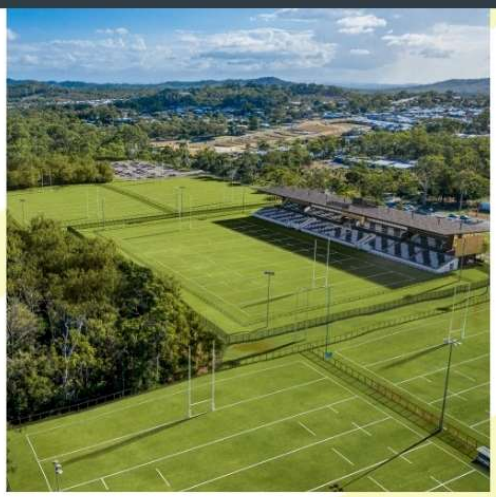
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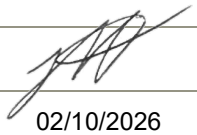


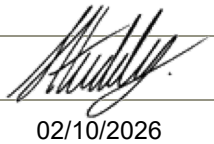
114 & 122-136 Binnies Road / 1-63 Bryants Road & 101 Jackson Court / 128-146 Bryants Road, Ripley

Total Water Cycle Management Overarching Site Strategy

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Executive Summary

KDL Property Group Pty Ltd engaged Burchills Engineering Solutions to prepare a Total Water Cycle Management Overarching Site Strategy (TWCM OSS) in response to Ipswich City Council's Request for Information for application 11092/2026/PDA. The strategy addresses the proposed residential development at Binnies Road and neighbouring KDL land holdings at Jackson Court and Bryants Road within the Ripley Valley Priority Development Area. It establishes water cycle management objectives, performance targets and implementation requirements to guide development planning and detailed design.

The TWCM OSS was prepared with consideration of Council's Integrated Water Strategy 2015–2031 and its objectives for community resilience and liveability, efficient resource use, protection of the natural environment, and communication and collaboration. The proposed strategy integrates stormwater, flooding, waterways, groundwater and soils, and water and wastewater servicing across the three subject Sites, which drain to the Deebing Creek and Bundamba Creek systems.

Stormwater Quantity
Stormwater quantity management will target post-development peak discharge no greater than pre-development peak discharge at the lawful points of discharge. Detention infrastructure may comprise offline basins or online measures, subject to site-specific constraints and assessment.

Stormwater Quality
Stormwater quality treatment will comprise bioretention basins or underground proprietary devices, targeting pollutant load reductions of 80% for total suspended solids, 60% for total phosphorus, 45% for total nitrogen and 90% for gross pollutants. Saturated zone bioretention systems will contribute to urban cooling and support vegetation resilience during drought.

Waterways
Waterway management will prioritise retention and rehabilitation of natural or stable reaches, with reconstruction considered for substantially modified or degraded areas. Proposed treatments will integrate drainage conveyance, erosion control, water quality, riparian habitat, fish passage where applicable, and landscape amenity. Vegetated corridors and infill planting will contribute to urban cooling.

Flooding
Flood management objectives include no loss of floodplain storage and no material worsening of flood risk or hazard external to the Sites. Hydraulic assessment will inform development layouts and mitigation requirements. Proposed dwellings are to be located a minimum of 0.5 m above the 1% AEP design flood level and above the 1% AEP climate change flood level at 2100. Major overland flow paths will be retained to safely convey catchment runoff, with any development encroachment subject to detailed assessment.

Soils
Mapped Sodosols indicate a potential risk of dispersive soils and low-permeability subsoils. Geotechnical investigations will confirm soil and groundwater conditions and inform site-specific management plans where required.

Water and Waste Water
Potable water and wastewater services will be provided through reticulated networks designed in accordance with Urban Utilities requirements and the SEQ Water Supply and Sewerage Design and Construction Code. Alternative water supplies, recycled water and stormwater harvesting are not proposed, having regard to development scale and available infrastructure.

Implementation

Implementation will occur through supporting stormwater, hydraulic, waterway, geotechnical and servicing documentation submitted at the relevant planning and pre-construction stages. Detailed design will consider maintenance requirements, opportunities to consolidate infrastructure and coordination with relevant authorities and adjoining developments. Monitoring requirements will be addressed through the pre-construction submissions. This TWCM OSS provides the overarching framework, with achievement of the nominated performance targets to be demonstrated through the subsequent site-specific assessments and management plans.

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1. Introduction

KDL Property Group Pty Ltd engaged Burchills Engineering Solutions to prepare a Total Water Cycle Management Overarching Site Strategy (TWCM OSS) in support of a Development Application (DA) Request for Information (RFI) response. The TWCM OSS was requested by Ipswich City Council (the EDQ Delegate for the Ripley PDA) in Item 1 of the RFI (app ref. 11092/2026/PDA) dated 12 August 2026 over the application associated with 114 & 122-136 Binnies Road, Ripley. The subject application seeks a Development Permit for Reconfiguring a Lot to facilitate a residential subdivision comprising residential lots, associated roads, open space, drainage reserves, utility infrastructure and land identified for future medium density residential development. This TWCM OSS was extended to consider neighbouring KDL land holdings and as such covers all of the following addresses:

- 114 & 122-136 Binnies Road, Ripley
- 1–63 Bryants Road & 101 Jackson Court, Ripley
- 128-146 Bryants Road, Ripley

1.1 Background

1.1.1 Policy and Legislative Context

The strategies proposed in this TWCM OSS were developed to address the objectives outlined in the *Integrated Water Strategy 2015-2031* prepared by Ipswich City Council. The proposed strategies were prepared in alignment with the requirements of the Ipswich City Plan 2025 and the following relevant guidelines:

- State Planning Policy (DILGP, 2017)*;*
- Queensland Urban Drainage Manual (QUDM) Fourth Edition (IPWEAQ, 2017);
- Australian Rainfall & Runoff: A Guide to Flood Estimation Version 4.2 (Ball J, 2016);
- MUSIC Modelling Guidelines (Water by Design, 2019), and
- Best Practice Erosion and Sediment Control (IECA, 2016).

1.2 Purpose and Scope

The main objectives of this TWCM were established based on the strategic framework outlined in the ICC Integrated Water Strategy. The framework identifies several strategic objectives which are listed below:

- Strategic Objective 1: Community resilience and liveability
- Strategic Objective 2: Economic development and efficient resource use.
- Strategic Objective 3: Protection and enhancement of the natural environment.
- Strategic Objective 4: Communication and collaboration.

The strategic objectives are satisfied through addressing a range of water management pressures and challenges in Ipswich which are also defined in the Integrated Water Strategy, the items that are relevant to this TWCM OSS are listed below:

- Floodplain management and risk
- Drought resilience
- Stormwater quality management
- Stormwater infrastructure planning
- Erosion, sediment and dispersive soils
- Climate change and urban heat island impacts

This TWCM OSS will specify how these water management challenges will be addressed to meet the requirements of the ICC Integrated Water Strategy.

1.3 Stakeholders

Key stakeholders of the management plan and their roles and responsibilities are listed below:

- Ipswich City Council (MEDQ Delegate): Review and approval of this management plan.
- KDL (Development Proponent): Planning, design and construction of the development.
- SEQ Water: Regional authority supplying bulk water to Ipswich.
- Urban Utilities: Entity to provide reticulated water and wastewater services to the developments.
- Department of Primary Industries: State authority responsible for management of waterways and catchments.
- Department of Regional Development, Manufacturing and Water: State authority responsible for water resources.

2. Site Detail

2.1 Location

The investigation areas under this report are comprised of three separate sites:

- **Site 1:** 114 & 122-136 Binnies Road, Ripley (Lot 356 on S3173 & Lot 2 on SP114885).
- **Site 2:** 1-63 Bryants Road & 101 Jackson Court, Ripley (Lot 359 & Lot 360 on S3173).
- **Site 3:** 128-146 Bryants Road (Lot 361 on S3173)

The proposed development Sites are located within the Ripley Valley Priority Development Area (PDA). Site 1 will hereby be referred to as the Binnies Road project site, Site 2 will be hereby referred to as the Jackson Court project site, and Site 3 will be referred to as the Bryants Road project site.

The Binnies Road Site occupies a total area of approximately 17.07 ha and is bounded by Binnies Road to the north, Bryants Road to the south, and freehold land to the east and west.

The Jackson Court Site occupies a total combined lot area of approximately 37.39 ha and is bounded by Jackson Court to the north, Wensley Road to the east, Bryants Road to the south and freehold land to the west.

The Bryants Road Site occupies a total area of approximately 12.14 ha and is bounded by Bryants Road to the north, Centenary Highway to the south, and freehold land to the east and west.

Figure 2.1 below identifies the locations of the subject sites.



Figure 2.1 Site Locality Map

2.2 Existing Land Uses and Topography

2.2.1 Binnies Road

Existing surface levels vary between approximately 54 mAHD and 72 mAHD. The Site generally falls from east to west, with a small portion of the Site falling eastward due to a natural ridgeline bisecting the parcels. The western catchment forms part of the Deebing Creek catchment, whilst the eastern catchment forms part of the Bundamba Creek catchment.

The existing Site contours are shown below in Figure 2.2.

The Site is comprised of a combination of cleared corridors (electricity transmission easements) and medium density vegetation cover. Existing dwellings and access tracks are observed across the Site and are anticipated to be removed as part of future development works.

Upstream catchments are discharged to and conveyed through the Site via informal overland flow paths.

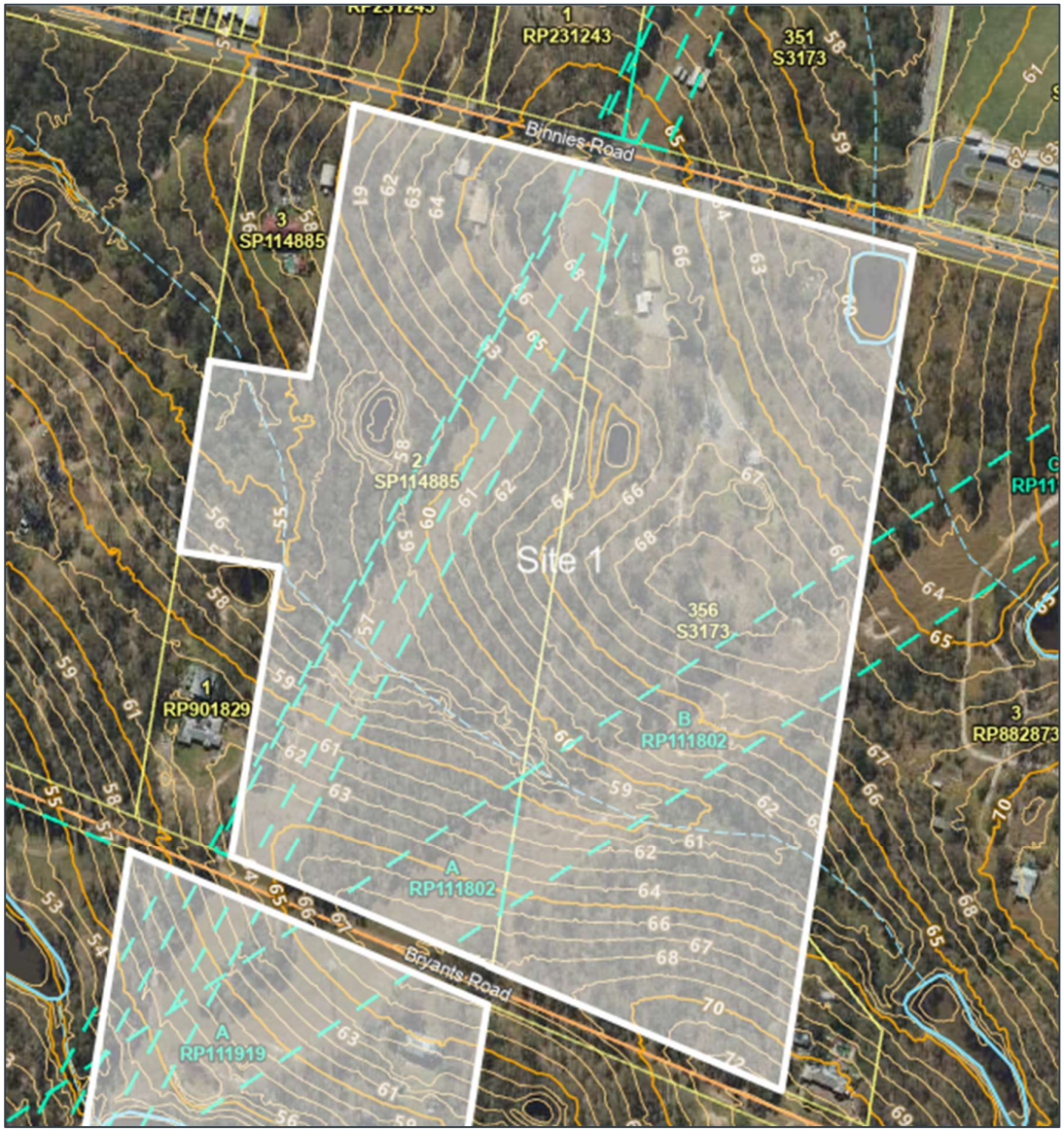


Figure 2.2 Binnies Road Site Topography

2.2.2 Jackson Court

Existing surface levels vary between approximately 61 mAHD and 96 mAHD. The land is characterised by undulating to steep terrain, with several ridgelines, drainage gullies and established vegetation covering the Site. There are several existing dwellings and access tracks within the land parcels that will be removed as part of future development works.

The existing Site contours are shown below in Figure 2.3.

The Site is situated at the top of the catchment and is encumbered only by a minor external catchment along the western boundary which discharges as sheet flow.

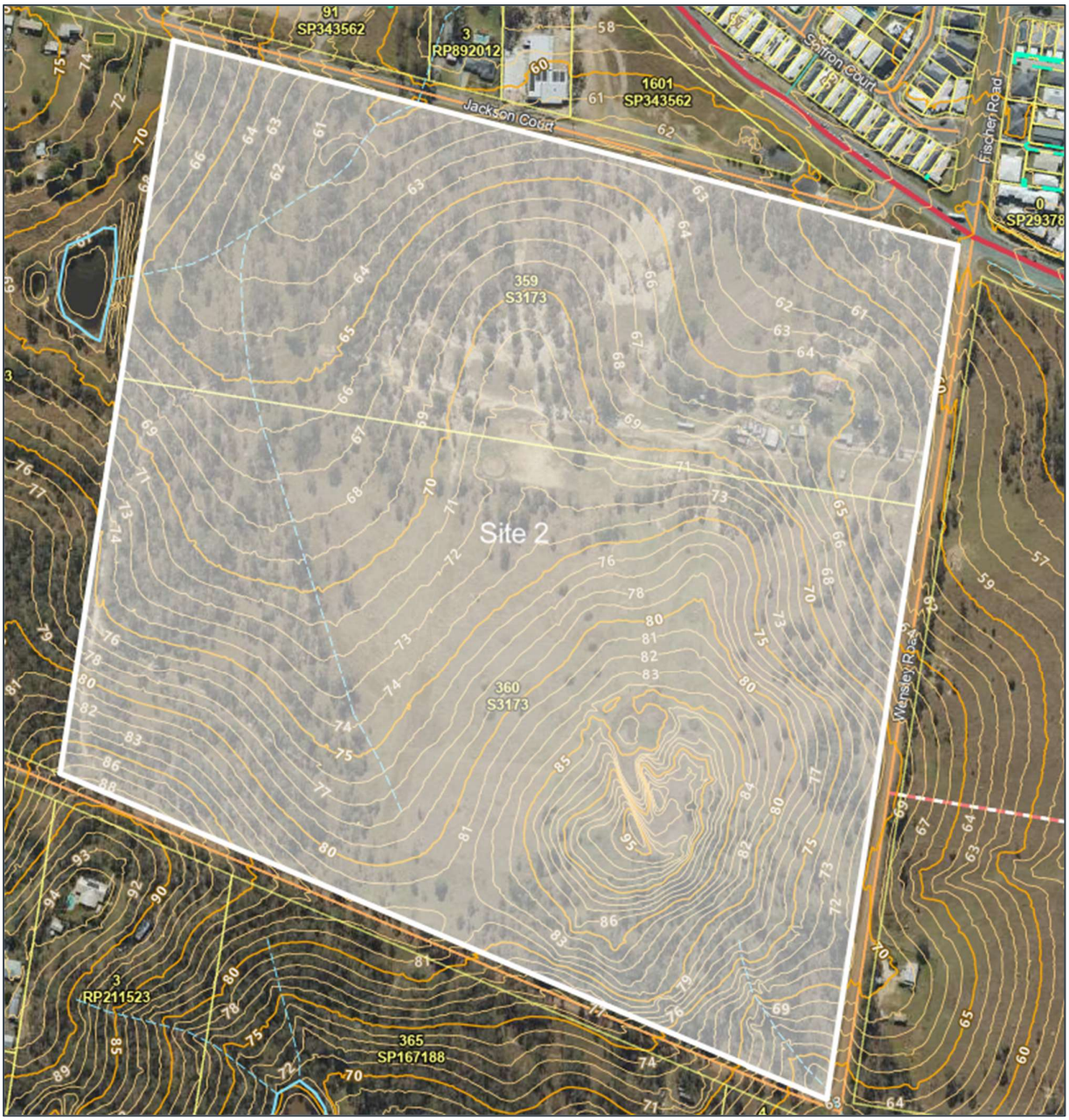


Figure 2.3 Jackson Court Site Topography

2.2.3 Bryants Road

The existing surface levels vary between approximately 51 mAHD to 74 mAHD. Local terrain generally falls towards the north with a small portion of the Site at the Bryants Road frontage falling back towards the South.

The existing Site contours are shown below in Figure 2.4.

The eastern neighbouring land parcel discharges runoff to the Site which is conveyed via an informal overland flow path. There are several manmade waterbodies and other manipulations along this flow path, with discharge from the Site occurring at the western Site boundary which forms part of the Deebing Creek catchment.

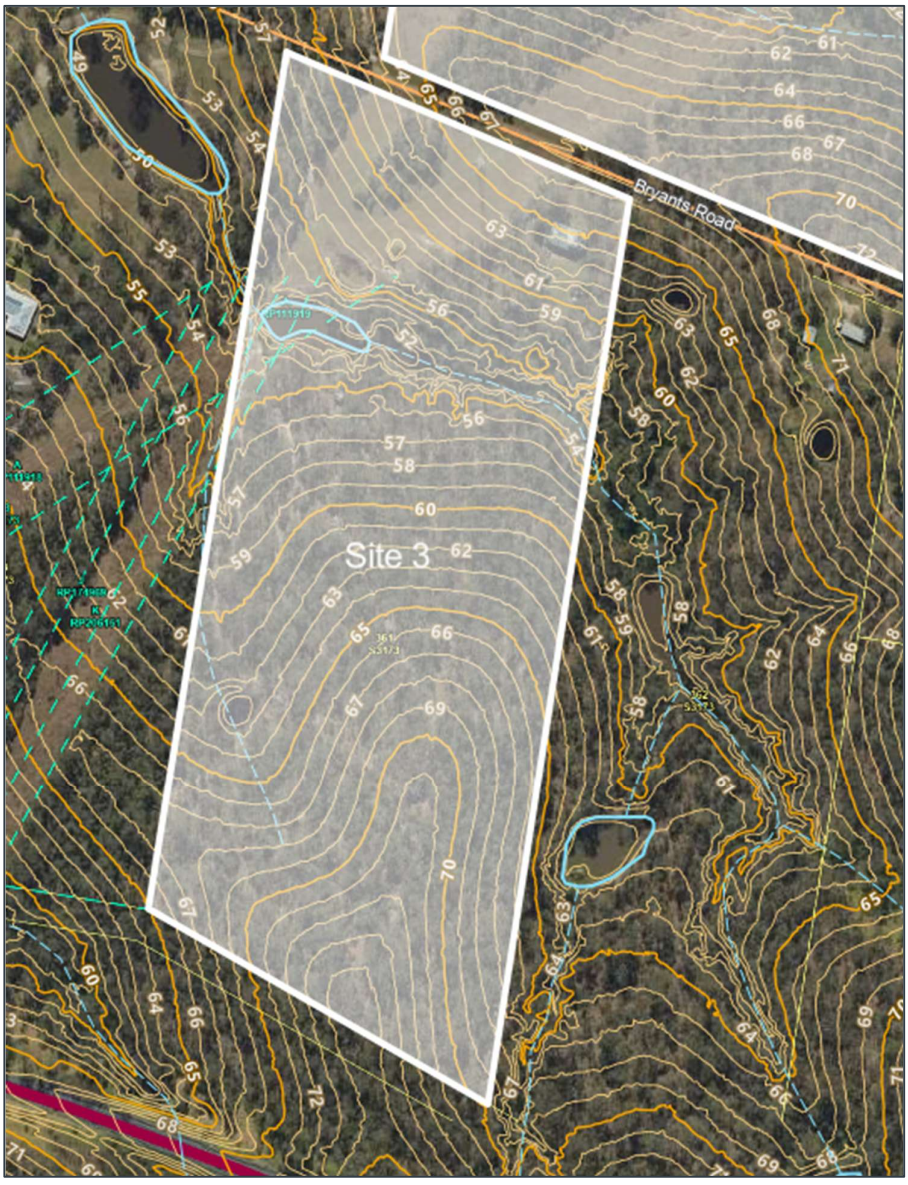


Figure 2.4 Bryants Road Site Topography

2.3 Downstream Environment

2.3.1 Binnies Road

Discharge from the Site occurs at Binnies Road along the northern frontage and in the overland flow path along the western land parcel boundary.

The environment downstream of the western boundary is predominantly densely retained vegetation, with some urban development along the fringes of the floodplain. There is an observable shift in urban density downstream of Cunningham Highway with development up to what is assumed to be the riparian corridor buffers. The first land parcel downstream of the western boundary is undeveloped and consists of natural vegetation with some residential dwellings. Catchment runoff forms part of Deebing Creek.

The environment downstream of Binnies Road is predominantly urbanised, with runoff contained within constructed channels where urbanisation has occurred. The first land parcel immediately downstream of Binnies Road is undeveloped and consists of natural vegetation and some built form structures. The catchment ultimately discharges into Bundamba Creek.

The downstream environment is shown below in Figure 2.5.



Figure 2.5 Downstream Environment

2.3.2 Jackson Court

Discharge from the Site occurs at several locations along Jackson Court along the northern frontage Wensley Road along the eastern frontage.

Discharge along the northern boundary is directed into a series of constructed channels and culvert crossings (Ripley Road and Fischer Road) through the Ripley Valley masterplan development. The receiving environment downstream of the Ripley Valley development is retained natural vegetation until runoff discharges into Bundamba Creek.

The environment downstream of the Wensley Road discharge locations is initially a well-cleared land parcel consisting of sparse vegetation and grass. Runoff then enters what is observed to be retained natural channels spaced between several culvert crossings, until runoff is discharged into Bundamba Creek.

2.3.3 Bryants Road

Discharge from the Site occurs along the western boundary which is ultimately received by the same downstream environment as the Binnies Road western boundary. The first land parcel downstream consists of natural vegetation and tree cover with some residential dwellings.

2.4 Rainfall

The mean annual rainfall for the Site area estimated at 949 mm from the data set obtained from the nearest Bureau of Meteorology (BOM) station number 40873 at the Bundamba School Alert, Queensland.

2.5 Soils

The proposed development Sites are covered solely by Sodosols as categorised under the Australian soils classification, this is shown below in Figure 2.6



Figure 2.6 Australian Soil Classification Mapping (sourced from QGlobe)

Sodosols have a high likelihood of displaying dispersive properties which is consistent with the general understanding of sub-soils soils in the Ripley Valley. It is recommended that a geotechnical investigation is undertaken prior to construction to verify the presence of dispersive soil material. Based on information from Queensland Globe, the soil over the 3 sites is described as “sodosol” under the “Australian soil classification” layer.

Sodosols can often contain two primary soil horizons, with the underlying Horizon B layer consisting of clay-rich material which typically exhibits low saturated permeability. This can result in unwanted ponding and storage of water if not appropriately considered in design. A geotechnical investigation should be undertaken to verify substrate materials and properties.

2.6 Vegetation

The proposed development Sites are covered by several different classifications of vegetation, these are:

- Category X: Exempt clearing works on freehold land
- Category C: High-value regrowth vegetation
- Category B: Remnant vegetation

The spatial distribution of the state-wide RVM mapping is shown below in Figure **2.7**. This shows that majority of the Sites are covered either by Category X or Category C vegetation, with some Category B vegetation observed in the southern portions of the Binnies Road and Bryants Road developments.

There are no requirements for vegetation offsets based on the sourced mapping.

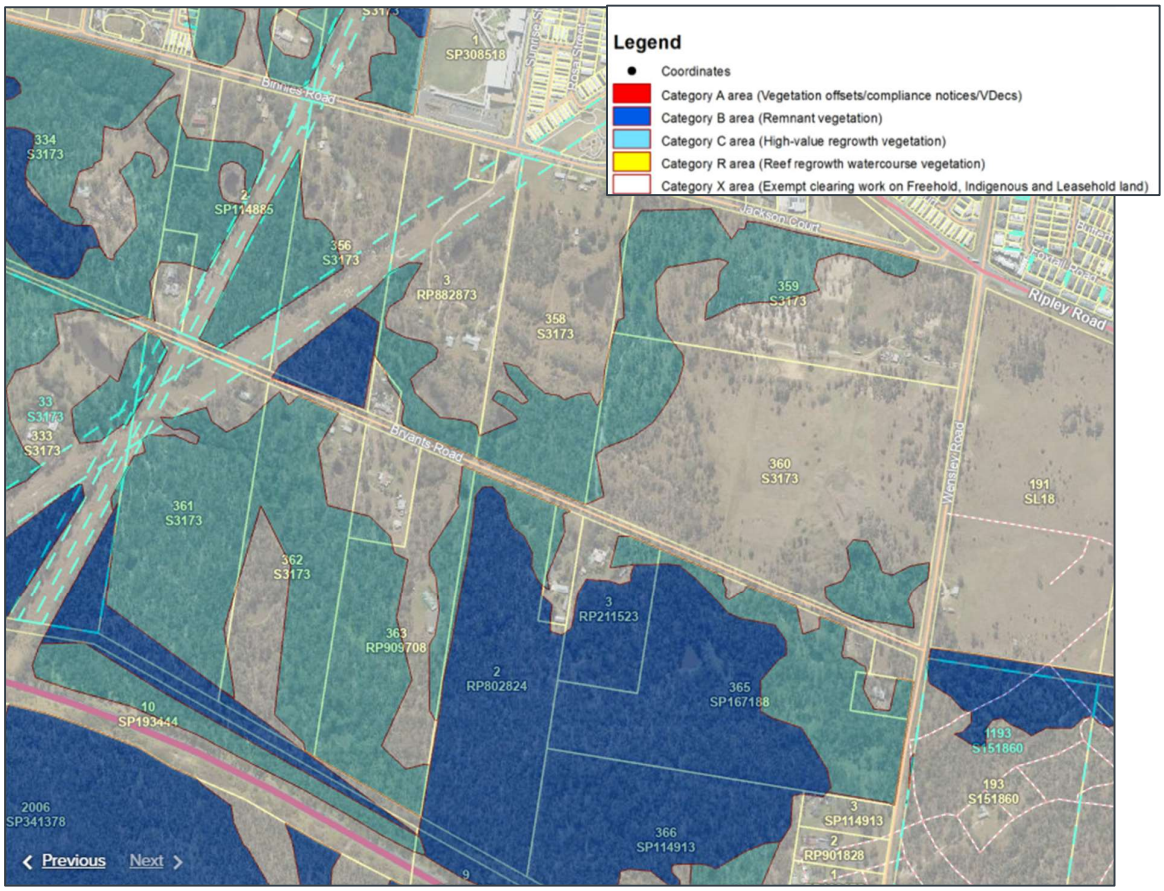


Figure 2.7 **RVM Mapping (Sourced from QGlobe)**

2.7 Waterways

Based on information from Queensland Globe available at the time of writing, mapped watercourses within the three sites are as per the below. State mapping shows a mixture of Stream order 1 and Stream order 0 watercourses, typical of the Sites' locality so close to the top of the relevant catchments.

On-ground validation of mapped watercourses included pre-lodgement advice sought from SARA as to if all works in these watercourses would be considered waterway barrier works. Where SARA does not consider a watercourse to be applicable for waterway barrier works (due to lack of defined bed and banks, a catchment suitable to sustain frequent hydraulic flow or fish habitat) it provides support to the conclusion that these watercourses constitute an "overland flow path" rather than a "waterway" for the purpose of the developments.

Pre-lodgement references:

- Binnies Road (2606-52705 SPL, 15th June 2026)
- Jackson Court (2607-53404 SPL, 28th August 2026)
- Bryants Road (2608-53937 SPL, 7th September 2026)

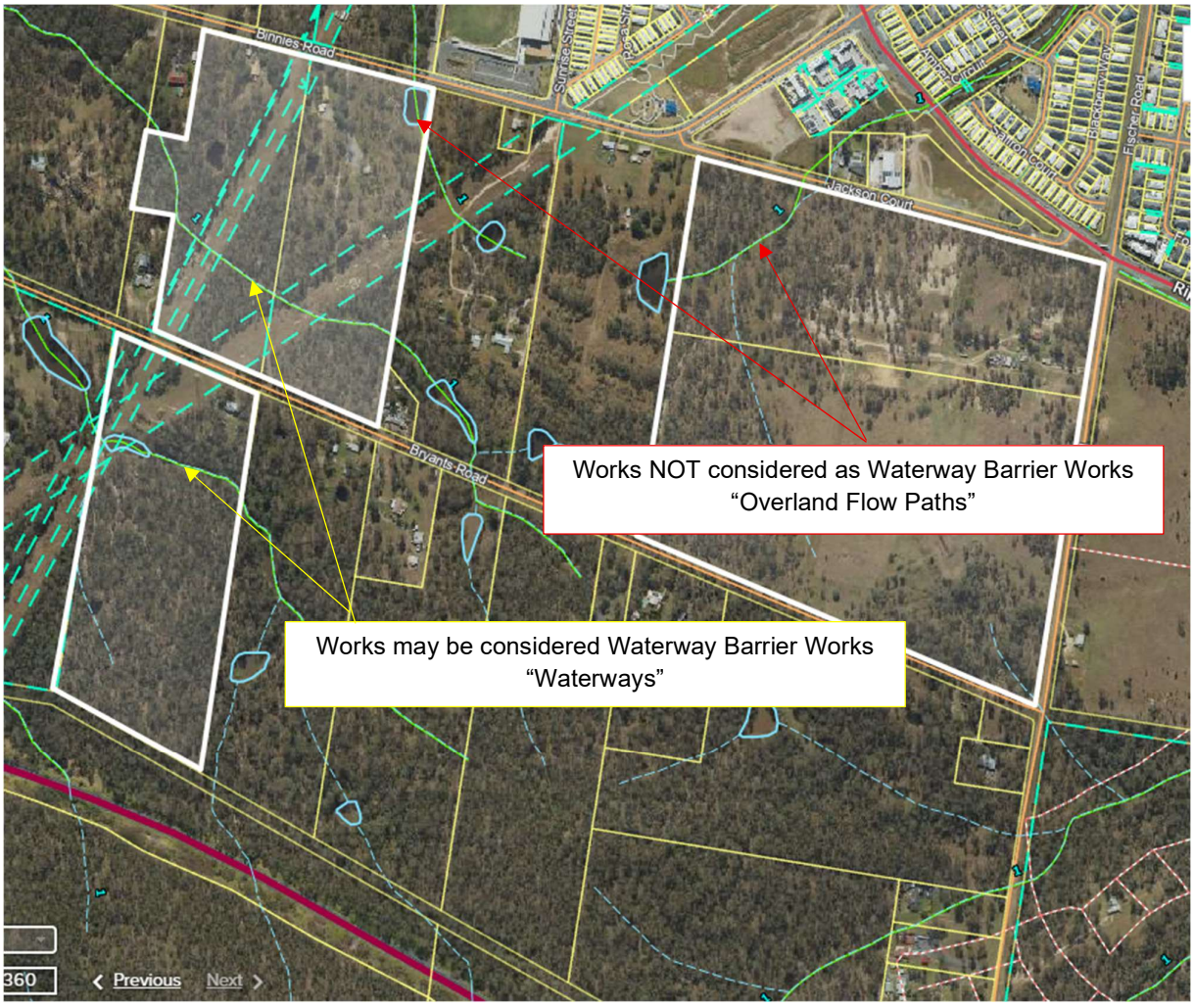


Figure 2.8 State Watercourse Mapping

3. Management Strategy

The proposed water cycle management strategy for the subject Sites consists of the following:

- Objectives: developed based on the ICC Integrated Water Cycle Strategy framework.
- Performance Targets: quantifiable metrics that directly link and demonstrate achievement of the objectives outlined in the management plan.

3.1 Management Objectives

The management objectives and performance targets of this TWCM OSS are described in Table 3.1 below.

Table 3.1 Total Water Cycle Management Objectives

Element	Objective	Performance Target
Stormwater	> Stormwater quality treatment of new urban areas. > Mitigation of stormwater runoff of new urban areas.	> Achieve the following pollutant load-based reduction targets prior to discharge to the receiving waterway. o Total suspended solids: 80% o Total phosphorus: 60% o Total nitrogen: 45% o Gross pollutants: 90% > Removal of 80% of sediment from runoff prior to discharge to the receiving waterway. > Mitigation of peak flows at the lawful point of discharge such that post-development discharge does not exceed pre-development discharge.
Flooding	> No loss of floodplain storage. > No increase to flood risk or hazard for people and the environment external to the Site. > Management of flood risk within the Site.	> No increase to flood hazard or flood risk in areas external so the Site, unless it can be demonstrated that it does not pose any material worsening of flood conditions. > Flood risk managed in accordance with QUDM and ARR guidelines. > All proposed dwellings to be located a minimum of 0.5 m above the 1% AEP design flood event, and located above the 1% AEP climate change at 2100 sensitivity flood event.
Waterways	> Conservation and management of overland flow paths and waterways, riparian corridors, hydraulic, geomorphic, environmental and ecological values, as well as fish-passage where applicable. > Minimise risk of scour and erosion within waterways.	> Ground truthing and assessment of the attributes of higher stream order mapped features to validate significance and value as a waterway or as an overland flow path; > Retention and rehabilitation of existing waterways (typically higher order mapped features) where existing condition is considered good/stable and minimisation of disturbance including optimisation of pipe outlets or overbank flow points within riparian corridors. > Reconstruction of existing waterways (where existing condition is considered poor and the extent of rehabilitation works are not practicable).
Groundwater and Soils	> Minimise impact to existing groundwater flow regimes.	> Geotechnical investigation to be completed to inform dispersive soils risk and presence of any groundwater profiles. > Preparation of site-specific dispersive soils and/or groundwater management plans, where required by the findings of the geotechnical investigation.

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Water and Wastewater	> Provision of infrastructure to minimum levels of service.	> Provide water and wastewater infrastructure in accordance with Urban Utilities requirements and the current SEQ Water Supply and Sewerage Design and Construction Code.

4. ICC Integrated Water Cycle Strategy

The proposed developments at Binnies Road, Bryants Road and Jackson Court were prepared with consideration of the ICC Integrated Water Cycle Strategy framework. Table 4.1 below provides a summary of how the proposed development Sites contribute to the management of the total water cycle.

Table 4.1 Integrated Water Strategy Contributions

Strategic Objective	Proposed Development Contribution to TWCM
Community Resilience and Liveability	
Improve the understanding of flood risks and manage and communicate them appropriately to minimise these risks to the community.	> Appropriate signage at areas at risk of flooding will be provided.
Consider environmental and social impacts of flood mitigation options.	> Detention basin design will carefully consider impacts to riparian vegetation in the sizing and specification of pipe outlets. Pipe outlet velocities will be minimised where possible to reduce hard-engineered outcomes within the waterway. > Infill planting within the waterways will be provided to enhance the existing natural environment. This provides both a social (visual amenity) and environmental benefit.
Support effective floodplain management to ensure community safety and resilience.	> Existing major overland flow paths will be retained to provide safe and effective conveyance of catchment runoff and flood flows. Detailed analysis of any encroachment of development into the waterways will be undertaken to verify the safety and resilience of the community is maintained. > All proposed dwellings will be located above the 1% AEP climate change flood event at 2100. > Flood mitigation infrastructure will be provided to ensure no material worsening of flood conditions or increased flood hazard external to the Site will result from the proposed development.
Support efforts to prepare the community for droughts.	> Bioretention basins will be designed as saturated zone systems which support plant establishment and resilience during periods of drought.
Support the appropriate use of recycled water.	> Recycled water is not considered suitable for this development due to limited size. There is no trunk recycled water infrastructure than can be reticulated within the development.
Understand the impacts of climate change on the water cycle in Ipswich and develop climate change adaptation strategies.	> The effects of climate change on rainfall intensity and soil losses will be considered by a simulating a sensitivity event for 1% AEP climate change at 2100. All proposed dwellings will be

	located above this flood level to ensure a changing climate does not increase hydraulic hazard to residents within this time horizon.
Ensure multiple functions are provided for within riparian corridors as the City develops.	> The existing/proposed riparian corridors and associated buffers will be designed to allow for conveyance of overland flow, enhance of water quality, provide of communal open space and fauna habitat and movement. > Existing overland flow paths will also be analysed for fish passage and designed in accordance with the requirements for waterway barriers, if required. > Compatible low-growing vegetation will be used within electrical easements with consultation with the landscape architects.
Utilise water to reduce urban heat island impacts.	> Waterways will be retained where possible or reconstructed to vegetated outcomes to allow vegetation to absorb urban heat. > Infill planting will be provided to improve riparian vegetation density and maximise the heat absorption benefits of a waterway corridors and overland flow paths. > Bioretention basins will adopt the saturated zone systems which will improve the hardiness and resilience of plant media during droughts, providing some cooling to the urban environment.
Enhance community pride in the Bremer River.	> Not applicable.
Encourage and support water-based recreation opportunities in appropriate locations.	> Water-based recreation opportunities are not appropriate for this development.
Provide the community with opportunities to view and access waterways for recreation.	> Where possible, community green space and linear parks will be provided adjacent the retained and reconstructed waterways. > Detention and bioretention basins will be densely planed and located adjacent and visible from the roads and pedestrian footpaths within the development.

Ensure recreational water access is accompanied by appropriate water quality information.	> Recreational water access is not proposed for this development as it is not considered appropriate.
Encourage appropriate sewerage and potable water services to Ipswich communities to protect public health and support planned growth.	> Water and wastewater reticulation will be supplied to the proposed development in accordance with Urban Utilities requirements and the SEQ Water Supply and Sewerage Design and Construction Code.
Encourage the implementation of holistic water-sensitive design measures to improve stormwater management and community liveability, integrating systems into the landscape to provide amenity benefits to the community.	> There are limited opportunities for holistic water sensitive urban design measures due to the size and scale of the developments. > The bioretention basins will be designed in accordance with the State Planning Policy to achieve the required load-based reduction targets. > Detention, stormwater-quality treatment, controlled flow entries, riparian rehabilitation and naturalised waterway treatments will be coordinated so that stormwater quantity, quality and waterway-stability outcomes are integrated with the landscape.
Ensure long-term impacts and intergenerational equity are considered in water decision-making.	> Not applicable.
Protect drinking water catchments to ensure a safe, resilient and efficient drinking water supply.	> The developments are not located in drinking water catchments.
Demonstrate Council stewardship and leadership in managing our impacts on the water cycle and communicate this to the community.	> Not to be addressed by development proponent.
Economic Development and Efficient Resource Use	
Understand the long-term costs (including whole-of-life-cycle costs) of decisions impacting the water cycle, particularly in relation to construction of assets, and communicate them to relevant stakeholders.	> Design of flood mitigation and WSUD infrastructure will consider the associated maintenance costs and optimise the design for reducing maintenance costs where feasible. This will consider and include, but is not limited to, design items such as debris blockage, plant establishment and resilience, filter media operation, soil erosion and dispersive soils, and rarer than design flood events.

Consider long-term maintenance and replacement costs when designing, constructing or approving assets for water management.	> Refer above.
Encourage diversity of water sources and ensure they are fit for purpose.	> Alternative water sources are not considered feasible for this development due to the size and scale.
Use water efficiently in Council operations, including facilities and open space irrigation, and seek opportunities for water reductions and cost savings.	> There will be limited Council operations within the developments due to their scale and size.
Investigate and support opportunities for alternative water supplies, including stormwater harvesting, to reduce reliance on potable water supplies in Council operations.	> Stormwater harvesting is not considered a reasonable or feasible alternative for the developments given their scale and size.
Ensure sufficient and appropriate water and sewerage infrastructure is provided to support development of a growing community and economic activity.	> Water and wastewater reticulation will be supplied to the proposed development in accordance with the SEQ Water Supply and Sewerage Design and Construction Code and applicable Urban Utilities standards and requirements.
Cost-effectively manage stormwater assets to provide for development in the City while also managing water quality impacts.	> Not to be addressed by development proponent.
Increase focus on proactive management of Council's water assets to ensure continued performance.	> Not to be addressed by development proponent.
Support the appropriate use of stormwater offsets / alternative stormwater solutions where they deliver optimised multiple outcomes for stormwater management (environmental, social, economic).	> Stormwater offsets are no longer a viable alternative in the Ipswich City Plan.
Provide for resilient economic development in the City by understanding and managing flood risks.	> A Hydraulic Impact Assessment will be undertaken for the developments to ensure the risk associated with flooding is understood. The developments will be designed to ensure the risks are appropriately mitigated in accordance with ARR, QUDM, EDQ guidelines and ICC guidelines.
Understand and promote the economic benefits and ecological services provided by the City's waterways.	> The site waterway strategies recognise the waterways' combined functions for drainage and flood conveyance, erosion control, water-quality filtering, riparian habitat, fish passage and landscape amenity. These functions will be protected through buffers and either infill rehabilitation for retained waterways or landscape response to reconstructed waterways.

Protection and Enhancement of the Natural Environment	
Protect or enhance all waterways and wetlands, recognising the multiple values they provide to the environment and the community.	> The profile of the waterways is retained where possible, or otherwise reconstructed (with a natural vegetated outcome) where the condition of the waterway or constraints of the Site don't allow. A Waterway Strategy report will be provided with any submissions to Council to support the development proposal.
Manage the impacts of land development on waterways and wetlands.	> Flood mitigation measures will be included in the development proposal to ensure the impacts of catchment urbanisation are managed prior to discharging from the Site. The approach, modelling and findings will be detailed in a Hydraulic Impact Assessment report and Concept Stormwater Management Plan. > Flood mitigation measures may be offline or online, depending on the site-specific requirements and constraints of the Site.
Ensure waterways, wetlands and riparian corridors are appropriately considered in Council's planning instruments.	> Not to be addressed by development proponent.
Recognise the contribution of lower-order waterways to the effective functioning of the water cycle.	> A site assessment of all mapped features will be undertaken at project inception. The findings of the Site inspection will be documented in a Waterway Strategy report and nominate which low-order waterways or overland flow paths should be retained within the Site based on the values they are observed to provide.
Support and prioritise waterway health improvement projects.	> Waterway-health works are targeted to local erosion, vegetation gaps and existing artificial barriers. They include weed and waste removal, native revegetation, local bank stabilisation, decommissioning of obsolete dams and structures, and reconstruction of continuous channels where required.
Ensure environmental and pre-development flows in Ipswich's waterways are maintained.	> Flood mitigation measures will be designed to ensure all post-development peak flow discharge from the Site (at a lawful

	point of discharge) is maintained and does not exceed the pre-development peak flow discharge.
Understand and maximise the benefits of catchment and riparian vegetation.	> Existing riparian vegetation will be retained where practicable and supplemented through weed management and locally appropriate groundcover, shrub and tree planting, with increased density in erosion-prone areas. Planting within electricity easements will remain compatible with clearance and access requirements.
Seek opportunities to protect natural waterways and wetlands, prioritised ahead of creating artificial waterways.	> Natural or stable waterways will be retained and rehabilitated in preference to reconstruction. Reconstruction is limited to substantially modified reaches, including farm-dam storage areas and heavily degraded locations requiring bank establishment, and will use natural-channel principles and vegetated finishes, where practical.
Effectively manage stormwater quality and quantity and ensure stormwater assets are well designed (including consideration of soil types), constructed and maintained to achieve water quality benefits.	> The design of stormwater quality and quantity infrastructure will be in accordance with the relevant local and state requirements.
Improve water quality in the City's waterways.	> Stormwater-quality treatment will be provided before discharge to receiving waterways. Riparian rehabilitation and stable, vegetated flow-entry treatments will reduce sediment mobilisation and support downstream water quality.
Achieve or exceed water quality targets set out in State Planning Policies.	> The load-based reduction targets for water quality (total suspended solids, total nitrogen and total phosphorus) will be met through implementation of stormwater quality treatment devices. > Stormwater quality treatment devices will either be bioretention basins or underground proprietary devices based on the site-specific use and proposal.
Manage high-risk land uses to protect water quality.	> There are no applicable high-risk land uses.

Improve erosion and sediment control practices to ensure minimum regulatory standards or better are met for all developments within the City, using methods appropriate for the soils and environmental conditions within Ipswich.	> The Concept Stormwater Management Plan developed for the Site will consider and propose appropriate erosion and sediment control practices to meet minimum regulatory standards.
Investigate and understand causes of water quality declines in the City and develop appropriate management strategies and responses.	> Not to be addressed by development proponent.
Ensure the impacts of Council's activities on the water cycle are managed in accordance with the Council's Environmental Management Policy and this strategy.	> Not to be addressed by development proponent.
Support the development of whole-of-waterway and catchment management plans and creek master plans.	> Opportunities for flood mitigation options to be leveraged and utilised by several neighbouring project Sites (or within the same catchment) will be investigated. This offers the benefit of consolidating infrastructure to reduce the Council maintenance burden and minimise impacts to existing vegetation and soils. > The strategies consider the continuity of waterways beyond each site, including connections to Reedy Creek, Deebing Creek and Bundamba Creek. Channel, crossing and outlet works will be designed to maintain upstream and downstream hydraulic, geomorphic and fish-passage functions, where it applies.
Ensure that water and sewerage infrastructure is provided in a way that achieves appropriate water quality outcomes.	> Potable water and wastewater networks will be designed as closed reticulated systems in accordance with Urban Utilities requirements. > Sewer infrastructure will be located and designed to minimise the risk of uncontrolled discharges to waterways, with appropriate separation from stormwater infrastructure and waterways provided in accordance with the applicable design standards.
Communication and Collaboration	
Encourage, support and seek opportunities for cross-boundary partnerships and collaboration on water cycle projects.	> The waterways and drainage paths extend across property boundaries. Design development will therefore consider adjoining flows and infrastructure and will be coordinated with

	Council, State agencies, neighbouring works and electricity-easement holders where relevant.
Engage with appropriate water cycle stakeholders and external agencies to advance the principles of total water cycle management for Ipswich.	> Consultation with Ipswich City Council, SARA and the relevant fisheries agency is informing waterway classification, reconstruction and fish-passage requirements. Written advice and approval conditions will be incorporated into detailed design.
Clarify and communicate roles and responsibilities for water management within Council and external agencies.	> Not to be addressed by development proponent.
Support opportunities for participation in water cycle research.	> Not to be addressed by development proponent.
Consider impacts on the water cycle at multiple scales (site, sub-catchment, catchment).	> Waterway impacts are considered at site, sub-catchment and catchment scales, including local flow paths, mapped waterways and downstream connections to the Deebing Creek and Bundamba Creek systems.
Establish communication protocols across statutory water cycle stakeholders.	> Not to be addressed by development proponent.
Facilitate communication and collaboration across Council to maximise water cycle outcomes.	> Not to be addressed by development proponent.
Prioritise consideration of impacts on the water cycle early in decision-making for Council activities.	> Not to be addressed by development proponent.
Integrate water planning with other long-term planning within Council.	> Not to be addressed by development proponent.
Ensure cultural heritage and traditional owners are appropriately recognised and provided for in water cycle management.	> Not to be addressed by development proponent.
Support capacity building, regional collaboration and best practice forums regarding water management.	> Not to be addressed by development proponent.
Ensure up-to-date, relevant best practice is incorporated into Council water management activities.	> Not to be addressed by development proponent.
Provide information to the community about water management to support water-smart behaviours, increase water cycle understanding, and build community understanding.	> Not to be addressed by development proponent.
Engage with the community about water cycle management.	> Not to be addressed by development proponent.

Support community education about water cycle management.	> Not to be addressed by development proponent.
Encourage community participation and support for water management initiatives and decision-making.	> Not to be addressed by development proponent.
Support appropriate regulation and enforcement to support water management decision-making.	> Not to be addressed by development proponent.

5. Implementation

Detailed management plans will be required at various stages in the development lifecycle to address and demonstrate how the proposed development meets the requirements of this TWCM OSS.
Table **5.1** provides a summary of the detailed management plans which will be submitted to the MEDQ Delegate for review and approval.

The definitions of implementation timing as outlined in **Table 5.1** are:

- Planning Phase: concept whole of Site planning submitted to the MEDQ Delegate via a Development Application submission.
- Pre-Construction Phase: detailed whole of Site design submitted to the MEDQ Delegate via a Compliance and/or Pre-Construction submissions.
- Construction Phase: Construction-specific documents

It is noted that the management plans outlined below may not be required for every subject Site and will only be submitted to the MEDQ Delegate where required.

Table 5.1 Detailed Management Plans

Element	Objective	Performance Target
Stormwater	Stormwater Infrastructure Master Plan	Planning Phase
	Concept Stormwater Management Plan	Planning Phase
	Detailed Stormwater Management Plan	Pre-Construction Phase
	Stormwater quantity and quality construction plans	Pre-Construction Phase
Flooding	Hydraulic Impact Assessment	Planning Phase
Waterways	Waterway Strategy report	Planning Phase
	Waterway Stabilisation drawings (if applicable)	Pre-Construction Phase
	Fish Passage Justification report (if required) to support an OPW Permit for WWBW	Pre-Construction Phase
Groundwater and Soils	Geotechnical Investigation report	Pre-Construction Phase
	Dispersive Soils Management Plan (if applicable)	Pre-Construction Phase
	Groundwater Management Plan (if applicable)	Pre-Construction Phase
Water and Wastewater	Engineering Services Report	Planning Phase
	Concept Water and Wastewater Servicing Plans	Planning Phase

	> Detailed Water and Wastewater Design drawings	> Pre-Construction Phase

6. Monitoring

The monitoring associated with this TWCM OSS will be addressed in the relevant Pre-Construction applications. The infrastructure proposed for this development is considered to be industry standard; and therefore, the standard monitoring programs will be applicable