GRIFFITH UNIVERSITY | 50 YEARS 1975–2025

Waterway Monitoring Protocol

Information and procedures for on-campus waterway condition monitoring as identified by the Griffith University Integrated Water Management Plan

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Acknowledgement of Country

Griffith University acknowledges the people who are the traditional custodians of the lands on which we learn and work, and pays respect to the Elders, past and present, and extends that respect to all Aboriginal and Torres Strait Islander peoples.

Griffith University campuses sit on the lands of the Yugarabul, Yuggera, Jagera, Turrbal, Yugambeh, and Kombumerri peoples. We acknowledge Aboriginal and Torres Strait Islanders' unique relationship with and understanding and ongoing stewardship of these lands. Through collaboration with staff, students, and community members, we are committed to embedding Indigenous cultures and diverse knowledge systems in our learning and teaching, research, operations, and partnerships. Griffith acknowledges Elders past and present who guide the way to a more sustainable future for all. Under the guidance of the Griffith University Elders and First Peoples Knowledge Holders Advisory Board, we seek to ensure sustainability actions are aligned with First Peoples' knowledges and cultural practices.

Authorship & Consultation

Focussed stakeholder consultation and specialist technical advice have occurred throughout all development stages of this document. This leveraged Griffith's leading waterway health and water quality monitoring experts and the Environmental Sustainability Committee as a key coordinating stakeholder body. The Griffith University First Peoples Knowledge Holders Advisory Board was also consulted on the Integrated Water Management Plan, within which this document sits, and comprehensive workshops were held at Gold Coast, Logan, and Brisbane South (Nathan) campuses to engage Aboriginal and/or Torres Strait Islander community members on place-based insights and knowledge. By harnessing the collective expertise of all these experts, we have done our best to ensure that these procedures are informed by the latest research, best practices, indigenous knowledge, and innovative approaches across multiple domains, thereby enhancing their comprehensiveness, effectiveness, and sustainability.

In accordance with Griffith University's commitment to continuous improvement and community engagement, this document is considered a living document. We recognise the importance of stakeholder and community feedback in shaping our approach to water management. As such, these procedures will be regularly reviewed and adjusted based on input received from stakeholders and the community to ensure their relevance, effectiveness, and alignment with evolving needs and priorities.

This report was prepared by Mark Grant, Environmental Manager (Strategy, Policy & Planning), Kendall Nesci, and Max Heaps, Work Integrated Learning Interns, on behalf of Griffith Sustainability, Office of the Vice Chancellor, Griffith University.

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Executive Summary

This protocol provides the framework for monitoring on-campus waterways at Griffith University, underpinning the university's Sustainability Strategy 2023–2030. Its main objective is to ensure that, by 2030, sensitive natural water bodies on campus retain their ecological value and biodiversity, with no decline in waterway or catchment health compared to a 2025 baseline.

The protocol details procedures, resources, and partnerships for establishing this baseline and for ongoing monitoring. It is designed to enable adaptive management, support compliance with regulatory and policy requirements, and facilitate effective reporting. The program was developed through consultation with Griffith experts, the Environmental Sustainability Committee, and First Peoples Knowledge Holders, ensuring integration of best practice and Indigenous knowledge.

Monitoring focuses on both perennial (year-round) and ephemeral (intermittent) water systems, with approaches tailored to each system's ecological dynamics and risk profile. Perennial systems are prioritised due to their sensitivity to continuous contaminant exposure, while ephemeral systems require longer-term and event-based monitoring to capture seasonal variability.

The protocol aligns with national (ANZG), state (Queensland Environmental Protection Act and Water Quality Guidelines), and university policies, and supports the Integrated Water Management Plan (IWMP), which incorporates United Nations Sustainable Development Goals 6 and 14.

Core Monitoring Locations:
Gold Coast Campus:
- G2 (Perennial Pond): Main site with a floating TracWater buoy measuring pH, oxidation-reduction potential, and temperature.
- G1 (Perennial Pond): High biodiversity, used for manual surveys.
- G3/G4 (Ephemeral Channels): Targeted for event-based monitoring, especially after rainfall.

Logan Campus:
- L2 (Southern Lake Discharge): Main site with a TracWater buoy measuring dissolved oxygen, conductivity, turbidity, pH, temperature, and algal indicators.
- L1 (Northern Lake Inlet): Receives runoff from high-risk sources; candidate for future monitoring.

Brisbane South (Nathan) Campus:
- N5 (Perennial Pool on Mimosa Creek): Main site with a multi-parameter sonde for dissolved oxygen, conductivity, turbidity, pH, and water level.
- N1–N4, N6, N7: Supplementary sites for future or event-based monitoring, especially in response to construction and runoff risks.

The protocol employs a mixed-methods approach, combining real-time sensor data, manual surveys, and event-based assessments. This ensures robust, adaptive monitoring and supports Griffith's long-term sustainability and compliance goals

Introduction

This waterway monitoring protocol has been developed to support reporting against the implementation of Griffith University's Sustainability Strategy 2023–2030, with a focus on its key measure of success in integrated water management:

> *"By 2030, sensitive natural water bodies on campus will show no loss in ecological value or biodiversity, and sediment erosion monitoring will show no deterioration in levels of waterway and catchment health, based on ecological surveys compared with baseline year (2025)."*
>
> (Griffith University Sustainability Strategy 2023–2030, p.9)

This document outlines the procedures, resources, and partnerships required to establish a baseline dataset in 2025 and conduct ongoing monitoring through to 2030. While it supports reporting against strategic targets, it also provides a practical framework for collecting the data and insights needed to enable effective adaptive management of campus environments.

Monitoring sites and data types have been carefully selected to reflect Griffith's strategic commitments, identify potential pollution sources, and establish indicators of biodiversity and ecological health. The program has been developed in consultation with Griffith experts and aligns with relevant regulatory guidance and best practice standards.

The protocol has three primary objectives:

- Clarify any regulatory obligations related to waterway monitoring and management at Griffith University.
- Provide staff and contractors with clear guidance to ensure compliance and demonstrate best practice in monitoring campus waterways.
- Enhance collaboration and reporting by supporting the identification, discussion, and resolution of waterway condition issues across relevant teams.

This protocol will be reviewed and adapted in response to emerging trends, data insights, and technological advancements. This adaptive approach ensures the Integrated Water Management Plan remains responsive to new challenges and opportunities, incorporating expert recommendations as they arise.

Scope

The on-campus water systems included in this monitoring program vary considerably, ranging from large perennial water bodies to small ephemeral streams. These differences require site-specific monitoring approaches, reflecting the distinct ecological dynamics and contaminant exposure pathways associated with each system.

Perennial systems, which retain water year-round, are more vulnerable to continuous low-level contaminant exposure. In contrast, ephemeral systems—characterised by intermittent flow—are subject to short-term, high-concentration contaminant pulses during rainfall events. However, they are generally considered less sensitive to these brief exposures. As noted in the Australian and New Zealand Water Quality Guidelines (ANZG, 2020):

> *"There has been much less research into the impacts of pulsed exposures of contaminants [in ephemeral systems]… The permanence of water [in perennial systems] leads to a focus on ecosystem sensitivity to continuous exposure to contaminants in the water column. The sensitivity is generally regarded as greater under continuous exposures, with effects occurring at lower toxicant concentrations."*
>
> (ANZECC/ARMCANZ, 2000)

Given the University's success metric—which prioritises the protection of "sensitive natural water bodies"—monitoring efforts have been focused on perennial systems across campus.

The limitations of current guidance for ephemeral systems were acknowledged during an expert workshop held in September 2015. The workshop concluded that detailed methods for assessing and managing water and sediment quality in temporary waters remain underdeveloped. It recommended:

> *"Until empirical data for multiple (chemical, physical, and biological) indicators for specific locations have been gathered, assessments should rely on conceptual models within adaptive water management frameworks that evolve over time."*
>
> (ANZG, 2020)

Due to their episodic nature, ephemeral systems require additional data collection focused on variables such as flow rate, volume, and rainfall. The wet/dry seasonal cycle—which governs contaminant exposure—varies throughout the year. As such, a single year of monitoring is insufficient to capture seasonal variability. Ideally, data should be collected over a 3–5 year period to develop a robust seasonal profile.

Policy Requirements and Strategic Alignment

Australian Government

The ANZECC Guidelines for Fresh and Marine Water Quality, now part of the ANZG (Australian and New Zealand Guidelines for Fresh and Marine Water Quality), provide nationally consistent guidance for protecting aquatic ecosystems, drinking water, recreation, and agricultural uses. These guidelines establish water quality trigger values that help identify when water quality is at risk of causing harm to the environment or human health.

While not legally binding, they are widely adopted by regulatory authorities and serve as a benchmark for environmental compliance. To align with the guidelines, Griffith University is required to regularly monitor their water discharges and receiving environments, assess results against the relevant guideline values, and implement appropriate management or remediation actions if exceedances are identified.

Queensland Government

There are several Queensland Government legislation and policy frameworks that govern the protection and sustainable management of on-campus waterways and wetlands. These frameworks establish legal obligations and best practice standards for maintaining water quality and ecological values across the state.

The **Environmental Protection Act 1994** provides the overarching legal basis for environmental protection in Queensland. It defines environmental values (EVs) and outlines obligations to prevent environmental harm, including contamination of water bodies. The Act mandates best practice environmental management and binds all persons, including Griffith University, to uphold its objectives.

The **Environmental Protection (Water and Wetland Biodiversity) Policy 2019** (EPP Water) supports the Act by specifically addressing water and wetland ecosystems. It establishes EVs and **Water Quality Objectives (WQOs)** for Queensland waters, which serve as measurable targets for physical, chemical, and biological parameters. These include indicators such as nitrogen compounds, phosphorus, chlorophyll-a, dissolved oxygen, conductivity, pH, turbidity, and total suspended solids. Elevated levels of these indicators are associated with eutrophication, algal blooms, anoxic conditions, and biodiversity loss.

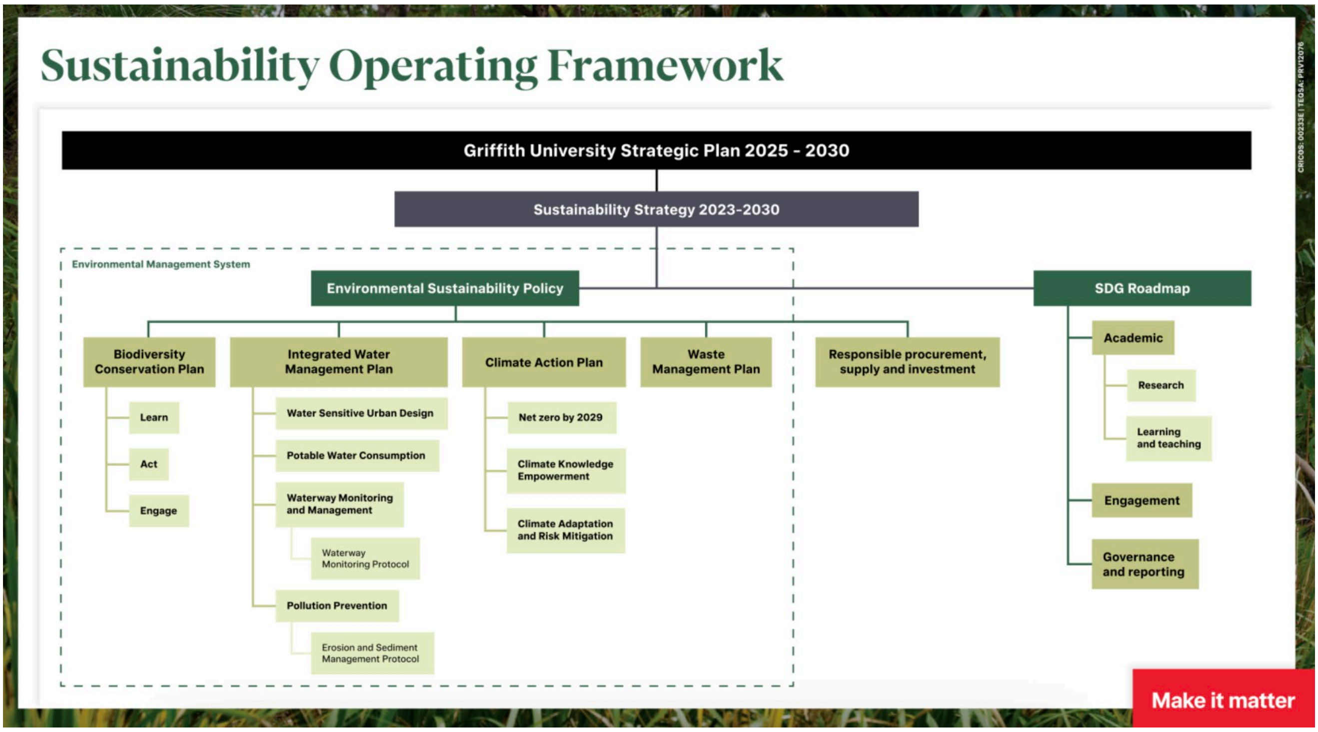
The **Queensland Water Quality Guidelines (2009)** provide region-specific benchmarks for slightly to moderately disturbed waters, including those in South-East Queensland. These guidelines are used to assess compliance with WQOs and support the development of site-specific monitoring programs.

The **State Planning Policy 2017** (SPP) identifies water quality as a key state interest. It requires that development activities—both during and after construction—achieve stormwater management design objectives that protect and enhance the environmental values of Queensland waters. The SPP allows for flexible approaches, including off-site solutions, provided they deliver equivalent or improved water quality outcomes. These provisions are particularly relevant for urban campuses like Griffith, where space constraints may limit on-site treatment options.

Griffith University

Griffith University delivers environmental sustainability, including integrated water, erosion, and sediment management, through its Sustainability Framework (Figure 1). This On-campus Waterway Monitoring Protocol aligns with the Sustainability Strategy 2023-2030, supporting outcome-focused actions that enhance environmental management. The protocol is backed by the Environmental Sustainability Policy and the Environmental Management System (EMS) framework, which provides structured processes to manage environmental risks and improve water management outcomes.

Figure 1: Griffith University Sustainability Operating Framework



Integrated Water Management at Griffith

The Integrated Water Management Plan (IWMP) drives sustainable water management across Griffith's operations, academic activities, and partnerships, promoting healthy catchments and recognising the social, cultural, environmental, and economic importance of Southeast Queensland's waterways and marine environments. The IWMP incorporates key principles from the United Nations Sustainable Development Goals (SDGs), particularly:

- Goal 6 (Clean Water and Sanitation) – Ensuring access to clean water and efficient water use.
- Goal 14 (Life Below Water) – Preventing pollution and protecting aquatic ecosystems.

The IWMP directly supports Griffith's Sustainability Strategy 2023-2030, with the following key success measures for water:

1. All new development actively seeks to manage its water cycle impacts in a sustainable way considering water-conscious building standards.[1]
2. By 2030, annual potable water consumption (average per full-time equivalent staff and students) will have reduced by 10 per cent based on 2023 consumption.
3. By 2030, sensitive natural water bodies on campus will show no loss in ecological value or biodiversity, and sediment erosion monitoring will show no deterioration in levels of waterway and catchment health, based on ecological surveys, compared with the baseline year (2025-26).

How This Protocol Supports Griffith's Water Management Goals

This protocol forms a key component of the Integrated Water Management Plan (IWMP), which, in conjunction with the Griffith University Erosion and Sediment Management Protocol (ESMP), allow the university to deliver on success measure number 3 documented above.

This document directly supports two of the three actions outlined in the IWMP under Action Plan 3: Natural Waterway Monitoring and Management (see Table 1) and one of the two actions under Action Plan 5: Continual Improvement (see Table 2). Specifically:

- Action 3.2 is fulfilled through the development of this protocol.
- Action 3.3 is addressed through its ongoing implementation.
- Action 5.2 will be achieved through future remediation of erosion hazards identified via proposed audits.

By delivering on these actions, this document ensures the University remains on track to meet Action Plan 3's Measure of Success: By 2030, sensitive natural water bodies on campus will show no loss in ecological value or biodiversity based on ecological surveys compared with the baseline year (2025). It also ensures the University's commitment to continuous improvement and alignment with evolving risks, needs and priorities.

[1] Such as Green Star, Water Sensitive Urban Technical Design Guidelines for South East Queensland and the Griffith University Design Guidelines

Table 1: Griffith University's Integrated Water Management Plan's Action Plan 3: Natural Waterway Monitoring and Management

No.	Action	Time	Measure of Success	Campus(es)
3.1	Reduce riparian weeds via targeted 'hotspot' management and additional management actions under the Biodiversity Conservation Plan.	From 2024	Annual reductions in riparian weed cover and at least an 80% reduction by 2030 (measured against 2025 levels).	Gold Coast, Logan, Nathan
3.2	Develop informed and appropriate procedures for the ecological monitoring of sensitive water bodies at Gold Coast, Logan and Nathan campuses. Procedures to include information on monitoring locations, parameters (e.g. biological, physico-chemical), timing, and people responsible.	By mid-2025	Procedures completed.	Gold Coast, Logan, Nathan
3.3	Conduct targeted waterway monitoring (as per 3.2) to measure the ecological condition of sensitive wetlands and provide management recommendations.	Ongoing from 2025	Monitoring completed and report delivered showing status, change, influencing factors (natural and anthropogenic) and management recommendations.	Gold Coast, Logan, Nathan

Table 2: Griffith University's Integrated Water Management Plan's Action Plan 5: Continual Improvement.

No.	Action	Time	Measure of Success	Campus(es)
5.1	Conduct community consultation, in particular with First Nations elders, knowledge holders, and community members, on the planning and implementation of all actions.	From 2024	Consultations with relevant stakeholders conducted and outcomes, including on appropriate species and community use of campus areas, incorporated into action and implementation plans.	All
5.2	Implement water management actions directly resulting from community consultation, waterway monitoring and erosion audits.	From 2025	Actions implemented on time and within budget.	Gold Coast, Logan, Nathan

Approach to Waterway Monitoring

Griffith University employs a mixed-methods approach to monitor its on-campus waterways, combining continuous high-resolution data collection with targeted ecological assessments. This approach integrates:

- Real-time monitoring via floating buoy systems and in-situ sensors,
- Historical data from staff- and student-led monitoring programs,
- Event-based ecological surveys and knowledge contributions from Griffith professional and academic staff.

This layered methodology enables a comprehensive understanding of waterway health, drawing on site-specific characteristics and long-term contextual knowledge. In particular, exploiting existing baseline knowledge, drawing contextual interpretation from site characteristics, and years of staff- and student-led monitoring allows Griffith to understand waterways effectively.

Site Selection and Strategic Focus

Monitoring sites have been strategically selected based on their ecological value, risk profile, and capacity to support learning and research. While budget constraints prevent equal monitoring across all sites, priority has been given to locations that offer the greatest potential for biodiversity protection and alignment with the South-East Queensland Water Quality Objectives.

Adhering to the South-East Queensland Water Quality Objectives is a legal requirement for maintaining regional environmental standards. Compliance ensures that Griffith University contributes to the protection of aquatic ecosystems, supports community efforts to preserve water resources, and generates valuable data for adaptive management.

By aligning its monitoring program with these legislative and policy instruments, Griffith University demonstrates its commitment to environmental stewardship and regulatory compliance. The program's design ensures that water quality indicators are tracked systematically, enabling timely responses to emerging risks and supporting the long-term ecological health of campus waterways.

Risk-Based Monitoring and Early Detection

Continuous water quality sensors serve as the first line of detection for potential hazards. When anomalies—such as spikes in conductivity or drops in dissolved oxygen—are detected, follow-up investigations are triggered to assess risks and inform management responses.

Sediment and erosion monitoring is also conducted through routine surveys by Griffith staff as per the Erosion and Sediment Management Protocol. This helps mitigate risks to sensitive water bodies and supports broader biodiversity outcomes.

Adaptive Management and Ecological Resilience

The monitoring program is designed to support adaptive management, enabling Griffith University to respond to emerging threats and ecological changes. By establishing a robust baseline dataset, the University can detect deviations from natural conditions and intervene before ecological thresholds are crossed.

Regular monitoring not only supports compliance and ecological resilience but also provides valuable learning opportunities for students, staff, and alumni. It ensures that Griffith's campuses remain vibrant, biodiverse environments and contributes meaningfully to long-term sustainability outcomes.

Table 3 - Water Objectives for Griffith University Campuses

Parameter	Ammonia (µg/L)	Oxidised Nitrogen (µg/L)	Total Suspended Solids (mg/L)	Conductivity	Filterable Reactive Phosphorus (µg/L)	pH
Gold Coast	NA	NA	NA	NA	NA	NA
Logan	NA	NA	NA	NA	NA	NA
Nathan Low flow	11	16	3	490	7	6.5-8.0
Nathan High-flow	8	75	5	250	11	6.5-8.0
Parameter	**Dissolved Oxygen (% Saturation)**	**Total Nitrogen (µg/L)**	**Turbidity (NTU)**	**Chlorophyl-a (µg/L)**	**Total Phosphorus (µg/L)**	
Gold Coast	50-95	650	8	15	60	
Logan	50-95	650	8	15	60	
Nathan Low flow	85-110	330	3	1	25	
Nathan High-flow	85-110	560	13	1	40	

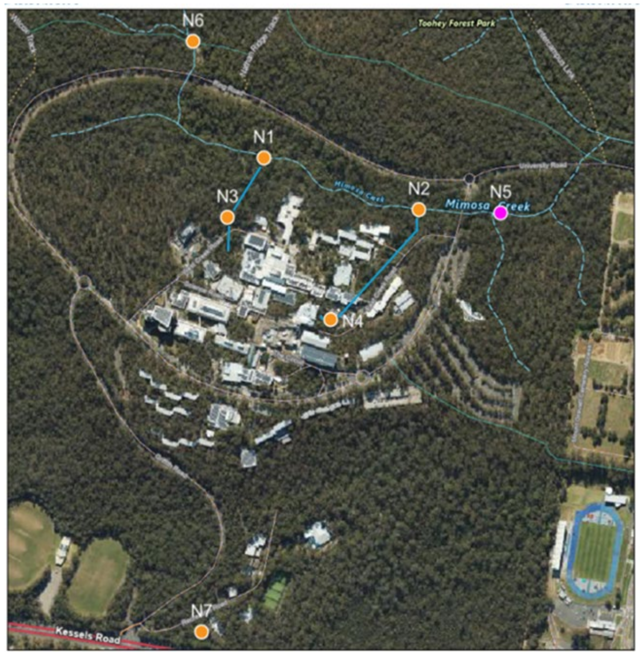
Monitoring Location Summary

The monitoring program will operate at Gold Coast Campus, Logan Campus, and Brisbane South (Nathan) Campus. At each campus, the water systems vary significantly. In addition to the physical differences of each system, the potential pollutant sources also differ. As such the protocol has been designed to operate differently at each location. This ensures that resources expended result in the most relevant information being captured.

Gold Coast

Logan

Nathan



Pink dots indicate locations where real-time in-situ water quality monitoring is being undertaken. Orange dots indicate secondary monitoring locations where supplementary data are being collected by Griffith staff and students. See table 4 for more information.

Table 4 – Locations and monitoring approaches for Gold Coast and Logan Campuses. Bolded sites are sites of in-situ sensor based monitoring.

Site	Description	Ecological Value [2](relative to Griffith ecosystems)	Likelihood of Human Impact	Management Control Ability	Monitoring Approach	Parameters Measured
G1	Perennial sensitive wetland	High – biodiverse including some threatened species	Low– very rare disturbance, but periodical fire impacts	Low - – some ability to manage riparian vegetation	Risk-based approach using expert elicitation	Ad-hoc coursework/ academic surveys
G2	**Perennial sensitive wetland**	**Moderate - biodiverse but several invasive species present**	**Moderate – some disturbance by students and public, and periodical fire impacts**	**Moderate – ability to manage riparian vegetation, erosion & pollution**	**In-situ water quality monitoring buoy (via TracWater partnering agreement)**	**pH, Oxidation-Reduction Potential (ORP), and Temperature**
G3	Ephemeral drainage channel	High – threatened species present	Low – some erosion hazards and runoff from buildings	Moderate – ability to manage riparian vegetation, erosion & pollution	Future Opportunity	TBC
G4	Ephemeral stormwater channel (point of discharge from campus)	Low – fast-flowing concrete channel with low habitat value	High – collects stormwater runoff from most campus drains, buildings & outdoor areas	Moderate – ability to manage pollution sources from campus	In-situ water quality monitoring logger (Griffith managed)	TBC
G5	Ephemeral stormwater channel	Moderate – drains into wetland area with public amenity	High – collects stormwater from Griffith, a high school & a residential area	Low - inability to manage 2 external sites	Future opportunity	TBC
L1	Perennial (man-made) urban lake	Moderate - biodiverse but several invasive species present	High – high-impact development project to start in 2025 and inflows direct from adjacent motorway	Low - inability to manage external processes	Future opportunity	TBC
L2	**Perennial (man-made) urban lake**	**Moderate - biodiverse but several invasive species present**	**High – adjacent to residential and sporting areas, inflows from L1**	**Moderate – ability to manage pollution sources from campus & implement water quality control measures**	**In-situ water quality monitoring buoy (via TracWater partnering agreement)**	**Dissolved oxygen, Conductivity, Turbidity, pH, temperature**

[2] These ratings are comparative across Griffith University sites. All sites may have higher ecological value than typical urban areas, but are categorised here to support internal prioritisation.

Table 5 – Locations and monitoring approaches for Nathan Campus. Bolded sites are sites of in-situ sensor based monitoring.

Site	*Description*	*Ecological Value [3] (relative to Griffith ecosystems)*	*Likelihood of Human Impact*	*Management Control Ability*	*Monitoring Approach*	*Parameters Measured*
N1	Ephemeral low/high flow waterway	Moderate - biodiverse but invasive species present	Moderate – erosion hazards, stormwater runoff from buildings, and periodical fire impacts	High – ability to manage erosion and pollution sources from campus	Future opportunity	Ad-hoc coursework/ academic surveys
N2	Ephemeral low/high flow waterway	Moderate - biodiverse but invasive species present	Moderate – erosion hazards, stormwater runoff from buildings, and periodical fire impacts	High – ability to manage erosion and pollution sources from campus	Future opportunity	Ad-hoc coursework/ academic surveys
N3	Ephemeral low/high flow waterway	Low – shallow and ephemeral	Moderate – erosion hazards, stormwater runoff from buildings, and periodical fire impacts	High – ability to manage erosion and pollution sources from campus	Future opportunity	Ad-hoc coursework/ academic surveys
N4	Ephemeral low/high flow waterway	Low – shallow and ephemeral	Moderate – erosion hazards, stormwater runoff from buildings, and construction impacts	High – ability to manage erosion and pollution sources from campus	Future opportunity	Ad-hoc coursework/ academic surveys
N5	**Perennial low/high flow waterway (point of discharge from campus)**	**Moderate - biodiverse but invasive species present**	**High – erosion hazards, stormwater runoff from most of campus (inc. construction areas), and periodical fire impacts**	**High – ability to manage erosion and pollution sources from campus**	**In-situ water quality monitoring multi-parameter sonde (supplied by TracWater)**	**Dissolved oxygen, Conductivity, Turbidity, pH, Water level**
N6	Perennial (man-made) wetland	Moderate - biodiverse but invasive species present	Low – some erosion hazards from Toohey Forest	Low - inability to manage externally owned land	Future opportunity	Ad-hoc coursework/ academic surveys
N7	Ephemeral low/high flow waterway	Low – shallow, eroded and ephemeral	High – erosion hazards, stormwater runoff from most of campus (inc. construction areas), and periodical fire impacts	High – ability to manage erosion and pollution sources from campus	Future opportunity	TBC

[3] These ratings are comparative across Griffith University sites. All sites may have higher ecological value than typical urban areas, but are categorised here to support internal prioritisation.

Gold Coast Campus Waterway Monitoring

Griffith University's Gold Coast campus contains a mix of perennial and ephemeral water systems. These systems are monitored to assess ecological health, track pollution risks, and support compliance with the Gold Coast Broadwater Basin Environmental Values and Water Quality Objectives.

Figure 2: Gold Coast Campus Monitoring Sites. Pink dots indicate locations where real-time in-situ water quality monitoring is being undertaken. Orange dots indicate secondary monitoring locations where supplementary data are being collected by Griffith staff and students.

Primary Monitoring Sites

The following sites have been selected for active monitoring based on ecological value, risk exposure, and suitability for sensor deployment:

G2 – Perennial Pond (in forested area)

Located in the southern forest reserve, G2 is a deep, perennial water body selected for continuous monitoring using a floating TracWater 'CBI' buoy. The buoy is equipped with multiparameter probes measuring:

- pH
- Oxidation-Reduction Potential (ORP)
- Temperature

Figure 3. Site G2. Taken from the northern side of the pond.

The chosen parameters—pH, Oxidation-Reduction Potential (ORP), and temperature—are fundamental indicators of aquatic ecosystem health, particularly in sensitive perennial water bodies. pH influences nutrient solubility and metal toxicity, which directly affects aquatic species and vegetation. ORP provides insight into the water's oxidative capacity, helping to detect contamination events and assess the system's ability to naturally break down pollutants. Temperature plays a critical role in regulating dissolved oxygen levels and biological activity, making it essential for understanding seasonal and diurnal variations in ecosystem function. Together, these parameters offer a robust baseline for tracking ecological changes and informing responsive management strategies.

TracWater has supplied this water quality monitoring buoy for Griffith University under a collaborative agreement signed between the two organisations in June 2025. It was installed in site G2 on 15 October 2025.

The buoy operates autonomously, continuously collecting water quality data and uploading it to a secure cloud-based platform 24/7. Griffith University staff will have real-time access to this data via an online portal, allowing for ongoing monitoring, analysis, and reporting. Griffith University is responsible for the ongoing calibration and maintenance of the equipment.

This partnership enhances the University's ability to proactively manage and protect waterway health, providing high-resolution data to support operational decision-making and long-term environmental research.

The site is also used by students and staff as a 'living laboratory', contributing additional biodiversity and macroinvertebrate data.

Supplementary Monitoring Sites

These sites have been identified as valuable for future or targeted monitoring, particularly for event-based surveys or specific investigations:

G1 – Perennial Pond (High Biodiversity Value)
Adjacent to G2, G1 is considered more biodiverse due to the absence of invasive species like mosquitofish. It is frequently used for teaching and research. Although unsuitable for buoy deployment due to shallow depth, G1 is ideal for manual ecological surveys and biodiversity assessments.

G3 – Ephemeral Runoff Channel (Frog's Lane)
G3 captures runoff from the eastern car park near G30 and sediment from a gravel parking area to the west. It provides insight into erosion and pollutant loading from urban infrastructure and is well-suited for targeted monitoring during storm events.

G4 – Northern Ephemeral Stormwater Outfall
G4 collects stormwater from the northern campus, including runoff from Frogs Hollow, a possible emerging natural spring, and hard surfaces across a wide catchment. It is a **key site for monitoring stormwater quality and sediment transport**, particularly after rainfall events

Figure 4. Site G4. Taken from the North-East facing the South-West after heavy rainfall

G5 – Southern Ephemeral Outfall (Deprioritised)
G5 receives runoff from the international precinct and car park, but also includes inflows from two external stormwater inlets. This external influence reduces its value for assessing Griffith-specific impacts, making it less suitable for core monitoring.

Gold Coast Water Quality Objectives and Parameters

The Gold Coast campus water bodies are classified as moderately disturbed urban lakes within the Gold Coast Broadwater Basin. Based on this classification, five key parameters are used to assess compliance with Water Quality Objectives (WQOs):

Parameter	WQO Value
Total Nitrogen (µg/L)	650
Total Phosphorus (µg/L)	60
Chlorophyll-a (µg/L)	15
Dissolved Oxygen (%)	50–95
Turbidity (NTU)	8

These values are relatively flexible due to the urban context. However, wide ranges—such as the 50–95% for dissolved oxygen—can still mask significant ecological stress. Continuous and event-based monitoring will help detect deviations from natural baselines and inform timely interventions.

Logan Campus Waterway Monitoring

Griffith University's Logan campus features a single large perennial water body—Lake Ellerslie—which is divided into two sections by an overpass. During extended dry periods, water levels drop, limiting flow between the northern and southern halves due to restricted movement through culverts beneath University Drive. Despite this, Lake Ellerslie is considered the most hydrologically stable of all monitored sites, with minimal hard-surface runoff. However, current construction activity adjacent to the southern (smaller) side of the lake to build a residential estate along the western shore may significantly alter the lake's ecological value and water quality in the coming years.

Figure 5: Logan Campus Monitoring Sites. Pink dots indicate locations where real-time in-situ water quality monitoring is being undertaken. Orange dots indicate secondary monitoring locations where supplementary data are being collected by Griffith staff and students.

Primary Monitoring Site

L2 – Southern Lake Discharge Point

The L2 site is the primary monitoring location on the Logan campus. It is situated near the lake's discharge point, in line with water quality monitoring best practice.

Figure 6. Site L2. This site lies on the Northern side of University Drive. Green colouration of the water may indicate high algal growth and potentially eutrophication, caused by elevated levels of nutrients entering the water system.

A TracWater "Mini" floating buoy has been deployed at this site to continuously measure:

- Dissolved Oxygen (% saturation)
- Conductivity
- Turbidity (NTU)
- pH
- Temperature
- Blue-green algae (fluorescence)
- Chlorophyll (fluorescence)

The parameters selected for monitoring—dissolved oxygen (% saturation), conductivity, turbidity, pH, temperature, blue-green algae (fluorescence), and chlorophyll (fluorescence)—provide a comprehensive picture of water quality and ecosystem dynamics.

Dissolved oxygen is critical for aquatic life and reflects the lake's capacity to support biodiversity. Conductivity indicates the presence of dissolved salts and pollutants, often linked to urban runoff. Turbidity measures water clarity, which affects light penetration and photosynthesis. pH and temperature influence chemical reactions and biological activity, including nutrient cycling and species viability.

Fluorescence-based detection of blue-green algae and chlorophyll helps identify algal blooms and primary productivity, which are key indicators of eutrophication risk and ecological health in artificial water bodies subject to external nutrient inputs.

TracWater has supplied this water quality monitoring buoy for Griffith University under a collaborative agreement signed between the two organisations in June 2025. It was installed in site L2 on 21 October 2025.

Data is uploaded in real time to a secure cloud platform, enabling continuous access for staff and researchers.

Supplementary Monitoring Site

L1 – Northern Lake Inlet (Motorway and Construction Runoff)
The L1 site, located at the northern end of Lake Ellerslie, receives runoff from several high-risk sources:

- Nutrient-rich runoff from the adjacent golf course and university sports field
- Organic chemical pollution from the Logan Motorway, which borders the southern edge of the lake
- Diffuse and point-source pollution from the neighbouring suburb of Meadowbrook, whose stormwater system contributes to the upstream catchment

French drains from the motorway discharge directly into the lake at its southernmost point, introducing potential contaminants such as hydrocarbons, metals, and nutrients. While L1 is not currently monitored under the TracWater program, it remains a valuable candidate for future targeted investigations, particularly to assess the influence of external pollution sources. However, due to the complexity of these inputs, it is less suitable for assessing Griffith-specific impacts compared to L2.

Logan Water Quality Objectives
The Logan campus falls within the Logan River Basin, and its water bodies are classified as moderately disturbed urban lakes. According to the Logan River Basin Environmental Values and Water Quality Objectives (Government, 2022), five key parameters are applicable:

Parameter	WQO Value
Total Nitrogen (µg/L)	650
Total Phosphorus (µg/L)	60
Chlorophyll-a (µg/L)	15
Dissolved Oxygen (%)	50–95
Turbidity (NTU)	8

These values are relatively flexible due to the urban context. However, broad ranges—such as the 50–95% for dissolved oxygen—can still mask significant ecological stress. Continuous monitoring helps detect deviations from natural baselines and supports early intervention.

Currently, dissolved oxygen and turbidity are monitored continuously via the TracWater buoy at L2. In addition, chlorophyll-a is being assessed in 2025 by PhD student Jas Singh, who is using drone-based remote sensing to detect algal activity and nutrient enrichment across the lake.

Brisbane South (Nathan) Campus Waterway Monitoring

The Brisbane South (Nathan) campus is characterised by a network of ephemeral waterways, with Mimosa Creek being the most prominent. These systems are prone to drying out, making them challenging for establishing consistent ecological baselines. However, several deeper pools within Mimosa Creek are likely to retain water year-round, offering opportunities for targeted monitoring.

Due to campus construction and development at the time of publication, the risk of diffuse sediment and pollutant runoff during rainfall events is elevated. Episodic flows can introduce elevated levels of metals, nutrients, suspended solids, and chlorine, the latter of which has been detected in past pollution events from upstream sources.

Runoff from the Nathan campus is split:

- Northern runoff flows east into Mimosa Creek.
- Southern runoff flows west into a stormwater drain in the Oxley Creek Catchment.

Figure 7: Brisbane South (Nathan) Campus Monitoring Sites. Pink dots indicate locations where real-time in-situ water quality monitoring is being undertaken. Orange dots indicate secondary monitoring locations where supplementary data are being collected by Griffith staff and students.

Primary Monitoring Site

N5 – Perennial Pool on Mimosa Creek (Northern Discharge Point)
Located near the campus boundary, N5 collects runoff from the northern half of the campus, including areas under active construction. It is a perennial pool likely to retain water year-round and has been selected as the primary monitoring site.

A TracWater-situ water quality monitoring multi-parameter sonde is deployed at N5 to continuously measure:

- Dissolved Oxygen (% saturation)
- Conductivity
- Turbidity (NTU)
- pH
- Water level

The monitoring parameters at site N5—dissolved oxygen (% saturation), conductivity, turbidity, pH, and water level—have been selected to capture the impacts of urban runoff and construction-related disturbance on this perennial water body.

Dissolved oxygen is a key indicator of aquatic health and biological viability. Conductivity reflects the presence of dissolved salts and potential pollutants, often elevated in runoff from developed areas. Turbidity measures sediment and particulate matter, which can increase due to erosion and construction activity. pH influences chemical stability and biological function, while water level monitoring helps track hydrological changes and assess the site's capacity to retain water year-round.

Together, these parameters support early detection of water quality issues and inform responsive management in a high-risk catchment zone.

This site provides critical data on the cumulative impact of campus activities on downstream water quality and supports Griffith's 2030 sustainability targets.

Figure 8. Site N5 Taken from South Facing North

Supplementary and Future Monitoring Sites

Several additional sites have been identified for future or targeted monitoring to provide a more complete picture of campus impacts. These sites may be used for event-based surveys, coursework, or targeted investigations, depending on available resources and emerging risks.

Site	Description	Monitoring Value	Notes
N1	Ephemeral upstream site	High	Ideal for measuring water quality before interacting with the campus. Pairs well with N5 to assess Griffith's net impact.
N2	Ephemeral mid-campus site	Moderate	Reflects runoff from buildings and fire-affected areas.
N3	Shallow ephemeral site	Low	Less suitable due to limited water retention.
N4	Ephemeral site near construction	High	Valuable for monitoring impacts from demolition and construction.
N6	Perennial man-made wetland (Yarning Circle)	Low	Altered site with limited management control; less suitable for monitoring.
N7	Southern ephemeral runoff site	High	Captures runoff from the southern campus; potential future monitoring location.

Nathan Water Quality Objectives

Nathan campus waterways fall within the Brisbane River Estuary Basin, with Mimosa Creek classified as a moderately disturbed lowland stream. Water quality objectives (WQOs) vary depending on flow conditions:

Parameter	WQO Value Low-Flow Conditions (Typical)	WQO Value High-Flow Conditions (Rain Events)
Ammonia (µg/L)	11	8
Oxidised Nitrogen (µg/L)	16	75
Total Nitrogen (µg/L)	330	560
Filterable Reactive Phosphorus (µg/L)	7	11
Total Phosphorus (µg/L)	25	40
Chlorophyll-a (µg/L)	1	1
Dissolved Oxygen (%)	85–110	85–110
Turbidity (NTU)	3	13
Total Suspended Solids (mg/L)	3	5
pH	6.5–8.0	6.5–8.0
Conductivity (µS/cm)	490	250

Currently, turbidity, dissolved oxygen, conductivity, and pH are monitored at N5 using the TracWater device. Chlorophyll-a and other parameters may be added through coursework or research projects as capacity allows.

Data Access and Use

Access to Water Quality Monitoring Data

Griffith University's waterway monitoring program utilises real-time and event-based data collected from a network of TracWater sensors and supplementary manual surveys across Gold Coast, Logan, and Nathan campuses. Access to these data is provided to Griffith staff, students, and approved external collaborators to support research, teaching, operational management, and community engagement.

Data Portal Access:
Authorised users can access real-time and historical water quality data via the TracWater online portals:

- Desktop portal: https://griffithuni-portal.infoasaservice.net.au
- Mobile portal: https://griffithuni-mobile.infoasaservice.net.au
- Maintenance portal: https://griffithuni-maintenance.infoasaservice.net.au

All users are required to set a secure, unique password upon first login and are responsible for maintaining the confidentiality of their credentials. Access is managed by the Environmental Manager (Strategy, Policy & Planning) and the Deputy Head of School (Research), School of Environment and Science, Griffith University.

Griffith Waterway Monitoring Teams Group

The Griffith Waterway Monitoring Teams group serves as the central digital platform for connecting staff, students, and collaborators involved in waterway monitoring across the University. This Teams group is used to store, organise, and share information and data relevant to the program. Each month, Griffith Sustainability downloads data spreadsheets from the TracWater portal and uploads them to the Teams group, ensuring equal access to water quality data for the Griffith environmental management, research, and teaching community.

The Teams group also provides a repository for staff-collected data from supplementary and secondary monitoring sites, supporting both teaching and research activities. In addition, it contains files and outputs from Work Integrated Learning (WIL) projects related to waterway monitoring, fostering collaboration and knowledge sharing across the University.

Data Use Guidelines

The water quality data collected through this program is a valuable resource for the Griffith academic community, operational staff, and external partners such as the Queensland Department of Education and local schools. To ensure responsible and effective use of these data, the following guidelines apply:

- **Purpose of Use**: Data may be used for research, teaching, operational management, and community engagement activities that align with Griffith University's Sustainability Strategy and Integrated Water Management Plan.

- **Data Sharing**: Data may be shared with internal and external stakeholders for collaborative projects, provided that appropriate attribution is given and data privacy is maintained.
- **Attribution**: Any publications, presentations, or reports utilising these data must acknowledge Griffith University and the TracWater partnership.
- **Data Integrity**: Users must not manipulate or misrepresent data. Any issues or anomalies identified in the data should be reported to the Environmental Manager for investigation.
- **Privacy and Security**: User credentials must not be shared. All users are expected to comply with Griffith University's IT security and privacy policies.
- **Community and Educational Use**: The data is available for use in educational programs, including school visits and community outreach, to promote environmental awareness and stewardship.

Potential Future Monitoring Activities

If further analysis or expanded monitoring is required, the following practices could be integrated into Griffith University's mixed-methods approach across the Gold Coast, Logan, and Nathan campuses. These methods would enhance the University's capacity to detect, understand, and respond to emerging environmental risks.

Gold Coast Campus

Future monitoring at the Gold Coast campus could focus on identifying environmental stressors through land use analysis, ecological indicators, and targeted water quality assessments—without relying heavily on laboratory-based sampling.

Sediment and Stormwater Monitoring

- Rising Stage Samplers (RSS) could be installed at Sites G3 and G5 to capture stormwater during flow events and assess sediment deposition patterns.
    - At G5, the RSS could be positioned to isolate runoff originating solely from Griffith property.
- Physicochemical monitoring (e.g. pH, turbidity, dissolved oxygen, nutrients, and metals) may be conducted during site visits to assess water quality trends.

Environmental DNA (eDNA) Sampling

- Timing: eDNA sampling would ideally occur at the start of the monitoring program under stable weather conditions. Sampling should avoid periods immediately following heavy rainfall to prevent dilution of DNA traces.
- Purpose: eDNA analysis could provide a snapshot of species richness and biodiversity across all sites.
- Integration: Where possible, eDNA sampling could be aligned with macroinvertebrate surveys conducted through coursework to enhance data quality and cross-validation.

Logan Campus

Future monitoring at Logan campus could focus on assessing the impacts of adjacent land uses, particularly the Logan Motorway and nearby sports fields.

Stormwater and Organic Pollutant Monitoring

- RSS units could be installed at southern locations to capture stormwater pulses and compare pollutant loads from the motorway versus university activities.
- Chemical Oxygen Demand (COD) testing could be used at Site L1 to assess general organic pollutant loads.
- If elevated COD levels are detected, Gas Chromatography-Mass Spectrometry (GC-MS) could be used for targeted detection of BTEX compounds (e.g. benzene, toluene).

eDNA Sampling

- eDNA analysis could be used to:
  - Generate a Threatened Indicator Community Index (TICI) rating.
  - Produce a species list of aquatic organisms.
- While eDNA would provide biodiversity insights, population density estimates would not be possible without macroinvertebrate data.

Brisbane South (Nathan) Campus

At Nathan campus, future monitoring could focus on the impacts of campus development and construction on ephemeral waterways like Mimosa Creek.

Sediment and Flow Monitoring

- RSS units could be installed at Sites N1 and N2 to capture pollutant loads during storm events.
  - The RSS at N1 would target upstream natural inputs.
  - The RSS at N2 would capture runoff from construction-affected areas (e.g. near N4).

eDNA and Macroinvertebrate Surveys

- eDNA sampling could be conducted early in the program, ideally in coordination with macroinvertebrate surveys by the EcoCentre or Rivers and Catchments coursework.
- This combined approach would provide both species identification and population density estimates, enhancing ecological assessments.

Flow Monitoring

- Weekly measurements of water level and flow rate could be taken to develop a hydrological profile of Mimosa Creek.
  - High-flow periods may correspond with pollutant spikes.
  - Low-flow periods may indicate chronic, low-level exposures.

Anticipated Outcomes

- Identify erosion sources linked to disturbed surfaces.
- Pinpoint impervious areas contributing to runoff.
- Distinguish between localised construction impacts and broader catchment influences.

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