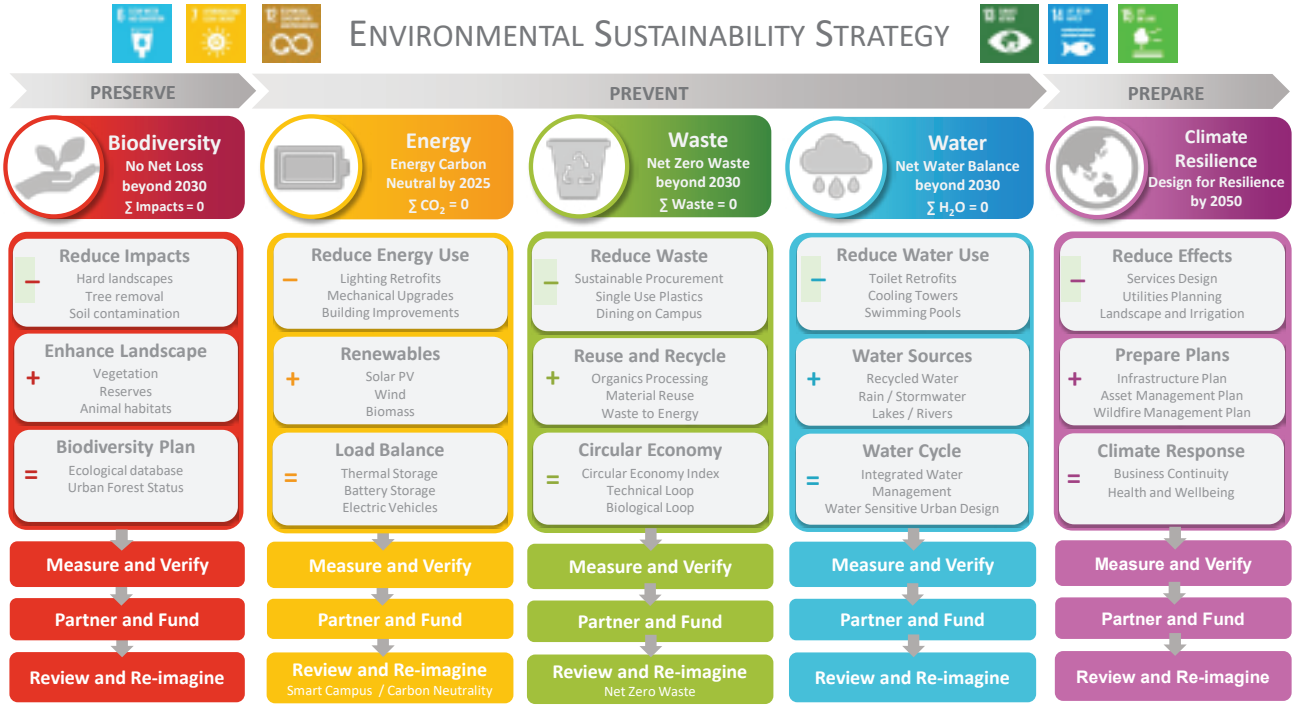


Figure 5: Environmental Sustainability Strategy Focus Areas

This Strategy has been predicated on the philosophy that, for true sustainability, the University should aim to have a net zero environmental impact (i.e. its operational impacts on the environment should be reduced or offset to achieve a balanced – if not net negative – position).

Σ *impacts* ≤ 0

Although this may be not be achievable within the timeframe of this Strategy, it has been a consideration in the planning within each focus areas.

Within each focus area, initiatives under various themes are proposed to take UWA from its current state (2018-19 baseline year) to its ambitions (2025 target year). These ambitions or goals have been benchmarked against measures of success consistent with those of progressive global institutions in the higher education and private sector.

The themes include initiatives on the **reduction** side (-) and **offset** side (+) as well as **balancing** mechanisms, such as storage (=).

Other key themes are **innovation,** which results from collaboration with UWA researchers and industry partners and can be integrated with campus services, and **management** of existing plant and infrastructure to ensure that operational efficiencies are maintained in the long-term.

Biodiversity

UWA sits in a temperate Mediterranean climate between the Indian Ocean and the Darling Ranges. It is flanked by the Swan River and Kings Park and fosters a serene connection with the natural environment in which to study, work and recreate.

To understand how biodiversity can be conserved and given minimal intervention to flourish, connection with the natural environment is necessary. This involves recognition of how life of flora and fauna in UWA's natural area can be enhanced, without any drastic changes in species being introduced, and how elements and species complement one another in that ecosystem.

Goals

UWA biodiversity management has been guided by various landscape masterplans and tree management plans over the years. However, a holistic biodiversity management plan, including flora and fauna inventory, has not been developed.

The ambition for the area of biodiversity is to develop a *Biodiversity Management Plan*, as part of the *Landscape and Public Realm Strategy*, by 2021. The *Landscape and Public Realm Strategy* prioritises the preservation and enhancement of the campus grounds and establishes a new vision of the campus as an urban forest. The UWA Crawley and Nedlands campuses have been identified as having 27 per cent canopy cover [3], placing it in a good position to achieve urban forest status (30 per cent canopy cover) in the near future.

Strategies

A holistic Biodiversity Management Plan would encompass key themes of landscape design, vegetation, soil and animals.

The considerations for biodiversity would include:

- Landscape design – microclimates, urban heat sinks, water sensitive design
- Protection of vegetation – carbon bio-sequestration potential, tree assessments, canopy replenishment
- Protection of animals – Species survival, organic pest removal, habitats and refuges
- Protection of soil – geographical information system mapping, topsoil re-use, mulching
- Management and policy – Design and Construction Standards for new developments, flora and fauna inventory
- Engagement – Cultural heritage, environmental regulators, teaching and research, community

Initiatives within key themes will be developed within the *Biodiversity Management Plan 2021*, and will be aligned with the *Landscape and Public Realm Strategy* and *Environmental Sustainability Strategy*.

Energy

UWA's stationary energy use[2] comprises 80 per cent electricity from the South West Interconnected Network (SWIN) and 20 per cent natural gas supplied from the North West Shelf of Australia. Due to the generation mix and energy content of various energy sources (e.g., coal, gas and renewables), it is convenient to express the impact of energy use as the mass of carbon dioxide equivalent emissions (tonnes CO_2-e). Crawley campus makes up approximately 85 per cent of UWA energy use.

Did You Know?

UWA's annual carbon emissions from energy is equivalent to that of approximately 10,000 standard cars in Australia [4].

Goals

UWA's emissions from energy (energy carbon) in the baseline year was 38,000 tonnes CO_2-e. The measure of success within the *Strategic Plan 2020–25* of an **energy neutral campus** translates to a net zero emissions from energy use by 2025. A logical next step for an emissions target would be carbon neutrality, whereby all measurable direct and indirect emissions (Scope 1, 2 and 3 emissions) [5], rather than from energy alone, are offset via renewables or sequestration.

As an institutional goal, an energy neutral campus is seen as the responsibility of all sectors of the University including Education, Research and Global Partnerships. The University is working collaboratively to explore innovative solutions through strategic partnerships. This strategic target as well as other operational targets are shown in *Figure 6*.

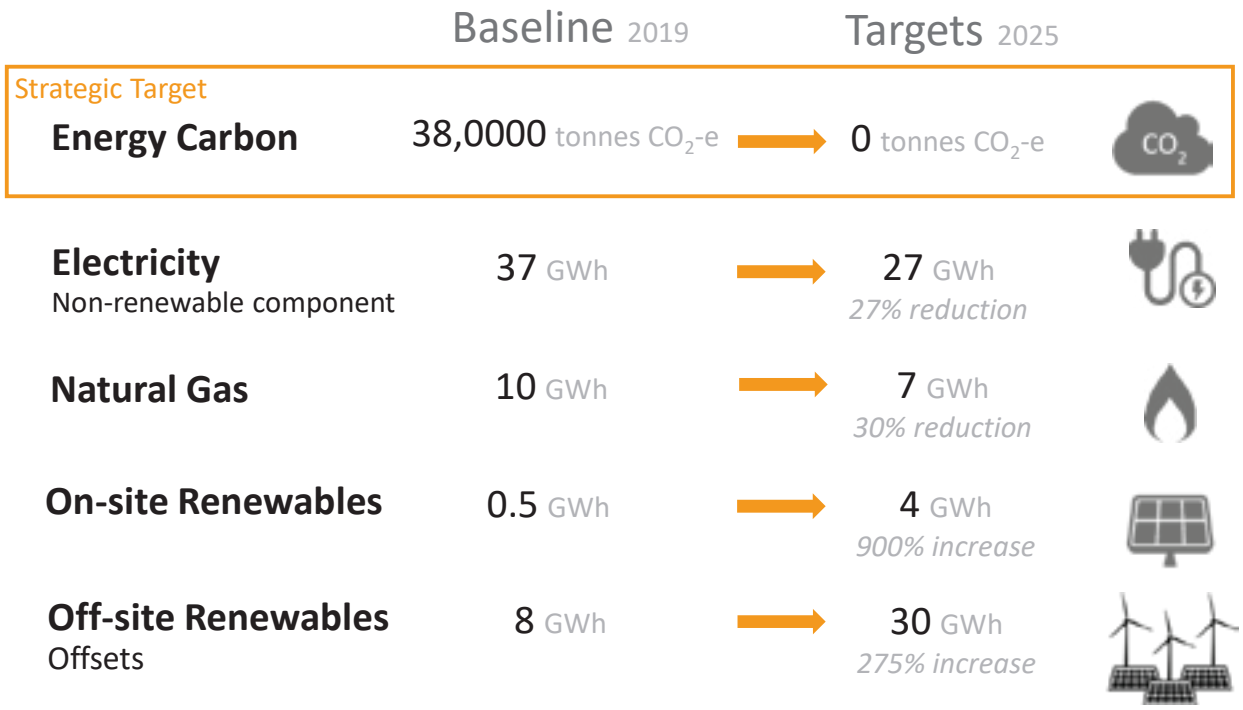


Figure 6: Energy baseline and targets[3]

2 Stationary energy includes energy for electricity and heating in buildings. It excludes other energy uses such as those for transport and industrial processes. Stationary energy accounts for approximately 95% of UWA's Scope 1 and 2 carbon emissions.

3 GWh refers to unit of energy in gigawatt hours.

Strategies

The energy targets are planned to be achieved via a set of initiatives based around the themes of energy efficiency, on-site renewables generation and off-site renewables procurement. Complementary to this strategy is the innovation potential for UWA to be a virtual power plant or microgrid, supported by distributed energy generation and storage. The microgrid concept aligns with the State Government's Distributed Energy Resources Roadmap [6] and can offer collaborative teaching, research and partnership opportunities.

Details of the initiatives under the various themes are provided in *Appendix A*. A summary of these initiatives as well as the projected annual emissions as a result of these initiatives are provided in *Figure 7* and *Figure 8* respectively.

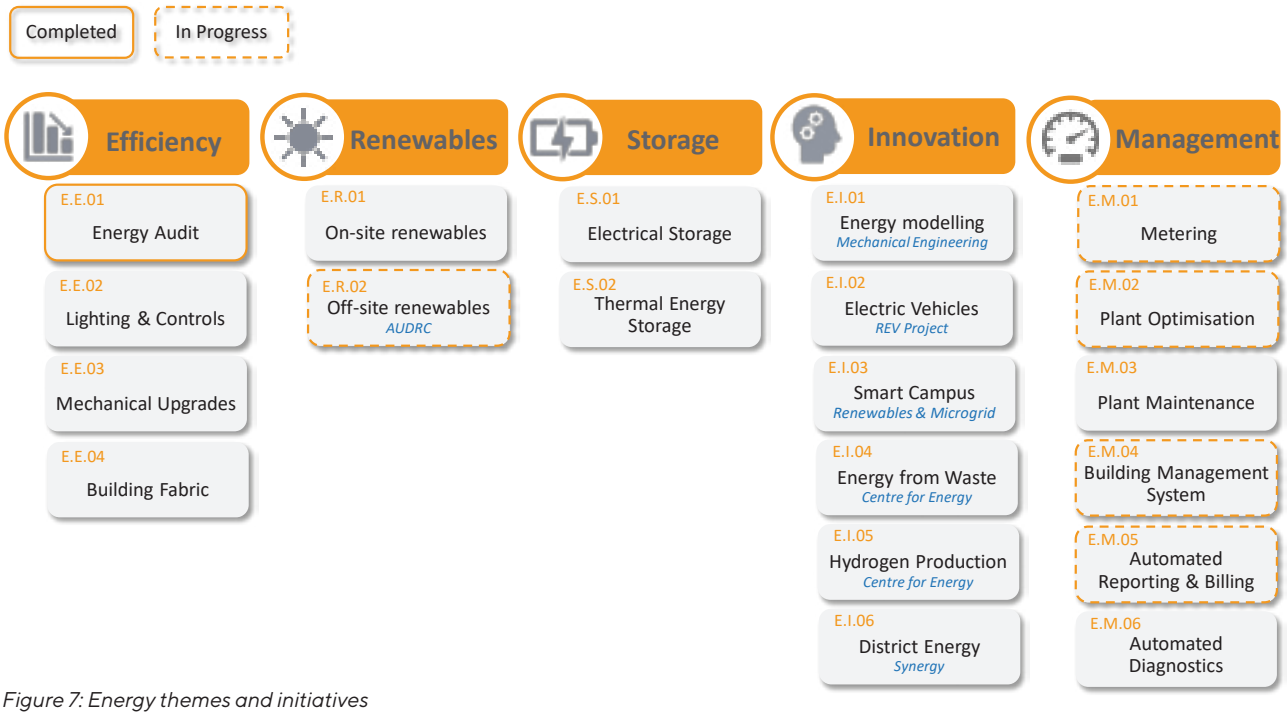


Figure 7: Energy themes and initiatives

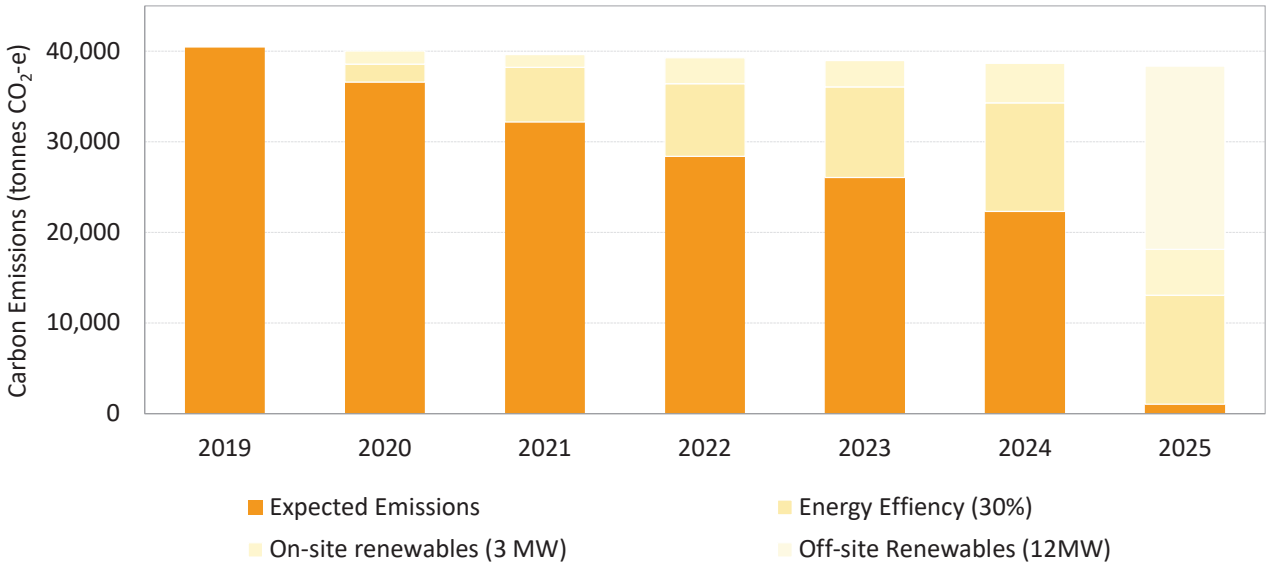


Figure 8: Annual emissions projections

Recycling and waste

UWA currently generates approximately 2,000 tonnes per annum of waste and recyclables. This equates to 66 kilograms per student and staff per annum, of which 46 per cent is diverted from landfill. UWA captures and recycles a range of materials including but not limited to garden organics, comingled recycling (bottles, cans, etc.), cardboard, paper, e-waste, glass, batteries and metals.

There are opportunities to reduce waste generation and increase recycling, as well as move towards a more circular economy at the University. The circular economy [7] is a recent concept based on the principles of designing out waste and pollution; keeping products and materials in use and regenerating natural systems. A South Australian report [8] demonstrated that if the state became more circular, over 25,000 jobs would be created while greenhouse gas emissions would reduce by 27 per cent.

Goals

Operational targets in the area of recycling and waste are to:

- Reduce waste generation by 10 per cent by 2025
- Increase diversion from landfill to 70 per cent by 2025

To align with the energy carbon neutral strategy, it is proposed that the next iteration of the recycling and waste goals should be for Net Zero Waste by 2030 (i.e. 100 per cent diversion from landfill by 2030). Furthermore, with regards to the concept of the circular economy, there is currently no established metrics for measuring circularity, although this is an area of research within many Australian and international institutions. An additional goal may be to develop baseline measures for circularity as a research focus which could be incorporated into UWA's reporting regime.

The recycling and waste targets are summarised in *Figure 9*.

Did You Know?

It can take up to 3L of water to produce a 1L plastic bottle of water [9]

Figure 9: Waste baseline and targets[4]

4 Waste is defined as all streams of waste generated from campus activities, excluding construction waste, as reported in the Tertiary Education Facilities Management Association Benchmarking Report. EFTSL refers to Equivalent Full-Time Student Load and FTSE refers to Full-time Staff Equivalent

Strategies

The recycling and waste targets are planned to be achieved via a set of initiatives based around the themes of reduction, diversion, circularity, innovation and management. Within innovation, several teaching and research activities in the areas of waste and circularity at UWA have been identified for potential integration with campus operations. Other key opportunities lie in the contracted waste management services, specifically, amalgamating Campus Management, UniClub, University Hall and Guild waste contracts. This could result in cost savings and consistency in reporting and signage.

Details of the initiatives under the various themes are provided in *Appendix B*. A summary of these initiatives as well as the projected annual levels as a result of these initiatives are provided in *Figure 10* and *Figure 11* respectively.

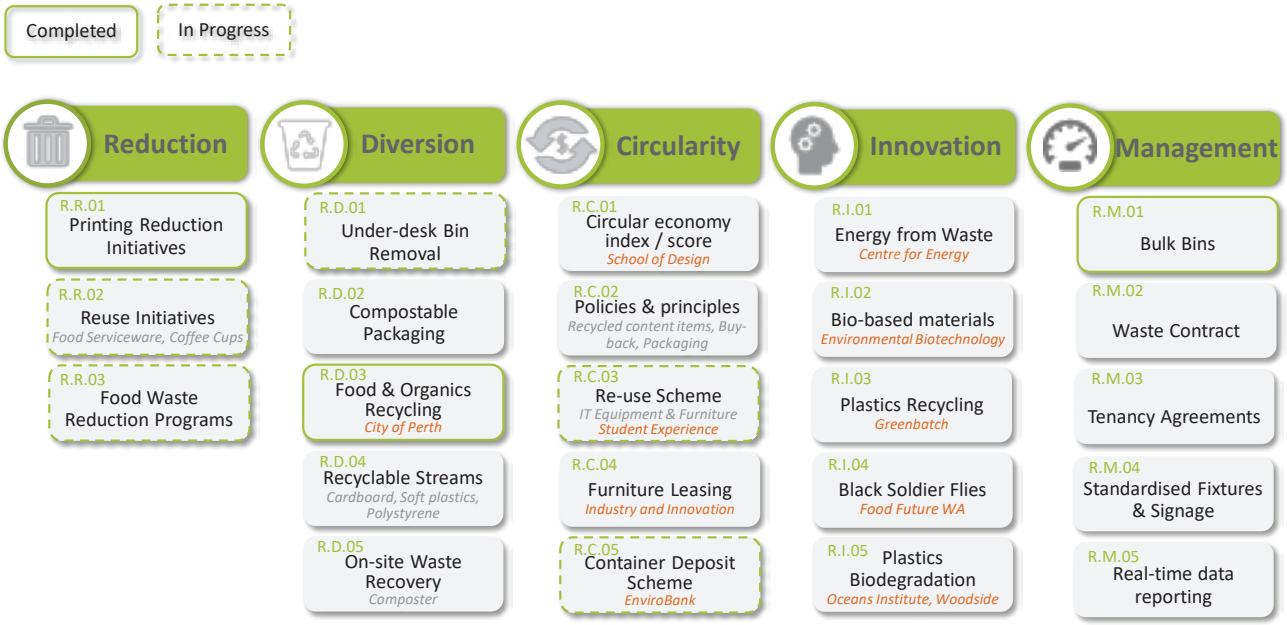


Figure 10: Recycling and waste themes and initiatives

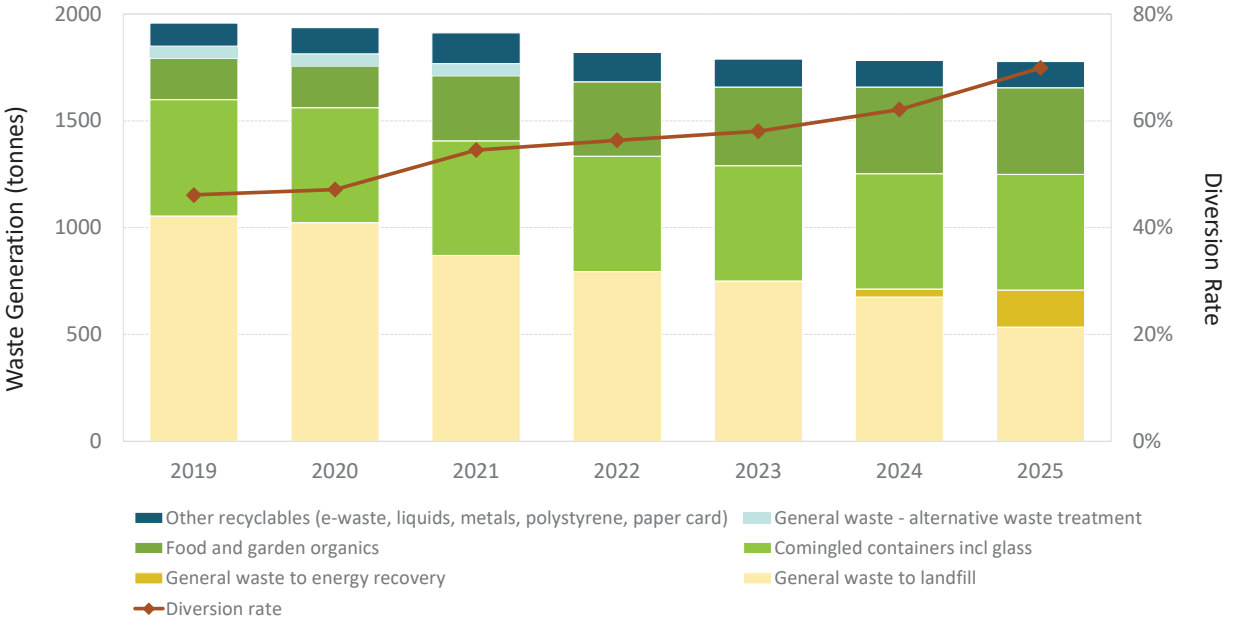


Figure 11: Annual generation and diversion projections

Water

UWA uses approximately 883 Megalitres (ML) of water per year (~30% scheme water, ~50% ground water and ~20% treated wastewater). UWA also receives approximately 910 ML of rainfall each year. Approximately 60 per cent of scheme water is used at the Crawley campus. Central Plant, which produces chilled water for air-conditioning, uses 30 to 40 per cent of this, depending on the season. Approximately 40 per cent of UWA's water use occurs at McGillivray Sports Park, largely ground water and treated wastewater.

Scheme water is the most energetically expensive water source as almost half of Perth's scheme water comes from desalinated seawater, with the remainder from groundwater and dams. Apart from the financial costs, water consumption impacts the environment, with consequent greenhouse gas emissions and declining groundwater levels from groundwater abstraction. Water disposal also impacts the environment, particularly through energy to pump and treat wastewater and loss of resources to the ocean.

Goals

Operational targets in the area of water use are to:

- Reduce water use from all water sources by 10 per cent by 2025
- Reduce scheme water use by 20 per cent by 2025

The targets are intended to reduce overall water use as well as reduce the energy capital of producing the water. This is achieved through substitution of scheme water with other non-potable, fit-for-purpose sources. The targets are based on maintaining similar levels of groundwater and treated wastewater use, while decreasing scheme water use and capturing stormwater (aquifer or tanks) to substitute for some scheme water.

Did You Know?

UWA's scheme water comes from Mount Eliza Reservoir in Kings Park, sourced from Perth's water supply, made up of seawater desalination (~50%), groundwater (~40%) and rainfall (~10%) [10]

To align with the energy carbon neutral strategy, the University could explore a net water balance for the campus, whereby the difference between the sum of all water inflow and outflow volumes are balanced through storage. This was explored in 2015 [11], and could be revisited. Similarly, active research areas within UWA such as groundwater quality and hydrogeology could inform and integrate with campus operations.

The water targets are summarised in *Figure 12*.

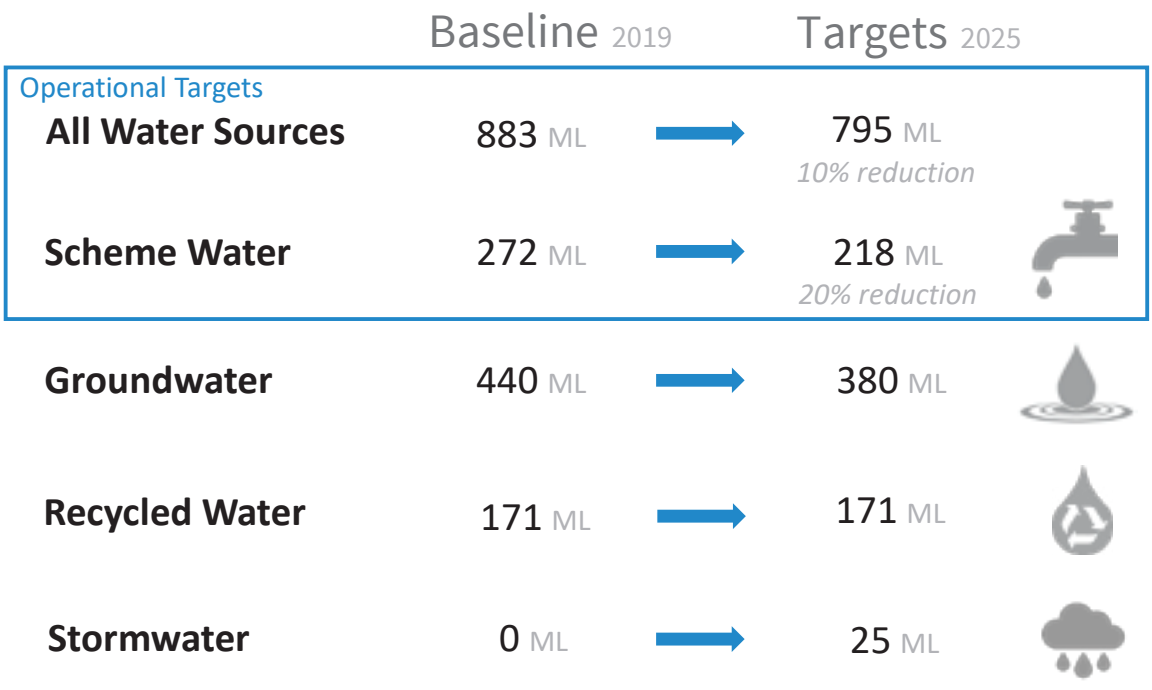


Figure 12: Water baseline and targets[5]

5 Water is defined as all sources of water, excluding rainfall, used in campus activities as reported in the Tertiary Education Facilities Management Association Benchmarking Report. ML refers to megalitres of water.

Strategies

The water targets are planned to be achieved via a set of initiatives based around the themes of efficiency, alternate sources and ecological health, innovation and management. The initiatives relate to reducing water use from all sources, increasing water reuse, increasing stormwater infiltration (and quality), reducing environmental impacts and transitioning to closed-loop water management.

Details of the initiatives under the various themes are provided in *Appendix C*. A summary of these initiatives as well as the projected annual water use as a result of these initiatives are provided in *Figure 13* and *Figure 14* respectively.

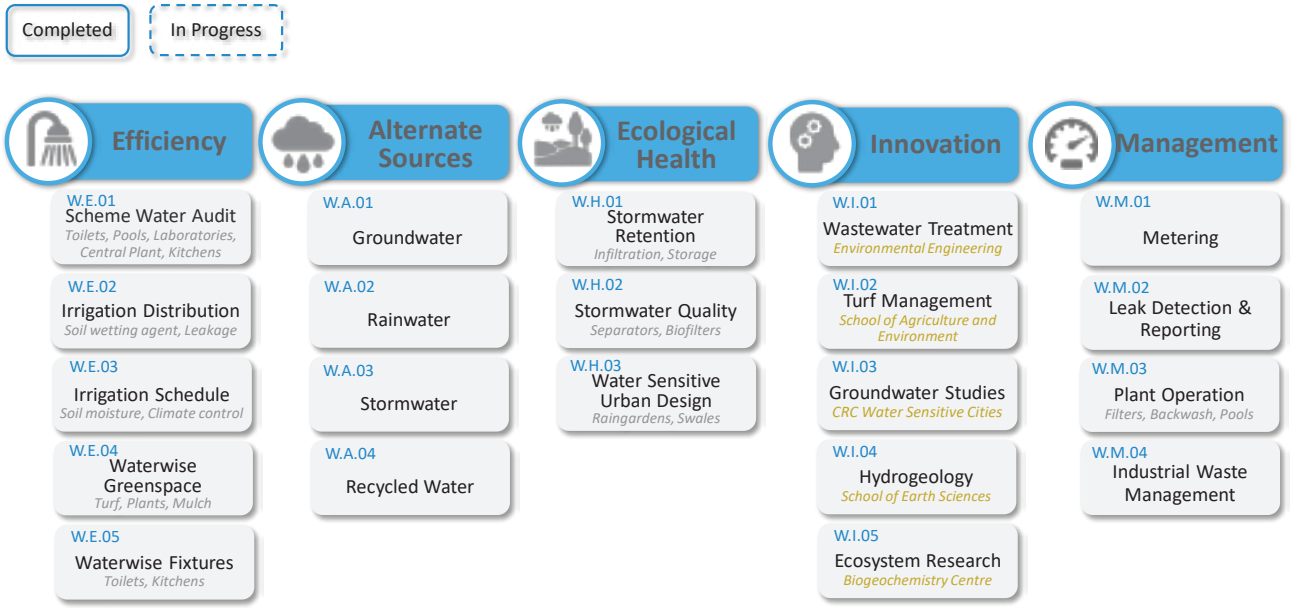


Figure 13: Water themes and initiatives

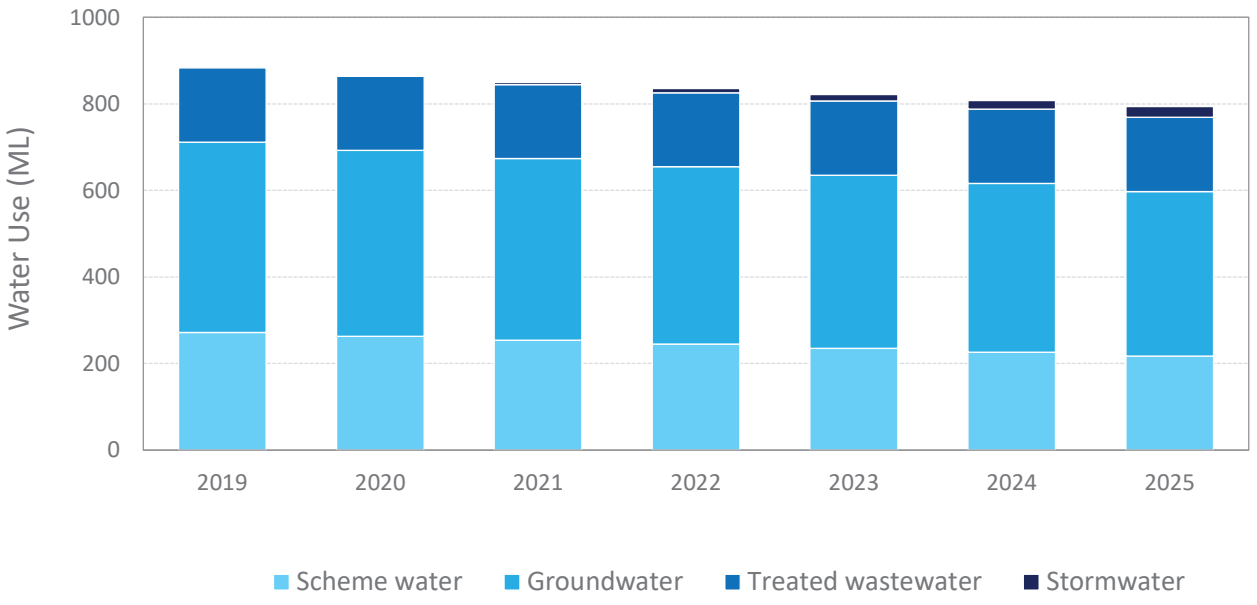


Figure 14: Annual water use projections

Climate resilience

Climate change is generally understood to be the greatest ecological challenge of our time. While the exact impacts of climate change on a global scale are difficult to fully appreciate, detailed modelling on local weather patterns can provide a reasonable indication of the likely events and impacts that will influence regions and the facilities contained within them.

For Perth, changing weather patterns are likely to include increased temperatures, decreased humidity, decreased total and high rainfall events, increased storm damage and increased incident of vector and water borne diseases.

Goals

UWA has completed a Climate Change Risk Review identifying likely climate change scenarios and developed a risk matrix classifying specific risks. The risk matrix will inform a climate change risk register and is shown in *Appendix D*.

The goal in the area of climate resilience is to workshop key risks with relevant sections of the University and develop an implementation plan by 2022 to identify and allocate actions and accountabilities.

Strategies

Key climate risks identified for UWA campuses include:

- Reduced humidity
- Increased maximum, average and minimum temperatures
- Reduced rainfall
- Increased solar radiation
- Increased wind speed
- Increased flood water levels
- Increased storm severity
- Heritage and public perceptions

These risks will need to be assessed against several criteria, including:

- Financial impact
- Occupational health and safety
- Reputation
- Operations and services
- Environmental health
- Biophysical environment
- Compliance

It is expected that the climate resilience response will be considered and adopted within future campus planning and design and will be reflected in the *UWA Design and Construction Standards*, *Integrated Infrastructure Strategy*, *Strategic Asset Management Plan* and Health and Safety policies and financial plans.

The road ahead

The release of this Strategy coincides with the occurrence of the COVID-19 global pandemic. While it is a period of great disruption and distress, it does not override the need for a considered response to environmental sustainability. In fact, it has highlighted the need for consolidated planning, preparedness, responsiveness and collaboration. Enforced isolation to minimise virus spread has also highlighted the importance of the natural environment to peoples' health and wellbeing. It also substantiates the notion of sustainability to reduce exposure to externalities.

The principles upon which sustainability and the Sustainable Development Goals are underpinned hold true; care for the individual person, the population in general and the planet. With far-reaching societal disruption comes the opportunity to reassess essential occupations and refocus activities to those which will enforce the SDGs. The pandemic response also demonstrated that humanity is capable of immense behaviour change, particularly when the reason for change is transparent and an understanding that their actions will lead to collective benefit.

As Rahm Emanuel, former Chief of Staff to US President Barack Obama, said: "You never let a serious crisis go to waste. And what I mean by that: it's an opportunity to do things you think you could not do before." There exists an opportunity at this time to redefine a 'new normal', to converge efforts towards addressing humanity's grand challenges, including climate change.

This Strategy is UWA's next step along its sustainability journey. Together with UWA's other pillars of Education, Research, Global Partnerships and People and Culture, it will contribute towards UWA's response to the grand challenges.

It remains for the Strategy to be accepted and adopted by all associated with UWA, if not challenged to do better. Actions and accountability will then be assigned for implementation. The Strategy will be subject to annual cycles of reporting and review, to be re-imagined in 2025. UWA will strive to uphold if not advance its bold vision to further reduce and reverse its impact on the natural environment and its inhabitants.

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Appendices

- *Appendix A: Energy Initiatives*
- *Appendix B: Recycling and Waste Initiatives*
- *Appendix C: Water Initiatives*
- *Appendix D: Climate Change Risk Assessment*

Appendix A: Energy Initiatives

INITIATIVES	DESCRIPTION	IMPACT	TIMELINE
EFFICIENCY			
E.E.01 Energy Audit	Energy review and audit carried out in buildings covering approx. 80% energy use to identify reduction opportunities in electricity, thermal energy and natural gas	Emission reduction of 12,000 tonnes CO_2-e (30%) @ cost of $1,300 / tonne	Completed
E.E.02 Lighting and Controls	Program of lighting upgrades to energy efficient LEDs and lighting controls	Included in E.E.01	2020 - 2024
E.E.03 Mechanical Upgrades	Program of mechanical equipment upgrades, including Central Plant to improve energy efficiency.	Included in E.E.01	2021 - 2024
E.E.04 Building Fabric	Modifications to building fabric to minimise energy leakage and improve thermal comfort	Included in E.E.01	2020 - 2024
RENEWABLES			
E.R.01 On-site Renewables	Approx. 3MW of on-site solar photovoltaics on Crawley and other campuses. B275, B348 and B453 expected to be completed in 2020.	Emission reduction of 6,000 tonnes CO_2-e (15%) @ cost of $1,200 / tonne	2020 - 2024
E.R.02 Off-site Renewables	Procurement of electricity supply and renewable energy certificates from renewable energy developer	Emission reduction of 20,000 tonnes CO_2-e (55%) @ estimated cost of $1,500 / tonne	2020 - 2024
STORAGE			
E.S.01 Electrical Storage	Installation of 4 MWh battery to store electricity generated from solar PV or from the grid to be used at peak period	Lower electricity cost by offsetting load from peak to off-peak periods	2020 - 2021
E.S.02 Thermal Energy Storage	Installation of 4ML thermal storage tank to supply chilled water demand of the campus and supplement demand at peak periods	Lower electricity cost by offsetting load from peak to off-peak periods	TBA
INNOVATION			
E.I.01 Thermal Energy Modelling	On-going collaboration with School of Mechanical Engineering which has resulted in several student projects	Integration of teaching, research and operations	2020 - 2025
E.I.02 Electric Vehicles	Possible collaboration with Renewable Energy Vehicles Project	Integration of teaching, research and operations	TBA
E.I.03 Smart Campus	Possible collaboration with School of Mechanical Engineering and Computer Science	Integration of teaching, research and operations	TBA
E.I.04 Energy from Waste	Possible collaboration with Centre for Energy	Integration of teaching, research and operations	TBA
E.I.05 Hydrogen	Possible collaboration with Centre for Energy	Integration of teaching, research and operations	TBA
E.I.06 District Energy Resource	On-going collaboration with Australian Urban Design Research Centre and Synergy	Integration of teaching, research and operations	2020 - 2025
MANAGEMENT			
E.M.01 Metering	Current program to update electrical metering software. To be rolled out to include thermal, gas and water metering	Improved monitoring and reporting to detect anomalies and aid diagnostics	2020 - 2025
E.M.02 Plant Optimisation	Optimisation of Central Plant in progress. On-going program to inspect and optimise plant in various buildings. B211 and B226 to be carried out in 2020.	Improved efficiency of Central Plant and building plant reducing energy demand	2020 - 2025
E.M.03 Plant Maintenance	On-going program to inspect and maintain building specific plant. B139 and B107 to be carried out in 2020.	Ensure energy use does not increase over time due to	2020 - 2025
E.M.04 Building Management System (BMS)	Current works to review BMS programs, setpoints and building tuning	Improve thermal comfort and reduce energy use, particularly at peak loads	2020
E.M.05 Automated Reporting and Billing	Transition the meter reporting software to Revata Energy which is capable of producing automated reports and invoices	Reduce time spent on producing utility reports and tenant invoices	2020 - 2022
E.M.06 Automated Diagnostics	BMS and metering data to inform automated diagnostic reports for the attention of maintenance contractors	Enables timely detection of faults requiring repairs	2022 - 2025

Appendix B: Recycling and Waste Initiatives

INITIATIVES	DESCRIPTION	IMPACT	TIMELINE
REDUCTION			
R.R.01 Printing reduction initiatives	Follow-me printing has been administered by UniIT with shared printers used in offices	Reduced waste by ~30t, reduced environmental impact of paper production and disposal, reduced printing cost	Completed
R.R.02 Reuse initiatives	Re-usable coffee cup and water bottle campaigns, e.g., installing filtered water dispensers	Reduced single use plastics waste	2021 - 2024
R.R.03 Food Waste Reduction Programs	Guild and Uniclub currently partner with OzHarvest or to reduce food waste. Investigate food waste reduction programs for cafes across campus	Reduced food waste	2020 - 2021
DIVERSION			
R.D.01 Under-desk bin removal	Create bin stations in all offices and remove under desk bins. Currently in progress.	Increased diversion (19t), reduced cleaning cost	2020 - 2022
R.D.02 Compostable packaging	Explore compostable packaging (takeaway containers, coffee cups, plates) where possible, particularly those that must be single use	Reduced single use plastics waste	2021 - 2023
R.D.03 Food and organics recycling	Food and organic waste is currently recycled by City of Perth. Opportunity of organic waste from kitchenettes and grounds bins to be recycled	Increased diversion (390t), higher costs, however, may reduce over time, reduced CO_2 emissions	2020 - 2022
R.D.04 Recyclable streams	Increase additional streams captured and recycled. Explore cost and logistics of each option	Lower contamination rates and generation of higher value waste	2022 - 2025
R.D.05 Investigate on-site waste recovery	Investigate in-vessel compost facility and dehydrators at cafes. Generally no payback, however, may be a good teaching, research or engagement initiative	Showcase waste technology of campus, integrate with teaching and research	2020 - 2021
CIRCULARITY			
R.C.01 Circular economy index	Create a circular economy index / score for the University	Integration of teaching, research and operations	2022 - 2025
R.C.02 Policies and principles	Implement policies that support the circular economy and waste hierarchy principles, e.g., procurement guide and banning single use plastics	Minimise packaging, encourage re-use, procure materials with recycled content	2022 - 2025
R.C.03 Re-use scheme	Explore re-use shops (online and physical) to take and sell furniture, IT equipment and other items	11-50t waste reduction	2020 - 2023
R.C.04 Furniture leasing	Leasing of new or repurposed furniture in lieu of new purchases	Reduced capital cost, increase life of furniture, reduced furniture waste	2020 - 2021
R.C.05 Container deposit scheme	Placement of reverse vending machines at Guild cafes with proceeds donated to charity or to fund Guild sustainability initiatives	Reduced waste of plastic, glass and aluminium containers, funds for worthwhile causes	2020
INNOVATION			
R.I.01 Energy from waste	Potential collaboration with Centre for Energy	Integration of teaching, research and operations	TBA
R.I.02 Bio-based materials	Potential collaboration with Environmental Biotechnology	Integration of teaching, research and operations	TBA
R.I.03 Plastics recycling	Potential collaboration with Greenbatch	Integration of teaching, research and operations	TBA
R.I.04 Black soldier flies	Potential collaboration with Food Future WA	Integration of teaching, research and operations	TBA
R.I.05 Plastics biodegradation	Potential collaboration with Oceans Institute	Integration of teaching, research and operations	TBA
MANAGEMENT			
R.M.01 Bulk bins	Replace 240L bins with 660 and 1100L bins to enable ease of collection	Smaller waste collection areas, lower collection costs	Completed
R.M.02 Waste contract	Negotiate a consolidated waste contract for all of UWA, including Unihall, UniClub and Guild	Lower waste costs, consistent practices throughout campus	2021
R.M.03 Tenancy agreements	Negotiate tenancy agreements with consideration of responsible production and consumption practices	Improved procurement and waste management practices of tenants	2022
R.M.04 Standardised fixtures and signage	Replace signage with consistent labelling. To be considered in conjunction with R.M.02	Consistent messaging to avoid confusion and contamination	2021
R.M.05 Real-time data reporting	Smart bins with level indicators with communication via the Uni's LoraWan network to inform collection frequency	Lower waste collection frequency and reduced cost	2021 - 2023

Appendix C: Water Initiatives

INITIATIVES	DESCRIPTION	IMPACT	TIMELINE
EFFICIENCY			
W.E.01 Scheme water audit	Conduct audit of scheme water users such as toilets, cooling towers, pools and kitchens	Better understanding of high use buildings and equipment	2021
W.E.02 Irrigation distribution	Implement soil wetting agents, mulch, etc. to improve water penetration and retention in soil	Reduced water use in irrigation	2021 - 2024
W.E.03 Irrigation schedule	Review irrigation scheduling to minimise wastage	Reduced water use in irrigation	2021
W.E.04 Waterwise greenspaces	Consider drought resistant plantings and hydrozones in landscape design	Reduced water use in irrigation	2021
W.E.05 Waterwise fixtures	Replace fixtures with waterwise fixtures with high WEL rating	Reduced scheme water use	2022 - 2025
ALTERNATE SOURCES			
W.A.01 Groundwater	Transition any irrigation from scheme water use to groundwater. Investigate the use of groundwater for cooling towers	Reduced scheme water use	2022 - 2025
W.A.02 Rainwater	Capture and store rainwater to displace use of scheme water	Reduced scheme water use	2020 – 2025
W.A.03 Stormwater	Capture and store stormwater to displace use of scheme water	Reduced scheme water use	2020 - 2025
W.A.04 Recycled water	Investigate capture and re-use of recycled water within new developments	Lower water use of new developments	2020 - 2025
ECOLOGICAL HEALTH			
W.H.01 Stormwater retention	Managed aquifer recharge of stormwater, to be pumped and/or detained and percolated into superficial aquifer	Offset abstraction of irrigation supplies, maintain aquifer levels, reduce saltwater intrusion	2021 - 2025
W.H.02 Water Quality	Assess stormwater contaminants and their origin with a view to targeted mitigation	Reduce contaminants and nutrients to the river	2021 - 2025
W.H.03 Water Sensitive Urban Design	Adoption of good fertiliser practice, detention zones, swales and biofilters. To be considered within the Landscape Masterplan	Enhanced greenspace and biodiversity	2021 - 2025
INNOVATION			
W.I.01 Wastewater treatment	Potential collaboration with School of Environmental Engineering	Integration of teaching, research and operations	TBA
W.I.02 Turf management	Potential collaboration with School of Agriculture and Environment	Integration of teaching, research and operations	TBA
W.I.03 Groundwater studies	Possible collaboration with CRC for Water Sensitive Cities	Integration of teaching, research and operations	TBA
W.I.04 Hydrogeology	Potential collaboration with School of Earth Sciences	Integration of teaching, research and operations	TBA
W.I.05 Ecosystem research	Potential collaboration with the Biogeochemistry Centre	Integration of teaching, research and operations	TBA
MANAGEMENT			
W.M.01 Metering	Repair or install water meters to major use buildings and plant and connect to meter reporting software	Enable detection and diagnostics for better management of water use	2020 - 2025
W.M.02 Leak detection and reporting	Install data loggers and connect to meter reporting software to enable real-time identification of leaks	Faster identification and repair of leaks	2021 - 2025
W.M.03 Plant Operation	Review high water use plant such as pumps, filters, backwashers, cooling towers, etc. and optimise water efficiency	Reduced water use in plant and equipment	2020 - 2025
W.M.04 Industrial waste management	Industrial waste from laboratories, kitchens and mechanical plant are devolved to individual departments. There is a requirement to coordinate monitoring and reporting to better manage industrial waste discharge	Better coordination of industrial waste discharge	2021 - 2022

Appendix D: Climate Change Risk Assessment (to 2040)

INITIATIVES	SEVERITY	LIKELIHOOD	RISK LEVEL
REDUCED HUMIDITY			
Increased frequency of bushfires / controlled burns decrease local air quality	Medium	Possible	Low
Increased frequency of bushfires	Medium	Possible	Medium
INCREASED MAXIMUM, AVERAGE AND MINIMUM TEMPERATURES			
Failure of HVAC plant	Medium	Unlikely	High
Increased frequency of tropical illnesses	Medium	Possible	Medium
Increased load on electrical infrastructure	Medium	Likely	High
Increased internal temperatures as systems are unable to meet design criteria	Medium	Likely	High
Increased mosquito breeding and associated issues	Medium	Possible	Medium
REDUCED RAINFALL			
Increased / decreased groundwater levels impact structure of building	High	Unlikely	Medium
Failure of landscaped areas	High	Likely	Medium
Reduction in availability of bore water and public scrutiny on irrigation practices	High	Likely	High
Increased cost of water as a utility	High	Likely	Low
Reduced availability of groundwater	High	Likely	High
INCREASED SOLAR RADIATION			
Increased wear to building materials	Medium	Possible	Medium
Increased building use	Medium	Possible	Medium
Increased heat load to buildings	Medium	Almost certain	High
Increased heat island effect	Medium	Likely	Medium
Change to plant growth seasons	Medium	Likely	Medium
INCREASED WIND SPEED			
Increased damage due to storm events	Medium	Unlikely	Low
INCREASED FLOOD WATER LEVELS			
Increased / decreased ground water levels leading to structural implications	Medium	Likely	Medium
Increased / decreased ground water levels reducing access for irrigation and use on site	Medium	Likely	High
Failure of stormwater systems	High	Possible	Medium
General inundation	High	Likely	High
General inundation leading to structural damage to the buildings and infrastructure	High	Rare	High
River levels rise	High	Likely	High
INCREASED STORM SEVERITY			
Damage to infrastructure – supply to site	Medium	Possible	High
Damage to infrastructure – on campus	Medium	Possible	Medium
Increased sedimentation leading to blocked drains	Medium	Possible	Medium

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