



INTEGRATED WATER MANAGEMENT PLAN

WAURN PONDS CAMPUS
JULY 2020



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EXECUTIVE SUMMARY

The Integrated Water Management (IWM) Plan is an important intervention that will respond to significant water-related challenges at Deakin's Waurin Ponds Campus. It's a dynamic document that will be reviewed and updated regularly.

Deakin University's Waurin Ponds Campus has seen a long period of continued expansion and is now facing a number of challenges associated with its water-related systems. Critical water-related problems include high use of potable water for irrigation, a stormwater and drainage network that cannot meet current or future needs and leads to regular nuisance flooding, and a sewerage system nearing capacity. Deakin's management of water use and its interactions with the campus is a crucial element of the University's long-term commitment to sustainability.

Recognising that these and other water-related issues pose current and future challenges, the Integrated Water Management Working Group has developed this whole-of-campus Integrated Water Management (IWM) Plan.

The scope of the Plan includes:

- consumptive water use, including potable and alternative water sources
- sewerage
- stormwater, drainage and flooding
- Waurin Ponds Creek and tributaries
- water in the campus landscape
- social values of water, mainly Traditional Owner values and community awareness
- economic values, particularly the links between the water cycle system and the University's teaching and research.








The Plan was developed from existing reports and with input from stakeholders from the operational functions of the University, including Campus Services Division Sustainability and Campus Environments) Infrastructure and Property Group (Capital Projects and Asset Maintenance and Renewal), and the Faculty of Science, Engineering and Built Environment.

Through a collaborative process, the stakeholders developed a common understanding of the critical water-system related issues, established IWM goals consistent with a broad vision, and identified a suite of options to address each issue. For a more detailed assessment of all options considered, refer to the Deakin Waurin Ponds IWM Plan Options Report (Encader Consulting, 2020).

The exploration culminated in a roadmap of projects that address current and future water-related challenges across the Campus.

The key IWM opportunities, with high priority projects highlighted, include:

Table 1: Key IWM Opportunities

IWM Aspect		Project	Priority	Planning and Delivery \$	Operation and Maintenance \$
Water sources		W1 Connect Class A Recycled Water	High	High	High
		W2 Upgrade potable water network and pressure	Med	High	Low
		W3 Improve water efficiency data	High	Low	Low
		W4 Improve water efficiency awareness	Low	Low	Low
Sewerage		S1 Upgrade sewerage system capacity	Med	High	Low
		S2 Improve sewerage operational effectiveness	Med	Low	Low
Stormwater, drainage, flooding		SW1 Review and implement proposed flood mitigation measures	High	High	Low
		SW2 Develop and implement a Stormwater and Drainage Plan	High	Med	Med
		SW3 Improve tools to avoid future flood risks	Med	Low	Low
		SW4 Improve stormwater and drainage data	High	Low	Low
Waterways		WW1 Improve condition of the Waurin Ponds Creek	Med	Med	Low
		WW2 Review wetland functionality and values	Med	Low	Med
Water in the campus landscape		WL1 Develop a Landscape Master Plan	High	Med	Low
Social values		SV1 Increase understanding and engagement with Traditional Owner values	Med	Low	Low
		SV2 Enhance campus communities understanding of IWM	Low	Low	Low
Economic values		EV1 Improve IWM representation in core business	Med	Low	Low

BACKGROUND

INTEGRATED WATER MANAGEMENT

IWM recognises the value of water in our urban landscapes as a finite and precious resource. It contends that a resilient water cycle system is critical to the livability of our cities and towns and the social and cultural values within our communities. We need to retain water within urban landscapes, acknowledging the social and cultural values it provides and use water wisely, effectively, and sustainably.

Across Australia, urban water management has historically been a highly fragmented endeavor. Water utilities have focused on the consumption of drinking water and sewerage, with Local Government responsible for stormwater management and Catchment Management Authorities the stewards of waterway health.

This fragmented approach has contributed to confusion, conflict, and missed opportunities for innovative solutions spanning different aspects of the urban water system.

Victoria's Water Plan, developed in 2016, recognised the need for a more integrated and collaborative approach to urban water management across the state's urban areas. In 2017, the Government released a Framework for Integrated Water Management (IWM) to drive a more coordinated approach to urban water management (DELWP, 2017).

In 2018, the Government established regional IWM forums across the state, with Deakin located within the Barwon Region.

The cornerstone of the IWM approach is to consider the urban water cycle as a holistic system of at least seven interconnected aspects, as shown in Figure 1. This approach acknowledges the complexity of water-related challenges and builds a shared understanding of the issues and goals and encourages the co-design of integrated solutions and collaborative implementation for better outcomes.



CONSUMPTIVE WATER SOURCES



WASTEWATER



STORMWATER, DRAINAGE AND FLOODING



WATERWAYS



WATER IN URBAN LANDSCAPES



COMMUNITY VALUES OF WATER



JOBS, GROWTH AND INNOVATION

Figure 1: Aspects of integrated Water Management (adapted from DELWP, 2018)

DEAKIN'S WAURN PONDS CAMPUS

The Deakin Waurn Ponds Campus was established in 1974 and is located 8km to the west of Geelong CBD. It is situated in a natural gully at the foot of the Barrabool Hills and receives rainfall up to 525mm/year¹. The campus is positioned at the headwaters of the Waurn Ponds Creek and features expansive landscaped grounds with six small lakes and extensive sporting facilities.

The area was extensively cleared for cropping and grazing and most large trees and native vegetation have been removed. The area is prone to several land management hazards, including²:

- low inherent fertility and high permeability which leads to nutrient decline
- steeper slopes that are prone to sheet erosion
- runoff from adjacent hills that can cause gully erosion
- high seasonal water table which leads to waterlogging and soil compaction.

The development of the Waurn Ponds Campus began in the more accessible, lower parts of the valley on the tributary floodplain. As the campus has grown, new buildings and infrastructure have progressively spread up the sides of the valley. Until about a decade ago, most development was within the campus ring road, Nichol Drive, but rapid expansion to the north and west has continued apace in that time, extending up the valley. The confined topography and land use layout plan concentrate all water flows down towards the primary tributary, which runs through the middle of the campus.

The campus is in an expansion phase with new student research and business facilities and amenities being planned, designed, and constructed. With this expansion comes a growing demand for a range of water-related services, including potable water, sewerage, and stormwater.

1 Based on long term average of nearest site at Grovedale

2 [http://vro.agriculture.vic.gov.au/dpi/vro/corangle.nsf/pages/coranglemitte_Is_pdfs/\\$FILE/barrabool.pdf](http://vro.agriculture.vic.gov.au/dpi/vro/corangle.nsf/pages/coranglemitte_Is_pdfs/$FILE/barrabool.pdf)

Figure 2: Waurn Ponds Campus IWM Study Area



UNDERSTANDING THE NEED FOR AN IWM PLAN

Water management across the campus has traditionally been reactive, rather than proactive, with the growth not matched by a corresponding increase in critical water infrastructure.

Various efforts have been made over the past decade to better coordinate and integrate water management, often driven by major issues and challenges.

Critical water-related problems that the campus is experiencing include; high use of potable water for irrigation, a stormwater and drainage network that cannot meet current or future needs and leads to regular nuisance flooding, and a sewerage system nearing capacity.

IWM AIMS AND SCOPE

The aim of the IWM project is to:

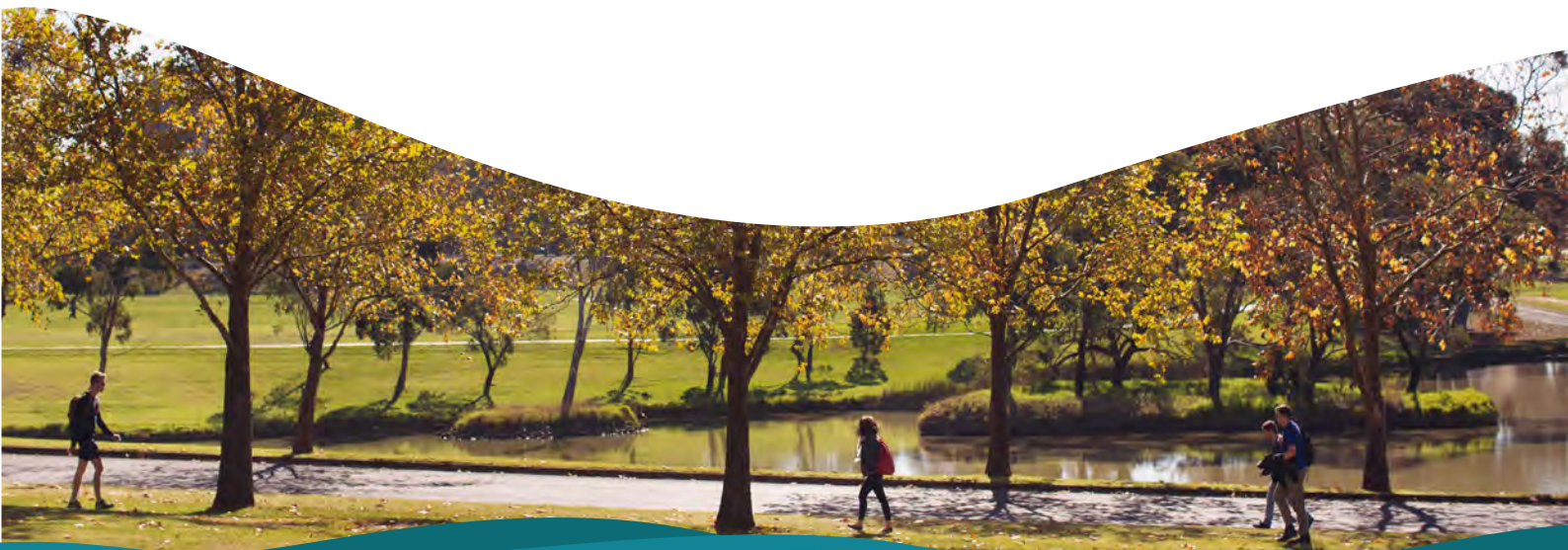
- engage stakeholders in a collaborative process that creates a shared understanding of the critical water system issues, form IWM goals consistent with the sustainability vision, and develop a roadmap to address current and future water- system related challenges across the campus
- establish clear directions for water-system related planning that supports the sustainable growth of the campus
- identify opportunities for IWM related topics in teaching and research projects and partnerships
- provide a pathway for achieving Deakin's Sustainability Commitments for water and the natural environment.

The scope of the IWM Plan is the area of land owned and managed by the University at the Wauron Ponds Campus and includes the interactions and linkages with the broader catchment beyond this area (Figure 2).

The Plan encompasses those aspects of the water cycle system outlined in the Barwon Region IWM Forum Strategic Directions Statement (DELWP, 2018) which are:

- water sources for consumptive use including drinking water and alternative sources of water
- wastewater management (sewerage)

- stormwater and drainage infrastructure and flooding, as well as links to land use and other built infrastructure (e.g. buildings, structures, roads and car parks)
- natural waterways, namely the Wauron Ponds Creek, its tributaries and associated water bodies
- water's interactions with green infrastructure in urban landscapes, including open spaces, trees and plants
- community values of water including Traditional Owner values, social and amenity values
- economic values of water, such as how IWM can contribute to the University's core business of teaching and research.



DEVELOPING THE PLAN

GOVERNANCE

In 2018, a formal sustainability governance structure was implemented at Deakin. The Enterprise Sustainability Committee, chaired by the Chief Operating Officer, has the ultimate responsibility for driving and overseeing the achievement of Deakin's Sustainability Commitments. Its seven working groups have the responsibility of achieving the targets of a specific aspect of sustainability, such as water.

The Integrated Water Management Working Group (IWMWG) drives the achievement of the water targets and is comprised of members from:

- Campus Services Division (Sustainability and Contracts and Grounds)
- Infrastructure and Property Group (Capital Projects, Asset Maintenance and Renewal, Infrastructure, Planning and Utilisation and Design and Development)
- Faculty of Science, Engineering and Built Environment.

The role of the IWMWG is to provide strategic guidance and planning advice that addresses water-related issues across Deakin's campuses.

The working group determined that an IWM Plan was necessary to provide a roadmap for tackling the full range of current and future water related issues across the campus and this group formed the majority of the key stakeholders for the project. Refer to Appendix 1 for a complete list of key stakeholders.



STAKEHOLDER ENGAGEMENT PROCESS

The stakeholder engagement method adopted to develop this IWM Plan was based on four phases that were designed to facilitate an integrated approach:

- Phase 1: create a shared understanding of the issues and goals based on systems thinking
- Phase 2: discover the options, identify preferred options, and develop the solutions

- Phase 3: develop an action plan of fit-for-purpose solutions
- Phase 4: support collaborative implementation and continuous improvement.

The development of this document encompasses phases 1-3 of this process, with Phase 4 being the endorsement of the IWM Plan by the Enterprise Sustainability Committee and assigning resources

and accountabilities to enable collaborative implementation.

Figure 3, below provides an overview of the process for the development, endorsement and implementation of the IWM Plan.



Figure 3: Developing the Deakin Waurn Ponds IWM Plan

STRATEGIC CONTEXT

TRENDS AND DRIVERS

CAMPUS GROWTH

Since the campus was established in 1974, it has continued to expand to serve the growing student and staff population.

Between 2006 and 2015, the Campus experienced unprecedented growth with the addition of fourteen new buildings and three car parks (Yip, 2018). More recently, campus growth has accelerated as the University seeks to build stronger partnerships with leading-edge innovators in emerging sectors, such as advanced manufacturing, engineering, and health. The hallmark of this new growth model is the Geelong Future Economy Precinct (GFEP).

The GFEP encompasses the 543-hectare area to the west of the existing campus and includes land owned by Marcus Oldham College and Epworth Hospital. The intention is to develop a precinct that 'will attract and host global leaders working in the areas of advanced manufacturing, materials, energy, sustainability, technology, health, and high-value agricultural initiatives with strong research links'.³

The development will involve the expansion of hard infrastructure including; buildings, roads, hardstands and car parks, services infrastructure (power, water, sewer, data, and communications) with road extensions having already commenced.

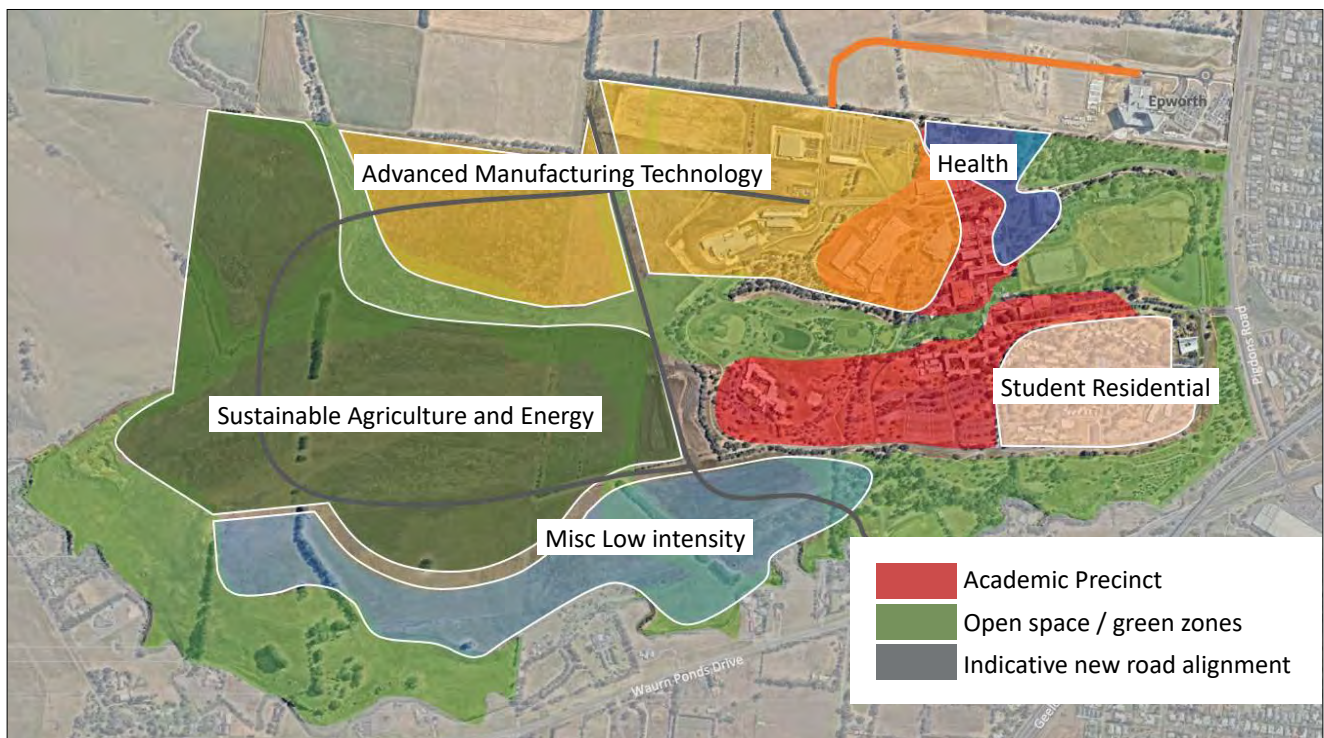



Figure 4: Waurn Ponds Master Plan Spectrum of Development (YIP, 2018)

3 <https://www.deakin.edu.au/locations/geelong-waurn-ponds-campus/building-projects/geelong-future-economy-precinct>



By the 2050s, the climate
of Geelong could be more
like the current climate of
Shepparton'

CSIRO & DELWP (2019) Barwon Climate Projections 2019

CLIMATE CHANGE

Climate change is one of the most significant challenges facing the planet and the way we live. For the purposes of climate change analysis, the Waurin Ponds Campus is situated within the Victorian Southern Slopes region. This region is likely to experience significant climate-related changes over the coming decades such as the following:

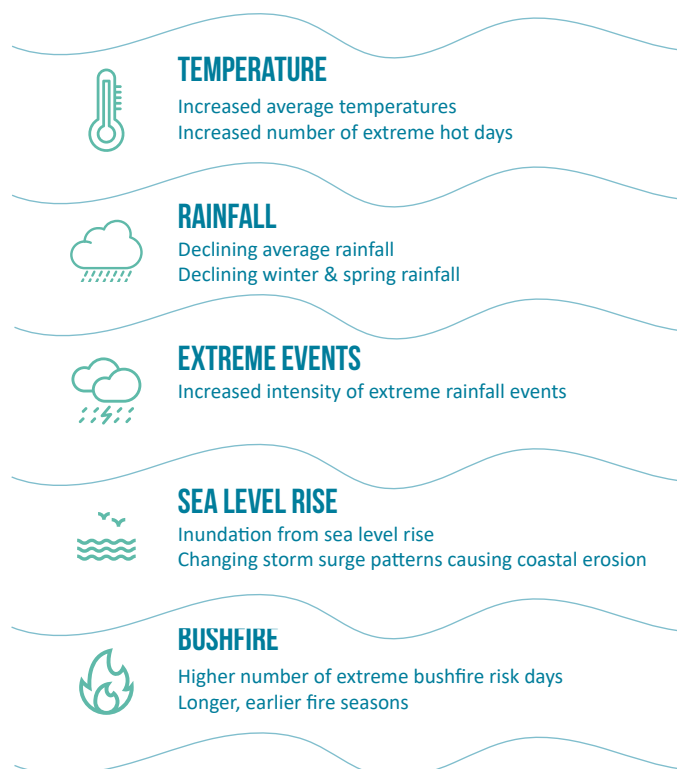


Figure 5: Climate Projections for the Barwon region⁴

In 2018, Deakin University commissioned TGM, in collaboration with Dr. Peter Coombes from Urban Water Cycle Solutions, to investigate the potential impacts of climate change on the built environment at Deakin University campuses. This report highlighted the significant risks to Deakin campuses posed by changes across a range of climate-related variables (see Table 2).

Table 2: Expected change for crucial Parameters due to climate change (Based on Coombes Et Al., 2018)

Variable	Trend	Variable	Trend
Maximum Temperature	Increasing for all seasons	Wind gust	Increasing
Minimum Temperature	Increasing for all seasons	Humidity	Decreasing
Number of hot days	Increasing	Evapotranspiration	Increasing for all seasons
Rainfall depth	Decreasing	Likelihood of drought	Increasing
Rainfall intensity	Increasing	Fire risk exposure	Increasing

4 CSIRO & DELWP (2019) Barwon Climate Projections 2019

Declining annual rainfall, with moderate reductions in rainfall depths during spring and early summer, will make it considerably more challenging to maintain green turf, open spaces, trees, and gardens at the time when they are most needed.

At the other extreme, peak rainfall intensity – that is, the amount of rain falling in downpours, could increase by 10%. More storm events are likely to exceed the capacity of the stormwater network and will lead to an increase in localised flooding. Higher average temperatures will increase thermal discomfort and the risk of heat stress, highlighting the need for accessible shaded areas and green open spaces.

The report predicts that, if left unaddressed, the economic impacts of climate change on water-related aspects for Deakin campuses could be \$1.5m per year by 2030. It recommended a range of tactics to ensure the campuses are 'ready to adapt' to climate changes, including:

- incorporate water efficiency measures into facilities design, including rainwater harvesting
- apply increased rainfall intensities and heat island multipliers in the design of buildings, roofs, roads, pavement, stormwater and flood mitigation infrastructure
- incorporate expected increases in wind gusts in building and structure design
- minimise impervious areas and cumulative flow paths for stormwater to mitigate local flood risks
- utilise green spaces, canopy cover trees and vegetation to avoid heat island effects and to provide refuges for people and biodiversity.

A flood investigation report conducted by Cardno/TGM in 2019 as a result of localised flooding in and around buildings LQ (Aviary), KE, and KA also highlighted the potential flooding risks posed by climate change, putting more pressure on the central gully spine.

Other climate change-related risks to the campus included:

- Infrastructure - the risk of heat-related asset failure (roads, buildings), exposure of assets to higher fire risk, faster deterioration of building stock
- Natural environment - loss of biodiversity, increased weed spread
- Green infrastructure, parks and gardens - water stress on trees, turf and gardens, demand for increased shading
- Community wellbeing - Increased rates of heat-related stress, increased heat at pavement level due to urban heat island effect, reduced active travel and outdoor recreation due to heat impacts
- Operations - Increased risk to staff from outdoor work and interruption of services by emergency events.



STRATEGIC DIRECTION

Deakin's commitment to sustainability is demonstrated through the inclusion of sustainability considerations in the Strategic Plan, Sustainability Policy and clearly defined Sustainability Commitments across Energy and Emissions, Water, Waste and Recycling, Travel and Transport, Natural environment, Built Environment and Procurement and Supply Chain areas. This IWM Plan aims to identify and realise opportunities where the water system can contribute to those broader sustainability commitments.

Strategic Plan – LIVE the future

Deakin's Strategic Plan LIVE the future is Deakin's top-level strategic framework (until the end of 2020). The LIVE acronym comes from the four elements of the Deakin promise: Learning, Ideas, Value, and Experience. Of relevance to the IWM Plan are the Ideas and Experience elements. Importantly it highlights that the University will embed sustainability in all aspects of the organisation, reducing environmental impact, maintaining its financial viability, and promoting the social aspects of sustainability while nurturing and enabling future leaders.

Deakin is in the process of developing its new strategic plan, which will be launched in 2020. At the time of developing this document it was understood that sustainability will continue to feature as one of the strategic priorities for the University.

Sustainability Policy

Deakin's Sustainability Policy 'provides a framework for giving expression to the University's commitment to integrating environmental, financial, and social sustainability in University practices and decision making' (Deakin, 2016). The Sustainability Policy presents ten principles to guide the embedment of sustainability in the University's practices. Essential aspects of the policy include 'responsibility for stewardship of campus environments and grounds, enhancing the quality of life for present and future generations and incorporating sustainability into practices and actions' (Deakin 2016).

Sustainability Commitments

Deakin's Sustainability Commitments (launched in 2017) provide a framework for the sustainable development of the University out to 2030 and is aligned with the United Nations Global Compact and Sustainable Development Goals (SDGs), the Paris Agreement and relevant Australian targets. Deakin University's Sustainability Commitments highlight the organisation's strategic commitment to the SDGs. How the University plans and manages water and its interactions with its campuses and communities is a vital element of this commitment to sustainability.

Deakin's Sustainability Commitments cover water management, the built environment, and the natural environments (among others) as key focus areas, setting targets that are relevant to the aspects covered in this IWM Plan (Table 3).

Table 3: Links between Deakin's Sustainability commitments and the IWM Plan

Target IWM Aspect	Water sources for consumptive use	Sewerage	Stormwater, Drainage & Flooding	Waterways	Water in landscape	Social values	Economic values
Water							
Reduce mains water consumption to 5 kL/person.							
25 % of campus grounds irrigated using reclaimed/ captured water.							
Maintain or improve on 2025 mains water consumption despite University growth.							
Built environment							
Embed the Deakin SBE Principles and complete a climate adaptation review.							
All high priority climate change adaptation actions completed.							
New Deakin buildings offset its sustainability impacts.							
Natural Environment							
Complete a biodiversity management plan and embed biodiversity in campus planning.							
Enhance biodiversity of the campus natural landscapes and waterways							
Biodiversity corridors established in priority locations, allowing wildlife to thrive on Campus							

CAMPUS PLANNING

At the time of developing this Plan, the hierarchy of campus planning (Figure 6) had recently been reviewed and endorsed and the process of documenting the Campus Development Plans (CDP) for each campus was also underway. The alignment of the IWM Plan and the Waurin Ponds CDP is critical to ensure that the IWM principles and goals are clearly articulated and the documents are consistent.



Figure 6: Hierarchy of campus planning⁵

⁵ Adapted from information provided by W. Viti, pers. Comm.

KEY DOCUMENTS

Deakin has commissioned several water-related investigations and has developed a range of internal strategies and plans that will support Integrated Water Management at the Waurin Ponds campus. Insights from these documents were considered in the preparation of this IWM plan, have informed relevant Deakin design standard updates, and will be further embedded within campus planning.

PRINCIPLES AND STANDARDS

Sustainable Built Environment Principles (2018)

Deakin's Sustainable Built Environment Principles guide the design and construction of all new buildings on campus. Promoting water efficiency in buildings, utilising alternate fit-for-purpose water sources, and understanding the use of water is one of eight design principles for sustainable built environments.

Campus Environment Design Standards (2016)

The Campus Environment Design Standards identify landscape characteristics and guide facility managers, external consultants, and contractors in the design and construction of outdoor spaces.

STRATEGIES AND PLANS

Climate Adaptation Plan (2020)

The Climate Adaptation Plan (Hip V Hype, 2020) reviews the risks associated with expected climate changes posed by global emissions scenarios and highlights that the most significant threats posed to the Waurin Ponds Campus include reduced annual rainfall and increased intensity of storm events.

Urban Forestry Strategy (2019)

The Urban Forest Plan (ArborSafe, 2019) provided a management strategy for highlights the importance of trees on the Waurin Ponds Campus, particularly the role they play in providing shade to reduce the heat island effect, reducing water runoff, creating biodiversity habitat and amenable landscapes.

Biodiversity Management Plan (2019)

The Biodiversity Management Plan (Ecology and Heritage Partners, 2019) identifies the ecological values at the Waurin Ponds Campus and identifies vital opportunities for protecting and enhancing biodiversity.

Water Savings Strategy Plan- Waurin Ponds (2019)

WaterGroup Pty Ltd was engaged to prepare a water savings strategy for the Waurin Ponds Campus and identified that the leading opportunity for the campus was to reduce potable water use through replacement with alternative, fit-for-purpose sources.

INVESTIGATIONS

Campus Flood Investigation- Waurin Ponds (2019)

Cardno/TGM was engaged to investigate existing flood conditions, flood impacts, and potential mitigation options for the Waurin Ponds Campus.

Defining Impacts of Climate Change on University Built Environment (2018)

TGM and Dr. Peter Coombes (Urban Water Cycle Solutions) were engaged to investigate the potential impacts of climate change on the built environment at Deakin's campuses, including Waurin Ponds. Key observations included increased rainfall leading to exacerbated flood damage and temperature changes that will increase the risk of heat island effects on campus.

PHASE 1: IWM GOALS

The IWM goals for each water aspect within this framework are as follows:








IWM Aspect	Icon	Goal
Water sources for consumptive use		Ensure long term water security through a diversity of water supplies that meet fit-for-purpose needs, water quality standards, community expectations, and are efficiently managed.
Sewerage		Ensure sewerage management meets public health and environmental standards, is effective and affordable, and maximises waste-to resource opportunities where appropriate.
Stormwater, Drainage and Flooding		Ensure stormwater and drainage networks that increase detention, retention, treatment and reuse of water that falls on the campus landscape close to its source and reduce velocity and volume of discharge and reduce risk of flood damage through prevention and mitigation that complements the protection of natural overland flow paths.
Waterways		Protect, enhance and restore waterway health and the accessibility of waterways for social outcomes.
Water within the campus landscape		Protect the extent of natural green assets within the campus landscape, enhance the quality of those assets, and improve the connectivity of green and blue spaces for people and nature.
Social values of water		Proactively support community involvement in IWM including increasing awareness, understanding, and engagement of Traditional Owner values and outreach to adjoining communities.
Economic values of water		Proactively leverage the IWM Plan and actions to contribute to the campus' economic resilience, through teaching, research, and new partnerships.

Table 4: IWM Goals for Deakin Waurn Ponds Campus (based on DELWP, 2018)




PHASE 2: PRIORITY OPPORTUNITIES

The following section will provide an overview of the key IWM issues and the preferred projects to manage each issue, as agreed by the IWMWG. This list of IWM opportunities will be reviewed and updated as required to reflect Deakin's IWM priorities.

The priority of the projects are based on the urgency and the importance in terms of the likely benefit, as follows:

- High priority – Urgent and important; implement by the end of 2021
- Medium priority – Less urgent and important; implement by the end of 2023
- Low priority – not urgent but important; implement over the longer term, by 2025.

WATER SOURCES FOR CONSUMPTIVE USE

IWM Aspect	Icon	Goal
Water sources for consumptive use		Ensure long term water security through a diversity of water supplies that meet fit-for-purpose needs, water quality standards, community expectations, and are efficiently managed.

W1: CONNECT CLASS A RECYCLED WATER

Reducing the use of potable water on campus is a significant challenge due to the expansive landscaped grounds. Central to this reduction is to replace part of the potable water footprint with alternative sources such as rainwater, stormwater, or recycled water. At least 60% of the campus' end-use water needs are irrigation, with an estimated annual cost of \$180,000 per year ⁶. This entire volume could theoretically be replaced with an alternative water source to potable, thereby reducing water use per person.

The main constraints on greater use of alternative water source for irrigation is the security of supply and reliability of the quality of the water and the whole-of-life cost of the respective sources. Stakeholders considered the following options:

Option 1 - Recycled water (Class A) supplied directly from the Barwon Water network via a pipeline extension from Mt Duneed








Option 2 - Recycled water (Class A) supplied from sewer mining or an on-site water reclamation plant

Option 3 - Stormwater harvesting via existing and new storages in the central gully basin.

Option 1, to use Class A recycled water from the Barwon Water network is the preferred option. This would provide the best level of security and quality to meet all the campus' irrigation needs in the long term. It would involve a pipeline connection to Barwon Water's Class A tank at Mt Duneed, a balancing storage on campus and associated distribution network, including pumping. Given the potential risks of cross-contamination with the existing potable network on campus, it is expected that a new Class A distribution network would be required. Once established, this supply could meet 100% of the campus' outdoor irrigation needs and thereby reduce potable water demand by about 60%.

Option 2, sewer mining, which involves the extraction of sewage from a trunk sewer main is technically feasible but would have high ongoing costs and pose some security risks per the Water Group Report completed in 2019 (Water Group, 2019)








Option 3, presents technical challenges associated with harvesting, storing, and treating large volumes of stormwater on-site which makes it a non-viable option for the bulk of irrigation water needs. However, there may be niche opportunities where small stormwater assets could provide local irrigation supplies, particularly if combined with a demonstration of other WSUD techniques. Rainwater tanks on new buildings can continue to provide localised opportunities for potable replacement in toilets and other suitable uses and could also be demonstration sites.

Relevant IWM Aspect							
Project	Connect Class A recycled water						
Priority	High						
Timeframe	2021						
Status	In progress						
Lead	IPG - Asset Maintenance and Renewal						

⁶ Based on the usage charge of \$1.9835/Kl: <https://www.barwonwater.vic.gov.au/billing-and-accounts/fees-and-charges>








W2: UPGRADE POTABLE WATER NETWORK AND PRESSURE

This project involves upgrading the water system to provide security and high-level pressure certainty to cater for projected long-term growth in demand. The project also needs to consider the upgrade or replacement of the campus Fire Ring Main which is particularly susceptible to mains supply pressures and flow capability. The mains water pressure across the campus decreases as it progresses up the slope to higher elevations. Pumping is currently required to maintain domestic and fire supply water pressure to high-level buildings. Future development without sufficient mains water pressure is unacceptable over the medium to long term.

Relevant IWM Aspect	      
Project	Upgrade potable water network and pressure
Priority	High
Timeframe	2021
Status	Proposed
Lead	IPG - Asset Maintenance and Renewal








W3: IMPROVE WATER EFFICIENCY DATA

Lack of detailed water-use data is a significant impediment. Active water metering is necessary to provide the intelligence required to inform future actions. This project involves upgrading the water use monitoring system, encompassing most of the Campus' water use to the nearest kilolitre.


Relevant IWM Aspect	      
Project	W3: Improve water efficiency data
Priority	High
Timeframe	2020
Status	Proposed
Lead	IPG - Asset Maintenance and Renewal

W4: IMPROVE WATER EFFICIENCY AWARENESS

Improved water efficiency is now embedded within new buildings through water-efficient fixtures and fittings and Deakin's Sustainable Built Environment Principles and Design Standards for Facilities (CSD, 2018). Noting that the relative impact of behavior-based water efficiencies is likely to be low (as irrigation is the most significant use), the preferred option is to place greater emphasis on sustainable water use as part of a broader sustainability outreach program. The project will help integrate the water efficiency message within the existing education and awareness efforts occurring across the campus.








Relevant IWM Aspect	      
Project	W4: Improve water efficiency awareness
Priority	Medium
Timeframe	2021
Status	Proposed
Lead	Campus Services - Sustainability

SEWERAGE

IWM Aspect	Icon	Goal
Sewerage		Ensure sewerage management meets public health and environmental standards, is effective and affordable, and maximises waste-to resource opportunities where appropriate.








S1: UPGRADE SEWERAGE SYSTEM CAPACITY

The internal sewerage network is expected to be at capacity within five years. The preferred option is to increase the internal capacity to cater for medium-term projections via a new internal main to a second point of discharge. Given the impact of COVID-19 on the future growth of the Campus, this project may not need to be activated for several years.


Relevant IWM Aspect	      
Project	S1 Upgrade sewerage system capacity
Priority	Medium
Timeframe	2024
Status	Proposed
Lead	IPG - Asset Maintenance and Renewal

S2: IMPROVE SEWERAGE OPERATIONAL EFFECTIVENESS

Existing blockages and lack of knowledge of assets cause regular operational issues in the internal sewerage network. This project involves engaging a hydraulic engineer to undertake a campus-wide sewerage network evaluation, coupled with an improved inspections program. It also involves the identification and location of all sewerage assets and asset data recording in the Spaceport asset management system, formal collaboration in the design phase for all new sewer facilities, plus a review of the Design Standards for Facilities to ensure they reflect the long term needs for sewerage services.

Relevant IWM Aspect	      
Project	S2 Improve sewerage operational effectiveness
Priority	Medium
Timeframe	2022
Status	Proposed
Lead	IPG- Asset Maintenance and Renewal

STORMWATER, DRAINAGE AND FLOODING








IWM Aspect	Icon	Goal
Stormwater, Drainage and Flooding		Ensure stormwater and drainage networks that increase detention, retention, treatment and reuse of water that falls on the campus landscape close to its source and reduce velocity and volume of discharge and reduce risk of flood damage through prevention and mitigation that complements the protection of natural overland flow paths.

SW1: REVIEW AND IMPLEMENT PROPOSED FLOOD MITIGATION MEASURES

This project involves conducting a review of the 2019 Waurm Ponds Campus Flood Investigation recommendations and implementing solutions consistent with the goal of having a water sensitive campus.








Managing existing flooding is one of the main issues driving the need for an IWM plan across the Campus. As the campus is located on a significant tributary of the Waurm Ponds Creek, it is subject to large flows after significant rainfall events. The existing stormwater and drainage network, most of which is underground, was built with limited redundancy and is now capacity constrained in that all new development within the catchment poses flooding risks (Coombes & TGM, 2018). With the increasing incidence of extreme rainfall events and a higher proportion of impervious surfaces due to new development, more storm events are likely to exceed the capacity of the stormwater network and lead to an increase in localised flooding (Cardno/ TGM 2019).

The 2019 flood mitigation study identified a range of structural measures (levees and underground pipes) to divert excess stormwater around the affected buildings at risk of flooding. The estimated costs of recommended works exceeded \$3m. Stakeholders involved in this plan acknowledge that these options do not necessarily reflect the IWM approach espoused in this plan, particularly the principles for water sensitive urban design (WSUD).

Relevant IWM Aspect							
Project	SW1 Review and implement proposed flood mitigation measures						
Priority	High						
Timeframe	2020						
Status	Proposed						
Lead	IPG - Asset Maintenance and Renewal						

SW2: DEVELOP AND IMPLEMENT A STORMWATER AND DRAINAGE PLAN




The increase in runoff from impermeable surfaces associated with new development presents an opportunity to plan and design a future campus landscape with an increased ability to retain, infiltrate, and utilise water where it falls. The preferred solution is to adopt a planned and integrated approach to stormwater and drainage, covering both the existing central spine catchment and other catchments. The proposed whole-of-campus Stormwater and Drainage Plan would be based on WSUD principles and aim to ensure no net increase in runoff from new developments to the existing stormwater and drainage network.

Relevant IWM Aspect							
Project	SW2 Develop and implement a Stormwater and Drainage Plan						
Priority	High						
Timeframe	2020						
Status	Proposed						
Lead	IPG - Asset Maintenance and Renewal						

SW3: IMPROVE TOOLS TO AVOID FUTURE FLOOD RISKS








This project builds on Project SW2, ensuring that all new development is subject to the specifications of the Stormwater and Drainage Plan and creating specific tools to operationalise this, including development zone maps, functional design specifications, and a formal mechanism for applying IWM in infrastructure planning and design.

Avoiding or minimising future risks through planning controls and design requirements is one of the cornerstones of an effective flood management response (DELWP, 2016). Central to this approach is better integration early in development planning, supported by increased knowledge of flood hazards. Flood overlays need to be introduced and updated and used to guide the placement of buildings, roads, utilities, and other infrastructure.


Relevant IWM Aspect	      
Project	SW3 Improve tools to avoid future flood risks
Priority	Medium
Timeframe	2021
Status	Proposed
Lead	IPG- Asset Maintenance and Renewal

SW4: IMPROVE STORMWATER AND DRAINAGE DATA

Lack of knowledge of the underground stormwater and drainage network assets is a significant impediment to effective operation. In this project, drainage and stormwater assets will be identified and mapped, then recorded in the Spaceport asset management system. This data will support the development and implementation of the Stormwater and Drainage Management Plan (SW2).








Relevant IWM Aspect	      
Project	SW4 Improve stormwater and drainage data
Priority	High
Timeframe	2021
Status	Proposed
Lead	IPG - Asset Maintenance and Renewal

WATERWAYS

IWM Aspect	Icon	Goal
Waterways		Protect, enhance and restore waterway health and the accessibility of waterways for social outcomes.

WW1: IMPROVE CONDITION OF THE WAURN PONDS CREEK




Protecting and enhancing biodiversity across its campuses is one of Deakin's Sustainability Commitments. Much of the creek is not within Deakin's management control, so the recommended option is for Deakin to continue to work collaboratively with the Corangamite Catchment Management Authority on specific activities to improve the creek conditions. This could include revegetation along the riparian zone to improve habitat quality and reduce sedimentation and or aquatic research opportunities. Also, this project should be aligned with the University's Natural Environment Sustainability Commitments and include consideration of the planned biodiversity/wildlife corridors of the campus.

Relevant IWM Aspect	      
Project	WW1 Improve condition of the Waurm Ponds Creek
Priority	Medium
Timeframe	2023
Status	Proposed
Lead	Campus Service- Contracts and Grounds


WW2: REVIEW WETLAND FUNCTIONALITY AND VALUES

This project involves a review of the functions and values of these wetland assets, investigation of their effectiveness, and opportunities for improvement to provide for multi-functional benefits to the Campus, the community, and the natural environment. This plan would also include maintenance and operational programs that could involve curriculum-based activities and or citizen science participation.

Deakin's Biodiversity Management Plan highlights the importance of the central chain of stormwater wetlands as an essential biodiversity zone on the Campus. Given the age of these assets, the hydrological functions of these water bodies are likely to have diminished while their social and biodiversity values have become more critical.

Relevant IWM Aspect	      
Project	WW2 Review wetland functionality and values
Priority	Medium
Timeframe	2023
Status	Proposed
Lead	Campus Services - Contracts and Grounds








WATER WITHIN THE CAMPUS LANDSCAPE

IWM Aspect	Icon	Goal
Water within the campus landscape		Protect the extent of natural green assets within the campus landscape, enhance the quality of those assets, and improve the connectivity of green and blue spaces for people and nature.


WL1: DEVELOP A LANDSCAPE MASTER PLAN

This project involves the preparation of a whole-of-campus Landscape Master Plan to provide a holistic approach to green and blue infrastructure across the entire campus. The plan would be aligned with the proposed Stormwater and Drainage Management Plan to provide a truly integrated approach to a water sensitive and environmentally friendly campus for future generations.

The Campus' undulating topography, large mature trees, and rolling open space are unique landscape features. The GFEP provides an exceptional opportunity for a land use and public open space layout that reflects these landscape features and enhances the visibility and functionality of stormwater where it falls across the campus. Stakeholders highlighted the need for a plan to ensure green and blue infrastructure is fundamental to all decisions regarding the campus development. Such a plan would help ensure the newly developed areas are in keeping with the character of the existing campus, help to address flooding, and alleviate potential heat island effects.

Relevant IWM Aspect	      
Project	WL1 Develop a Landscape Master Plan
Priority	High
Timeframe	2021
Status	Proposed
Lead	Campus Services - Contracts and Grounds

SOCIAL VALUES OF WATER

IWM Aspect	Icon	Goal
Social values of water		Proactively support community involvement in IWM including increasing awareness, understanding, and engagement of Traditional Owner values and outreach to adjoining communities.

SV1: INCREASE UNDERSTANDING AND ENGAGEMENT WITH TRADITIONAL OWNER VALUES

This project involves Deakin reaching out to Wadawurrung and involving them in identifying Aboriginal cultural values across the campus, as well as initiating partnerships on specific projects. Through this, Deakin would lead a joint plan with Wadawurrung to ensure traditional owner (TO) values are considered in future activities and communicated to the campus community.








Deakin acknowledges that the Waurin Ponds Campus lies in Wadawurrung Country, whose ancestors and their descendants are the traditional custodians of the land. Aboriginal cultural values associated with land, water, and landscape are different and distinct to European historical values. It is important to Traditional Owners that their values are understood, protected, and applied. The participants acknowledge that the IWM Plan offers an opportunity for more comprehensive engagement with Wadawurrung on potential future partnerships.

Relevant IWM Aspect	      
Project	SV1 Increase understanding and engagement with Traditional Owner values
Priority	Medium
Timeframe	2021
Status	Proposed
Lead	Campus Services - Sustainability


SV2 ENHANCE CAMPUS COMMUNITIES UNDERSTANDING OF IWM

This project involves Deakin reaching out to Wadawurrung and involving them in identifying Aboriginal cultural values across the campus, as well as initiating partnerships on specific projects. Through this, Deakin would lead a joint plan with Wadawurrung to ensure traditional owner (TO) values are considered in future activities and communicated to the campus community.

Deakin acknowledges that the Waurin Ponds Campus lies in Wadawurrung Country, whose ancestors and their descendants are the traditional custodians of the land. Aboriginal cultural values associated with land, water, and landscape are different and distinct to European historical values. It is important to Traditional Owners that their values are understood, protected, and applied. The participants acknowledge that the IWM Plan offers an opportunity for more comprehensive engagement with Wadawurrung on potential future partnerships.








Relevant IWM Aspect	      
Project	SV2 Enhance campus communities understanding of IWM
Priority	Low
Timeframe	2023
Status	Proposed
Lead	Campus Services - Sustainability

ECONOMIC VALUES OF WATER

IWM Aspect	Icon	Goal
Economic values of water		Proactively leverage the IWM Plan and actions to contribute to the campus' economic resilience, through teaching, research, and new partnerships.

EV1 IMPROVE IWM REPRESENTATION IN CORE BUSINESS

Given Deakin's core business is education and research, stakeholders recognised the need for a more focused effort to explore and develop IWM related opportunities in teaching and research. The project could also extend to establishing several IWM demonstration sites and leverage the University's data analytics capability to understand the performance of various IWM solutions better.

Relevant IWM Aspect	      
Project	EV1 Improve IWM representation in core business
Priority	Medium
Timeframe	2023
Status	Proposed
Lead	Faculty of Science, Engineering and Built Environment

PHASE 3: IMPLEMENTATION PATHWAY

This section presents an implementation plan for the IWM projects identified in the previous sections. Priorities are based on the urgency and the importance in terms of the likely benefit, as follows:

- High priority – Urgent and important; implement in the short term, preferably by the end of 2021
- Medium priority – Less urgent and important; implement by the end of 2023
- Low priority – not urgent but important; implement over the longer term, by 2025.

Note this timeframe for implementation may change based on a range of factors such as project life cycle and alignment with other initiatives, a perceived priority by the IWMWG, funding availability, commitment from other partners, etc.








Estimated costs are indicative and concept level only; based on estimates derived from reports and or feedback from stakeholders. Costs are classed as follows:

- High value – >\$1,000,000
- Medium value – \$100,000 - \$1,000,000
- Low value – <\$100,000.

The ‘suggested lead’ is likely to be the area best placed to lead the implementation of a particular action should it be endorsed; however, it is expected that many actions will require collaborative efforts between areas. Most of the projects would need to be scoped and designed further to be ‘shelf-ready.’ A range of activities are being undertaken by Deakin to support delivery of the IWM Plan, including:

- accountability and governance through the IWMWG and the Enterprise Sustainability Committee
- collection and analysis of data and information to assist timely decision-making
- developing progress indicators for the IWM goals consistent with the Sustainability Commitments and targets
- review the progress of the Plan annually, considering new information and outcomes from crucial projects, and any revision to targets
- monitor, measure, and report on the progress of actions to the IWMWG and the Enterprise Sustainability Committee
- advocacy and networking across the University to promote the value of IWM in a teaching and research context.

Table 5: Proposed Implementation Plan

IWM Aspect		Project	Priority	Planning and Delivery \$	Operation and Maintenance \$
Water sources		W1 Connect Class A Recycled Water	High	High	High
		W2 Upgrade potable water network and pressure	Med	High	Low
		W3 Improve water efficiency data	High	Low	Low
		W4 Improve water efficiency awareness	Low	Low	Low
Sewerage		S1 Upgrade sewerage system capacity	Med	High	Low
		S2 Improve sewerage operational effectiveness	Med	Low	Low
Stormwater, drainage, flooding		SW1 Review and implement proposed flood mitigation measures	High	High	Low
		SW2 Develop and implement a Stormwater and Drainage Plan	High	Med	Med
		SW3 Improve tools to avoid future flood risks	Med	Low	Low
		SW4 Improve stormwater and drainage data	High	Low	Low
Waterways		WW1 Improve condition of the Waurin Ponds Creek	Med	Med	Low
		WW2 Review wetland functionality and values	Med	Low	Med
Water in the campus landscape		WL1 Develop a Landscape Master Plan	High	Med	Low
Social values		SV1 Increase understanding and engagement with Traditional Owner values	Med	Low	Low
		SV2 Enhance campus communities understanding of IWM	Low	Low	Low
Economic values		EV1 Improve IWM representation in core business	Med	Low	Low

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APPENDIX 1:

PARTICIPATING STAKEHOLDERS

Name	Faculty/Division	Department/Company	Position
Emma Connan	Campus Services	Sustainability	Director, Sustainability and Supply
Zoe Roloff	Campus Services	Sustainability	Sustainability Officer
Luke Primus	Campus Services	Campus Services Grounds Maintenance	Grounds Team Leader
Spiro Fatouros	Campus Services	Contracts and Grounds	General Manager, Retail and Environments
Jason Ah Sam	Infrastructure and Property Group	Capital Projects	Regional Manager, Capital Projects
Adam Fletcher	Infrastructure and Property Group	Capital Projects	Project Manager, Major Projects Delivery
Jo Winter	Infrastructure and Property Group	Capital Projects	Project Assistant, Major Projects Delivery
David Haliwell	Faculty Office	Faculty of Science Engineering and Built Environment	Industry Professor
Sam Smith	Infrastructure and Property Group	Design and Development	Project Manager, Sustainability
Wes Viti	Infrastructure and Property Group	Infrastructure, Planning and Utilisation	Manager, Infrastructure Planning
Steve Price	Infrastructure and Property Group	Asset Maintenance and Renewal	General Manager, Asset Maintenance and Renewal
Brendon Blick	Infrastructure and Property Group	Asset Maintenance and Renewal	Coordinator, Campus Maintenance



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