Moreton Bay Regional Council

Local Government Infrastructure Plan (LGIP) Interim Amendment No. 1

Stormwater Extrinsic Material

Moreton Bay Regional Council

Extrinsic Material and Background Reports

The Local Government Infrastructure Plan (LGIP) is supported by a suite of reports available on the Moreton Bay Regional Council website.

An Extrinsic Material report is provided for each of the following trunk infrastructure networks:

- Transport (roads)
- Transport (active)
- Stormwater (quality and quantity)
- Public parks
- Land for community facilities.

An Extrinsic Material report is provided for each of the following:

- Planning assumptions
- Schedule of Works model

A Background report is provided for each of the following:

- Active transport
- Parks catchment analysis
- Community facilities network
- Stormwater quantity
- Stormwater quality
- Land valuations

Note: The first local government infrastructure plan for Moreton Bay Regional Council came into effect 2017 and is referred to as LGIP 2017 in all Extrinsic Materials. The term LGIP refers to Proposed Local Government Infrastructure Plan (LGIP) Interim Amendment No. 1 - Consultation Version 2021.

Note: The LGIP will provide up-to-date and comprehensive network planning for the period from 2016 to 2036. To ensure a minimum 10 year and maximum 15 year PIA, the future trunk infrastructure will be from the period 2021-2036. The projects delivered in 2016-2021 have been treated as existing assets. During the planning and preparation phase of the LGIP Interim Amendment No.1, a new version of the Minister's Guidelines and Rules (MGR) was introduced which influenced the alignment of the base date and the future trunk infrastructure. Any LGIP amendment undertaken post-release of the census data in mid-2022, will align the base date with future trunk infrastructure that has not been delivered. Council will undertake an LGIP review in 2022 and consider these matters further.

Contents

Tables

Figures

Glossary

Type	Description
Annual Exceedance Probability (AEP)	The probability that a given rainfall total accumulated over a given duration will be exceeded in any one year.
Bioretention basin	A well-vegetated, retention cell or pond designed to enhance water filtration through a specially prepared sub-surface sand filter. Bio-retention cells may be incorporated into grass or vegetated swales or may be a stand-alone treatment system. The system incorporates vegetation with medium-term stormwater retention and sub-surface filtration/infiltration. Also known as bio-filtration systems or biofilters.
Bypass flow	That portion of the flow on a road or in a channel which is not collected by a gully inlet or field inlet, and which is redirected out of the system or to another inlet in the system.
Constructed wetlands	An artificially created system containing pond, marsh and swamp features. The dominant element of the system is the vegetation of the marsh and swamp zones which either requires or can withstand wetting and drying, designed to support a diverse range of micro-organisms and plants associated with the breakdown of organic material and trapping of nutrients. Wetlands may be designed as permanent wet basins (perennial), or ephemeral systems.
Cross drainage	A system of pipes or culverts which convey storm flows transversely across or under a roadway.
Detention basin	A large, open, free draining basin that temporarily detains collected stormwater runoff. These basins are normally maintained in a dry condition between storm events.
Fraction impervious (FI)	Adopted measure for ascertaining the catchment impervious fraction including roof, pavement, paved driveway and other sealed areas. FI is the automated technique that involves conversion of geo-referenced colour aerial photo to native IMAGINE format (.IMG) to create a mosaic for each catchment area and develop a signature sample for each representation of surfaces such as different roof colours, road, grass, trees and other key surfaces.
Hazard	A source of potential harm.
Hydrological models	Hydrological models represent the real-world system (e.g. rainfall, infiltration, evapotranspiration, surface water, and groundwater); it is used to analyse hydraulic behaviour.
Hydrologic models	Hydrologic models are being used to convert rainfall that fall onto a catchment to runoff (or flow) whilst applying losses; it is used to understand, predict, and manage water resources.
Likelihood	Probability or frequency of an event.
Macrophyte	A large plant including macroscopic algae, mosses, ferns and flowering plants; a term commonly used to differentiate large plant from microscopic plants. Sometimes also used to describe aquatic macrophytes; see aquatic macrophytes, emergent aquatic macrophytes, submerged aquatic macrophytes.
Natural Channel Design	Natural Channel Design infrastructure is an engineered asset that emulates natural waterways whilst enabling flow retardation to treat stormwater by filtering and nutrient uptake.
No Net Worsening (NNW) target	Trunk stormwater treatment infrastructure is required to meet the NNW pollutant load targets specified for each service catchment under the MBRC's TWCMP, and in addition to the Business as Usual practice specified in the State Planning Policy (2017) for non-trunk stormwater treatment infrastructure.

Type	Description
Pervious surface (pervious area)	A surface or area within a drainage catchment where some of the rainfall will infiltrate thus resulting in a reduced volume and rate of runoff e.g. grassed playing fields, lawns etc.
Riparian vegetation areas/zones	Land areas adjacent to streams that have distinctive hydrologic, soil and vegetative characteristics.
Risk	The chance of something happening that will have an impact on objectives. It is measured in terms of a combination of the consequences of an event and their likelihood.
Runoff	That part of rainfall which is not lost to infiltration, evaporation, transpiration or depression storage.
Sedimentation basin	A permanent sediment collection basin as opposed to a temporary construction site sediment basin. A tank or basin designed for low-velocity, low-turbulent flows suitable for settling coarse sediment particles from stormwater runoff.
Total Water Cycle Management	Total water cycle management (TWCM) recognises water as a valuable and finite resource that must be managed on a total water cycle basis. TWCM recognises that: • all aspects of the water cycle (water supply, wastewater, stormwater, groundwater and environmental flows) within a catchment are interdependent • the management practices applied to any single component of the water cycle must integrate with all other elements • infrastructure planning within any component of the water cycle must integrate with all other components of the water cycle.
Water Sensitive Urban Design (WSUD)	A set of design elements and on-ground solutions that aim to minimise impacts on the water cycle from the built urban environment. It offers a simplified and integrated approach to land and water planning by dealing with the urban water cycle in a decentralised manner consistent with natural hydrological and ecological processes.

1. LGIP Introduction

1.1 Purpose

The Moreton Bay Regional Council - Local Government Infrastructure Plan (LGIP), identifies Council's plans for trunk stormwater infrastructure to serve future growth in an effective and financially sustainable manner. In May 2021 Council resolved to undertake an "interim LGIP amendment" to the Moreton Bay Regional Council LGIP to bring into effect the most recent trunk infrastructure network planning for the Moreton Bay Region in accordance with the *Planning Act 2016* Minister's Guidelines and Rules (MGR 2020).

1.2 Background

This report provides the background information for the stormwater network, to support the development of the MBRC LGIP, providing a comprehensive network planning for the period from 2021 to 2036.

MBRC plans, delivers and maintains a variety of stormwater infrastructure broadly divided into stormwater quantity and quality. The stormwater quantity trunk infrastructure network provides conveyance and flood immunity, whilst the stormwater quality trunk infrastructure network provides treatment.

As the region develops over the next 15 years, the amount of hard or impervious surfaces such as roads and roofs will increase dramatically. Stormwater infrastructure is required to ensure that Moreton Bay has the infrastructure to meet the liveability and sustainability challenges of the future.

The stormwater infrastructure network is intended to service development consistent with the assumptions in the LGIP by providing the desired standard of service in a coordinated, efficient and financially sustainable manner. These networks comprise development infrastructure for drainage, conveyance, water quality and stormwater detention, which is of a higher order and has the capacity to service multiple developments.

Stormwater quality infrastructure manages the urban water cycle in a decentralised manner consistent with natural hydrological and ecological processes. It mitigates impacts of urbanisation upon our waterways, rivers, foreshores and bays through the removal of sediment and nutrients to maintain healthy aquatic environments and functional recreational and open space areas.

The trunk stormwater quantity network provides a level of conveyance and flood immunity in accordance with Council's adopted standards identified in the MBRC Planning Scheme. It includes pipes, box culverts, channels and inlet structures required to capture and convey the whole 1% Annual Exceedance Probability (AEP) flows, as well as detention basins and levees required to specific to flood mitigation of 1% AEP flows.

This stormwater network review has included an assessment of trunk infrastructure for stormwater within Priority Infrastructure Area (PIA) as a priority over the rest of Local Government Area. It relies on the overarching Water Strategy 2012 -2031 as the established principles for the provision of waterway health, sustainable water management and flooding mitigation.

The Water Strategy 2012 -2031 establishes the vision, fundamental principles and strategic outcomes to guide Council's integrated water management into the future. The strategy informs and leads the development of subsequent strategies and plans, including the Total Water Cycle Management Plan (TWCMP) and Floodplain Risk Management Plan.

In addition, the Water Strategy 2012 – 2031 provides the mechanism by which a range of State and Local Government policies and legislation are implemented.

Why is water important?

A Water Sensitive Region

"We seek to protect and improve the health and resilience of our natural and built environments by managing water in an integrated and cost-effective manner."

[Vision statement MBRC Water Strategy 2012 – 2031]

The Moreton Bay Region has a diverse network of waterways and coastal areas, from the upland streams of the D'Aguilar Range to the coastal rivers and Moreton Bay. The region's waterways and coastal foreshores are indispensable to our identity, lifestyle and economic prosperity.

Water provides economic, social and environmental benefits for our growing community and is vital to sustain all life. Rivers, estuaries and wetlands, play many important roles for recreation, economic growth and the environment. They provide the foundation of complex ecosystems and the region's productivity is supported by waterways and the resources they provide. Waterways are also linked with a 'sense of place'. Just as our waterways connect land, towns and cities, so they connect individuals and communities.

1.3 Strategic Framework

'The strategic framework sets the policy direction for the planning scheme and forms the basis for ensuring appropriate development occurs within the planning scheme area for the life of the planning scheme' (3.1 Preliminary, MBRC Planning Scheme).

The MBRC Planning Scheme outlines twelve themes including Water Management. The strategic outcomes for the water management theme are listed in Part 3.12.1 of MBRC Planning Scheme and outlined below:

- **Total water cycle management**

  Develop a total water cycle management plan to sustainably manage the challenges of natural hazards, changes in weather, population growth and urban development.

- **Water security**

  Assess water supply sources to ensure future security of "fit for purpose" water and promote efficient water use and re-use, including rural catchments.

- **Protect water quality**

  Protect, maintain and enhance the water quality in the Region's waterways and drinking water catchments from the future predicted increases in population and development in the Region and existing land use practices.

- **Floodplain management**

  Floodplains in the region will be managed for the long-term benefit of the community such that hazards to people and damages to property and infrastructure are minimised and the intrinsic environmental values of the floodplain are protected.

- **Water sensitive urban design**

  Ensure development is appropriately planned, designed, constructed, operated and maintained to manage stormwater and wastewater in order to protect the environmental values.

1.3.1 Total water cycle management plan

In 2010, MBRC undertook the preparation of a Total Water Cycle Management Plan

The Total Water Cycle Management Plan was carried out in three phases:

- Total Water Cycle Management Strategy for Moreton Bay Regional Council (2010) adopted by Council in December 2010 (MP 10/2959-2960). This involved the identification of water cycle management drivers and issues in the MBRC region, development of solutions to address the identified issues, and preliminary assessment of these solutions resulting in a short list of solutions for further detailed analysis in Phase 2.

- Total Water Cycle Management Plan for Moreton Bay Regional Council (2012) adopted by Council in October 2012 (MP 12/1885-1888). This phase involved a detailed assessment of the costs and benefits of total water cycle management solutions developed in Phase 1. It identifies a preferred management scenario for each catchment to assist with Council's priority infrastructure planning.
- Total Water Cycle Management Implementation Plan (2013) adopted by Council in September 2013 (MP 13/1696-1699). This plan identifies the implementation pathways for the preferred management scenarios identified in Phase 2, including costs and benefits and the development of monitoring programs to measure the efficacy of the proposed management scenarios and inform the TWCM review process.

The TWCMP has been revised as part of network planning inform this LGIP. The *Stormwater Quality Network Planning Report* (BMT, 2020) was prepared as the Background document for LGIP stormwater quality network planning. The report outlines network planning for stormwater quality for the period from 2021 to 2036, and identifies the following:

- solutions for each catchment to address the key water cycle management issues and a preferred management scenario in the catchment.
- strategies and actions required to achieve the vision for the water cycle
- the program of activities in the TWCMP form the Schedule of Works (SoW) for the regional stormwater quality network in the LGIP.

1.3.2 Strategic Network Planning - Stormwater Quantity Report

The *Stormwater Quantity Network Planning Report* (BMT, 2020) was prepared as the Background document for LGIP stormwater quantity network planning. It forms the basis for the network planning and modelling for stormwater quantity and outlines the following:

- the size and scope of required activities that form the flood mitigation elements to address all future flood issues
- the program of activities forms the Schedule of Works for the regional stormwater quantity network in the LGIP.

The report provides up-to-date and comprehensive network planning for stormwater quantity for the period from 2021 to 2036.

2 Stormwater network

2.1 Stormwater quantity

In accordance with Council's Asset Management Plan for stormwater and related assets which consists of the following assets:

- Pipe network
- Open channels
- Detention basins
- Flood management devices (e.g. levees, weirs)

2.1.1 Pipe network

Pipe network includes pipes, box culverts, manholes, inlets and outlets conveying stormwater flows. It generally consists of piped stormwater drainage network from catchpits and other inlets to discharge into outlets (defined natural watercourses or open channels).

2.1.2 Open channels

Open channels are multifunction assets that, in addition to flood and drainage functions, are an essential component of the environmental, social and economic health of the region. They can be modified or constructed to collect and convey the design flood flow from an upstream catchment to a receiving environment.

Modified channels include sections of the natural waterway that have been reconfigured to accommodate increased volumes of runoff from urban areas and to stabilise waterway banks. Constructed channels characteristics include regular profile, full or partial lining of the channel invert and batters with concrete, rock or vegetation and works to protect or reinforce existing stream banks from erosion.

Mitigation measures may include the installation of loose or anchored materials such as large boulders, geotextiles, gabions, mattresses, concrete or precast concrete units. It may also include the re-shaping of batters and the installation of soil stabilising plant species.

2.1.3 Detention basins

Detention basins are assets used to reduce the peak stormwater discharge from urban areas and mitigate impacts of flooding downstream. They are designed to help reduce the frequency of flooding and associated flood damage, especially for flood-sensitive properties and infrastructure.

2.1.4 Flood management devices including levee, spillway, weir

Flood management devices generally include weirs, levees and tidal flaps. They have varying purposes, from the delineation of the upstream tidal extent of a waterway, to maintenance of a water level in an upstream of devices.

2.2 Stormwater quality

In accordance with Council's Asset Management Plan, the stormwater quality network includes basins, raingardens and modified waterways.

2.2.1 Basin Types

Basin types include bioretention systems, sediment basins and constructed wetlands.

- Bioretention System, an artificial stormwater system designed to treat stormwater runoff using a combination of sediment forebay to enhance sediment capture and vegetated media for adsorption of nutrients.

  A bioretention system treats run-off through a vegetated filter to a sub-soil drain – as the stormwater percolates, pollutants are retained through fine filtration, adsorption and biological uptake of nutrients by vegetation (e.g. garden beds/basins).

- **Sediment Basin**, an artificial body of water designed to capture coarse to medium size sediment and prevent this sediment reaching downstream treatment zone (e.g. bioretention basin or wetland).

  Sediment basins consist of open water to allow for settling of only the larger sediment (i.e. greater than 125 µm) and to enable sediment removal (by means of asset maintenance).

- **Constructed Wetland**, an artificial vegetated body of water designed to treat stormwater runoff through mimicking the physical and biogeochemical processes performed by natural wetlands. Wetlands may be designed as permanent wet basins (perennial or conventional) or alternating between dry and wet basins (ephemeral).

  Conventional constructed wetlands are shallow and vegetated water bodies that generally consist of an inlet zone (i.e. sedimentation basin, covered above), macrophyte zone (heavily vegetated area designed for nutrient uptake) and a high flow bypass (to protect macrophyte zone from scour and erosion). The marsh area of a constructed wetland must support aquatic and emergent plant species, to achieve the pollutant removal efficiencies – the wetland's contributing catchment should supply enough runoff to ensure that the marsh pools of varying depth are maintained as intended.

2.2.2 Raingardens

Raingardens comprise of small bioretention pods or swales that are integrated into the urban environment - providing benefits relative to large 'end-of-pipe' basins as follows:

- treating stormwater 'at the source'
- providing improved integration (e.g. self-watered landscaped areas within streetscapes).

Raingardens also have the potential to provide other benefits including urban cooling (particularly when planted with trees), enhanced street appeal, and improved local biodiversity.

The specific locations for these raingardens have not been identified in the LGIP, however the best and most cost-effective opportunities for integration would be to align with other infrastructure works programs through the catchment (e.g. road upgrades, urban renewal projects).

2.2.3 Modified waterways

Modified waterways consist of natural channel design and riparian vegetation.

- **Natural Channel Design**

  Natural channel design infrastructure comprises of sections of waterways or constructed channels that have been reconfigured to treat stormwater from urban areas and to stabilise waterway banks. The natural channel design features are presented in **Figure 1**, as defined in QUDM (2017)[1].

  As outlined in MBRC Planning Scheme Policy Integrated Design - Appendix C 'the design of the channel considers the regional importance of the waterway, the local plan form of the watercourse, the channel cross-section, and finally the design of in-channel features' (p. 22).

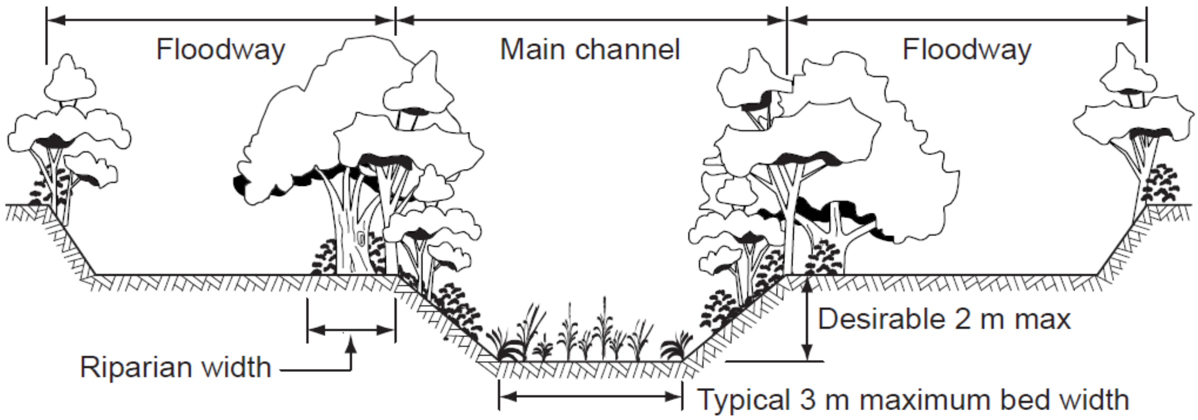


Figure 1: Natural Channel Design - based on the QDUM 2017[1]

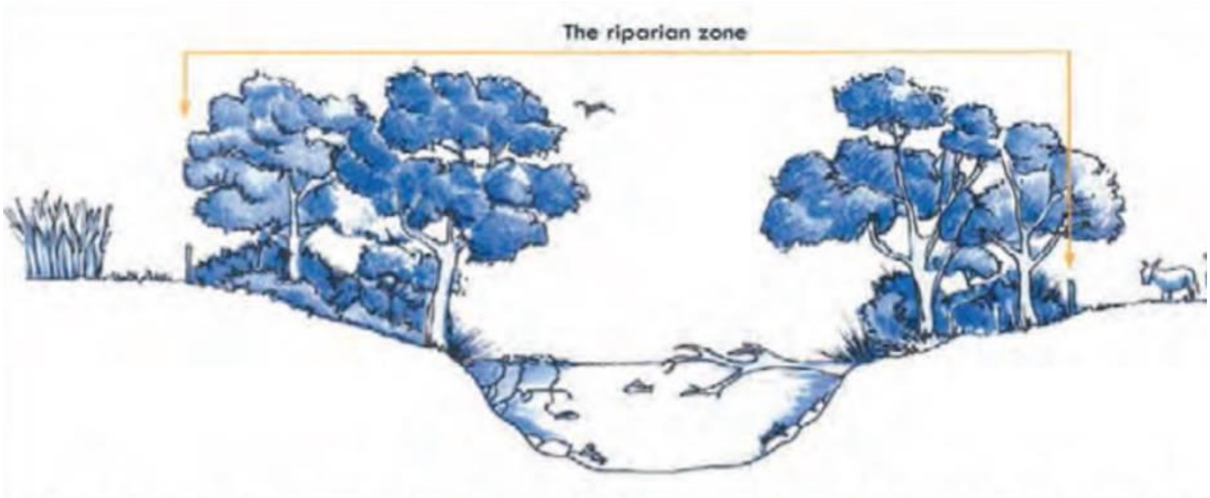
- **Riparian vegetation**

Waterway corridors incorporate the riparian vegetation zone measured from the highest bank on both sides of the waterway. **Figure 2** illustrates features in geomorphological context to enable definition of functional boundaries.

Riparian vegetation zones facilitate the direct interaction between terrestrial and aquatic ecosystems. Generally, riparian vegetation consists of variety of trees, shrubs and grasses.

The two main ways that riparian vegetation improves water quality is through protecting against streambank erosion and filtering of overland flows before they reach the waterway.

BMT (2020) report states 'that in a catchment where bank erosion is the largest source of sediment, a statistical analysis of river sediment data from Moreton Bay catchments (Olley et al. 2015) showed that sub-catchments with degraded riparian vegetation had sediment yields 50 to 200 times those of subcatchments with full cover of remnant riparian vegetation'.



Source: Lisa Robins*. 2002. Managing Riparian Land for Multiple Uses - Technical Paper,* Australian National University

Figure 2: Riparian vegetation

[1] Institute of Public Works Engineering Australasia. 2017. Queensland Urban Drainage Manual (QUDM).

3 Stormwater trunk infrastructure

The stormwater trunk infrastructure network has utilised the planning assumptions, converting the assumptions to network demand for each service catchment which underpins the network modelling. Given the PIA provides for 15 years of urban growth, the network planning and infrastructure planning has prioritised the infrastructure required to service growth within the PIA, particularly with regard to the financial sustainability provisions of the *Planning Act (2016*).

The stormwater trunk infrastructure network comprises development infrastructure which:

(a) includes only the following:

Infrastructure for drainage, conveyance, water quality and stormwater detention, which is of a higher order and has the capacity to service multiple developments. For example, pipes and other infrastructure, that have a hydraulic capacity equal to or greater than a 1,350mm diameter pipe.

(b) excludes the following:

(i) Infrastructure which is privately owned

(ii) infrastructure associated with the provision of another trunk infrastructure network

(iii) Infrastructure which relocates or replaces the capacity or function of existing stormwater infrastructure, and

(iv) For infrastructure provided under a development approval:

a. Infrastructure internal to the premises, the subject of the development approval, or necessary to connect the premises to the external infrastructure network

b. Infrastructure which services only the premises, the subject of the development approval (and other land the subject of related development approvals)

c. Infrastructure required as a direct result of development under the development approval to comply with stormwater management requirements of the MBRC Planning Scheme.

The stormwater trunk infrastructure network consists of the stormwater quantity trunk infrastructure network and the stormwater quality trunk infrastructure network.

3.1 Stormwater quantity

The stormwater quantity trunk infrastructure network is to provide an appropriate level of conveyance and flood immunity in accordance with MBRC Planning Scheme and comprises development infrastructure which:

(a) Includes only the following:

(i) Pipes, box culverts, channels and inlet structures required to capture and convey the whole 1%AEP flows for the fully developed catchment;

(ii) Pipes, box culverts and bridges for the conveyance of the whole 1%AEP flows for the fully developed catchment for trunk road crossings over waterways (rivers and creeks);

(iii) Detention basins (land or works) required to detain the whole 1% AEP flows for the fully developed catchment;

(iv) Levee banks (land or works), specific to flood mitigation, necessary to divert the whole 1% AEP flows for the fully developed catchment;

(b) excludes the following:

(i) Infrastructure which is not stormwater quantity infrastructure.

3.2 Stormwater quality

The stormwater quality trunk infrastructure network is to provide an appropriate level of stormwater treatment in accordance with MBRC Planning Scheme and comprises development infrastructure which:

(a) includes only the following:

  (i) Infrastructure for catchment wide stormwater treatment that achieves the "No Net Worsening" (NNW) objectives prescribed in the Total Water Cycle Management Plan (TWCMP) when compared to the 2016 pollutant loads and SPP requirements, such as:
    - Basins: Bioretention Systems (including Regional Basins and Streetscape Raingardens), Sediment Basins and Constructed Wetlands
    - Modified Waterways: Natural Channel Design and Riparian Vegetation

(b) excludes the following:

  (i) Infrastructure which is not stormwater quality infrastructure; and

  (ii) Infrastructure required to achieve compliance with the design objectives for South East Queensland in Table B: Post construction phase, Appendix 2 of the SPP

4 Stormwater network service catchments

The service catchments for the stormwater network (Figure 3) are based on delineated hydrological catchments that represent the minor basins of the Moreton Bay Region including the following:

1) Stanley River
2) Pumicestone Passage
3) Bribie Island
4) Caboolture River
5) Burpengary Creek
6) Upper Pine River
7) Lower Pine River
8) Sideling Creek
9) Hays Inlet
10) Redcliffe
11) Brisbane Coastal

The minor basis of Byron Creek, Neurum Creek and Mary River have been excluded as there is no urban development within the catchments.

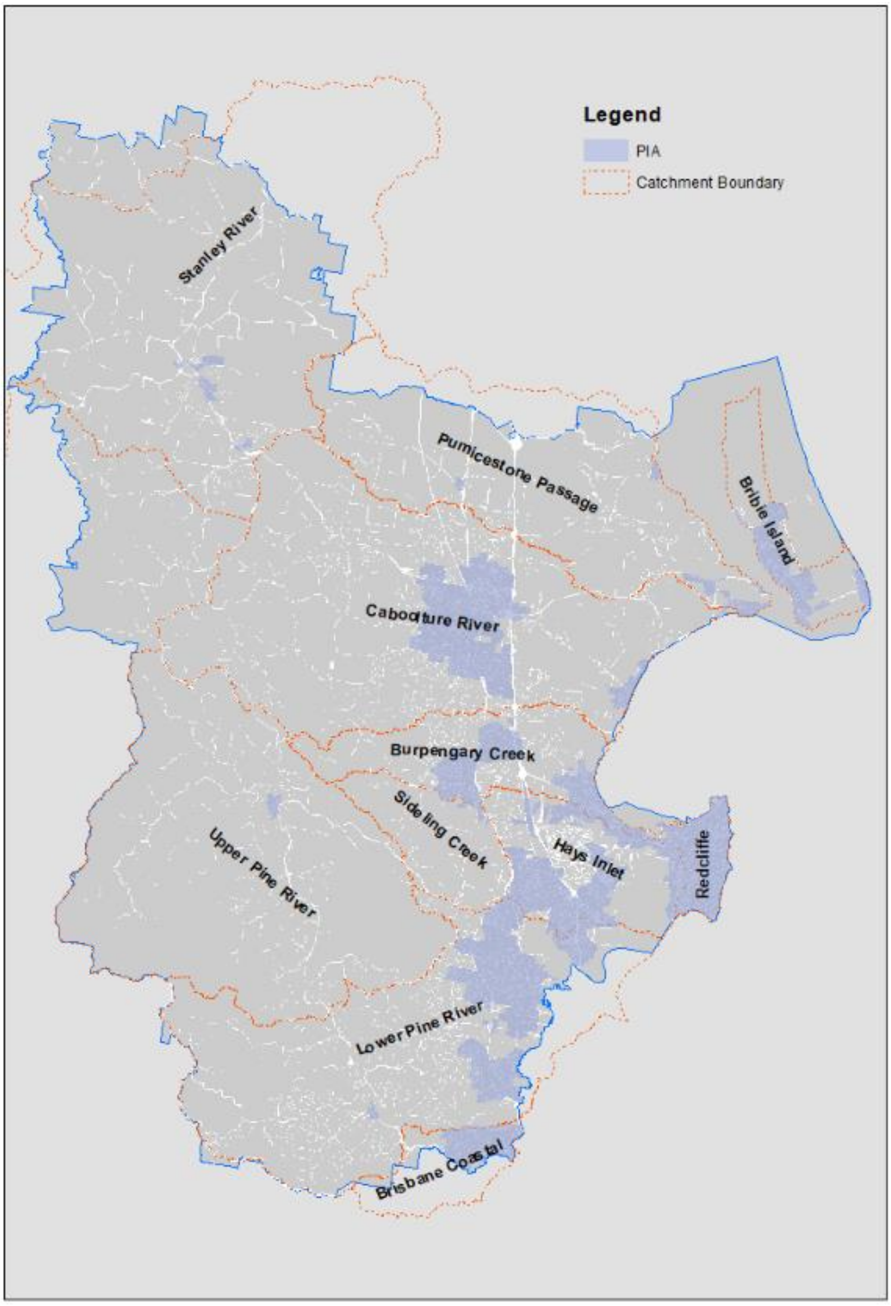


Figure 3: Stormwater catchment boundaries

5 Demand assumptions

The growth assumptions used to identify demand assumptions for the stormwater network have been extracted from the *Moreton Bay Regional Council LGIP2 Planning Assumptions Report* (2020)[2]. These population assumptions draw on several sources, including:

- existing and committed development
- planning intentions such as the SEQ Regional Plan
- strategic planning projects and the place types from the Strategic Framework
- growth forecasts such as the urban growth model
- approved development applications
- population forecasts from OESR
- land suitability and compatibility to accommodate growth.

5.1 Demand conversion factors

Functional unit (FU) codes were used to spatially translate the land use to fraction impervious for the existing and ultimate land use, as shown in Table 1. The fraction impervious is consistent with values outlined in the Queensland Urban Drainage Manual (2017)[3].

Table 1: Conversion land use to fraction impervious

FU Code	FU Description (Land use)	Fraction Impervious
1	Water	NA
2	Building Commercial	90%
3	Building Community	90%
4	Building Education	90%
5	Building Health	90%
6	Building Industry	90%
7	Building non private res	90%
8	Building office	90%
9	Building open space	90%
10	Building rec env	90%
11	Building residential	90%
12	Building retail	90%
13	Building rural res	90%
14	Building rural use	90%
15	Concrete surface	90%
16	Cropping	0%
17	Dirt	70%
18	Extractive	70%
19	Urban other	10%
20	Rural other	10%
21	Gravel Sand	70%
22	Grazing	0%
23	Plantation forest	0%

[2] MBRC. 2020. Local Government Infrastructure Plan 2020, Planning Assumptions Extrinsic Material
[3] Institute of Public Works Engineering Australasia. 2017. Queensland Urban Drainage Manual (QUDM).

FU Code	FU Description (Land use)	Fraction Impervious
24	Road surface	70%
25	Tree canopy	0%
26	Wetlands	0%
27	Grass - Urban Residential	10%
28	Grass - Rural Residential	10%

5.2 Network Demand

Table 2 outlines the existing and projected demand used to undertake catchment planning for stormwater quality and quantity.

Table 2: Stormwater demand assumptions

Service Catchment	Total Area (ha)	Impervious Area (ha)					
		Base	2021	2026	2031	2036	Ultimate
Brisbane Coastal	4,026.10	617.10	624.80	635.30	641.50	647.70	658.40
Bribie Island	5,060.80	1,756.20	1,782.10	1,808.90	1,821.80	1,825.10	1,834.00
Burpengary Creek	8,682.90	1,663.00	1,769.40	1,851.50	1,923.70	1,975.40	2,208.80
Caboolture River	38,308.20	4,493.10	4,738.80	4,982.00	5,230.50	5,420.70	7,081.40
Hays Inlet	8,016.90	3,044.60	3,295.50	3,420.80	3,552.60	3,618.60	3,799.00
Lower Pine River	30,795.10	4,624.20	4,760.20	4,851.80	4,950.10	5,059.00	5,212.80
Pumicestone Passage	23,936.70	2,817.20	2,849.60	2,898.40	2,940.70	2,979.00	3,109.00
Redcliffe	2,155.60	993.70	1,032.90	1,079.20	1,102.80	1,118.80	1,166.60
Sideling Creek	5,263.40	565.50	575.20	585.80	593.10	602.60	642.60
Stanley River	47,965.20	893.80	913.10	938.10	960.50	992.50	1,036.80
Upper Pine River	34,833.60	2,831.00	2,851.00	2,862.20	2,871.50	2,873.50	2,886.50
TOTAL	**209,044.50**	**24,299.40**	**25,192.60**	**25,914.00**	**26,588.80**	**27,112.90**	**29,635.90**

6 Desired standard of service (DSS)

6.1 Stormwater quantity DSS

The DSS for the trunk stormwater quantity network are outlined below.

1. Collect and convey stormwater flows for both major and minor flood events from existing and future land uses in a manner that protects life and does not cause nuisance or inundation of habitable rooms or public utility infrastructure.
2. Design the stormwater network to comply with council's adopted standards identified in the Planning Scheme Policy - Integrated Design.
3. Design trunk road crossing structures to provide an appropriate level of flood conveyance and immunity for a flood event in accordance with Council's adopted standards identified in the Planning Scheme Policy - Integrated Design.
4. In accordance with the MBRC Planning Scheme, assume development provides local infrastructure necessary to ensure the development does not result in any increase in flood risk off-site.

6.2 Stormwater quality DSS

The DSS for the trunk stormwater quality network are outlined below.

1. Meet "No Net Worsening" (NNW) target load objectives at a major catchment level prescribed in the Total Water Cycle Management Plan (TWCMP) when compared to the 2016 pollutant loads
2. Meet the water quality objectives for receiving waters outlined in the *Environmental Protection (Water and Wetland Biodiversity) Policy 2019* (EPP Water and Wetland Biodiversity).
3. Implement planning and management of urban stormwater to comply with the design objectives as set out in the *ShapingSEQ*, South East Queensland Regional Plan 2017 for water sensitive communities, including Goal 4: Sustain (primarily Water Sensitive Communities and Biodiversity elements) and Goal 5: Live (primarily Working with Natural Systems).

7 Network planning and modelling methodology

7.1 Stormwater quantity

The information presented in this section was sourced from the *Stormwater Quantity Network Planning Report*, prepared by BMT (2020) for the LGIP stormwater quantity network planning.
In planning infrastructure, Council seeks model industry best practice by incorporating ecologically sustainable siting principles, avoidance, mitigation and offset principles. Where infrastructure is proposed to be delivered within high value areas, alternative alignments may be considered for identified projects. These principles align with the MBRC Planning Scheme.

7.1.1 Stormwater quantity principles

The network planning was based on the Regional Floodplain Database Project developed by Council, including hydrologic Watershed Bounded Network Model (WBNM) and hydraulic TUFLOW Classic models across the entire LGA covering 14 catchment models.

The Stormwater Quantity Network Planning Report (BMT, 2020) converted the hydraulic model into TUFLOW HPC (Heavily Parallelised Compute) models to simulate across the LGIP panning horizons. The modelling solutions were subsequently assessed against the DSS to prioritise the mitigation solutions (i.e. also referred to as the LGIP projects). High priority mitigation solutions are presented as stormwater quantity infrastructure projects listed in the LGIP SoW.

Projects have been prioritised based on demand, level of need, proximity to other facilities and budget constraints.

Hydrological and hydrologic models were used for stormwater quantity network modelling:

- Hydrological models represent the real-world system (e.g. rainfall, infiltration, evapotranspiration, surface water, and groundwater) to analyse hydraulic behaviour.
- Hydrologic models are being used to convert rainfall that fall onto a catchment to runoff (or flow) whilst applying losses; it is used to understand, predict, and manage water resources.

Hydrological modelling has the objective to estimate the flow (in cubic-metre per second) at each sub-catchment considering the percentage of imperviousness in this catchment. The percentage imperviousness is estimated per land use (i.e. roads, car parks and vegetated areas, such as forested or grassed areas) and as such represents the percentage development in the sub-catchment. Hydrologic models are being used to convert rainfall that falls onto a catchment to runoff (or flow) whilst applying losses.

Hydrologic and Hydraulic modelling was undertaken for different planning time horizons reflecting the projected growth in the region as follows:

- 2016 (base line)
- 2021 - 2026
- 2026-2031
- 2031-2036

7.1.2 Stormwater quantity methodology

The network planning methodology for stormwater quantity infrastructure is shown below.

- WBNM modelling (for planning horizons): Hydrological modelling (using WBNM) of planning time horizons reflecting the projected growth in the region, to determine the changing rainfall runoff conditions in the catchments.
- TUFLOW modelling: Hydraulic modelling (using TUFLOW) of planning time horizons reflecting the projected growth in the region, to determine the changing rainfall runoff conditions in the catchments.

  - Build and validate HPC models: In 2012 to 2015, as part of Council's Regional Floodplain Database project, Council commissioned the development of TUFLOW Classic models, the most suited software available at the time. In 2018, BMT developed TUFLOW HPC (Heavily Parallelised Compute), a software which uses video gaming graphics cards (GPU) hardware compatibility and is much faster than TUFLOW Classic. TUFLOW HPC was adopted for this study. Hence the original TUFLOW Classic models were converted to TUFLOW HPC models.
  - Base Case: This represents the 2016-time horizon.
  - Ultimate Case: This represents the time horizons reflecting the ultimate projected growth in the region (i.e. build out of the planning scheme).
- Assessment of compliance with Desired Standard of Service (DSS): This section provides the trigger values and criteria to be assessed to determine compliance with DSS. The non-compliance with the DSS assessment was undertaken separately for properties and roads. The property DSS criteria was a detailed assessment which assessed floor levels, building footprints and the lot polygons. Peak flood levels, flood hazard and flood risk (Background Report - *Stormwater Quantity Network Planning Report (BMT, 2020)*, Sections 5.1.2 and 5.1.3) was used to assess and flag non-compliance with the DSS at each property and road element. The criteria and their prioritisation were developed in consultation with Council.

  The DSS non-compliance assessment was undertaken for the Base Case and Ultimate Case (Background Report - *Stormwater Quantity Network Planning Report (BMT, 2020)*, Section 5.3). The DSS non-compliance assessment was then repeated for the Mitigated Ultimate Case (Background Report - *Stormwater Quantity Network Planning Report (BMT, 2020)*, Section 6.6.1).
- Mitigation Assessment: A mitigation assessment was undertaken to develop feasible mitigation measures to accommodate future growth in the region. The mitigation assessment included the categorisation of DSS non compliances areas, development of mitigation measures and hydraulic modelling (using TUFLOW HPC) of mitigation measures, and 3 iterations for optimisation of the measure.
- Timing of Mitigation Element Delivery Assessment: The modelling was undertaken to assess when mitigation measures are required across planning time horizons, to cater for the projected growth.
- High Level Concept Designs and Cost Estimates: Cost estimates were developed for each mitigation measure, developed in this project. Cost estimates were also sourced from previous projects such as LGIP 1 or Drainage Investigation areas (DIAs), where applicable.

7.1.3 Stormwater quantity infrastructure prioritisation

The infrastructure prioritisation was based on the DSS compliance criteria outlined in (Background Report - *Stormwater Quantity Network Planning Report (BMT, 2020)*, Table 5-5).

Sequencing of mitigation solutions was undertaken over time horizons (i.e. 2021, 2026, 2031 and 2036) reflecting the projected growth in the region. The location of each mitigation solution was analysed considering the DSS non-compliance of properties and roads to inform the sequencing of mitigation solutions across time horizons.

The sequencing of mitigation solutions was carried out using prioritisation categories, as follows:

- *low* priority was used when there were DSS non-compliance issues in the existing case only
- *medium* applied to a small percentage of properties in the vicinity that were DSS non-compliant for the ultimate case
- *high* priority was applied, if there was a large percentage of properties in the vicinity that were DSS non-compliant.

Subsequent review by the LGIP internal Technical Working Group further refined the Schedule of Works based on the planned capital projects servicing PIA.

7.1.4 Stormwater quantity mitigation solutions

The stormwater quantity network modelling identified the following stormwater quantity mitigation solutions across the PIA:

- Network upgrade (non-return valves, stormwater network establishment and upgrades)
- Culvert upgrade (culvert establishment and upgrades)
- Detention basins (establishment and upgrades)
- Road raising
- Channel upgrade (channel works)
- Levee (establishment and upgrades).

These mitigation solutions are itemised as the future stormwater quantity network in the LGIP Schedule of Works.

7.2 Stormwater quality

The information presented in this section was sourced from the *Stormwater Quality Network Planning Report*, prepared by BMT (2020) for the LGIP stormwater quality network planning.

7.2.1 Stormwater quality principles

The Business as Usual (BAU) scenario modelling (i.e. carried out for LGIP to assess the impact of future development on stormwater pollutant loads for planned development between 2021 – 2036) assumes that development complies with SPP requirements for 80% removal of Total Suspended Solids (TSS), 60% removal of Total Phosphorus (TP) and 45% removal of Total Nitrogen (TN). The infrastructure associated with the requirement to meet the State Planning Policy (SPP) are non-trunk infrastructure.

Network planning methodology for stormwater quality LGIP infrastructure included the following stages:

- Establishing sustainable load targets for future development based on the current catchment conditions
- Modelling of future development for each planning horizon to understand the location, size and cost of stormwater quality infrastructure required to service the PIA
- Reviewing the TWCMP work to recommend preferred management options (pertained to PIA)
- Producing models for each planning horizon to identify the location, size and cost of trunk water quality devices required in a SoW for the LGIP deliverables.

Any future predicted increases in regional pollutant loads resulting from development (i.e. when compared to 2016 loads) would require regional treatment, achieved by trunk water quality infrastructure, to meet NNW objectives defined by DSS.

7.2.2 Stormwater quality methodology

The network planning methodology for stormwater quality infrastructure is shown below.

- Existing Base Case Model: Develop an existing base case model representative of current catchment conditions and establish sustainable load targets for future development.
- Future Development Scenario Models: Modelling of future development for each planning horizon to understand the location, size and cost of stormwater quality infrastructure required to service the PIA.
- TWCMP Review and Evaluation: Review and build upon the previous TWCMP work to recommend preferred management options. It summarises results of the project undertaken to date through the preparation of a revised TWCM Strategy.
- Revised TWCMP / Preferred PIA Scenario: The objective of this final phase is to prepare a revised TWCMP limited to the PIA area that satisfies LGIP requirements. This phase included the modelling

framework to model the preferred PIA scenario to identify the location, size and cost of trunk water quality devices required in a schedule of works for the LGIP deliverables.

7.2.3 Stormwater quality infrastructure prioritisation

Each stormwater quality mitigation solution was then prioritised based on the following criteria:

- potential treatment benefits over a 20-year planning period (i.e. to meet the NNW target)
- associated costs over a 20-year planning period.

Considerations used to sequence the mitigation solutions over planning time horizons for the schedule of works are shown below.

- Pollutant reductions required to meet NNW for each planning time horizon. The water quality targets were based on TN reductions for all catchments and time horizons (as TSS and TP reduction targets are easier to achieve). Treatments were selected to ensure that water quality targets were achieved within each planning time horizons.
- Treatment opportunities were initially prioritised considering the cost effectiveness of TN treatment (through assessment of treatment costs).
- Multiple benefits and specific constraints of sites for stormwater trunk infrastructure.
- Riparian vegetation opportunities were planned to account for limited treatment over their establishment period (approximately 5 years).
- Other treatment assets to be constructed in the catchment, and timing to ensure best outcomes (e.g. Natural Channel Design upstream of wetland built prior to wetland).
- Forecast timing of future development.
- Retrofit of streetscape raingardens, while comparatively cost effective for TN removal, were planned for once other end of pipe treatment locations had been exhausted.

Subsequent review by the LGIP internal Technical Working Group further refined the Schedule of Works based on the planned capital projects servicing PIA.

7.2.4 Stormwater quality mitigation solutions

The stormwater quality network modelling identified the following stormwater quality mitigation solutions across the PIA:

- Basins including
  - Bioretention basins
  - Constructed wetlands (Conventional and Ephemeral)
- Modified waterways including:
  - Riparian vegetation
  - Natural channel design
- Streetscape raingardens and swales (i.e. to be located at various locations across allocated catchments and within designated treatment area).

These mitigation solutions are itemised as the future stormwater quality network in the LGIP Schedule of Works.

8 Network costing and valuation methodology

High level concept designs and cost estimates were developed for each mitigation solution. The costing methodology is outlined in this section for the stormwater network.

8.1 Land valuations

The land allocated for stormwater network solutions was valued using suburb-based land valuations provided by a Jones Lang LaSalle (JLL) valuation report (2020). Land valuation costs informed by JLL (2020) is detailed in the Schedule of Works Model Extrinsic Material Report.

The suburb based land valuations are based on zones and two valuation categories:

- land above 1% AEP (Q100);
- land below 1% AEP (Q100).

8.2 Stormwater quantity network cost estimates and unit rates

The following assumptions were developed in consultation with Council for the cost estimates of infrastructure projects:

- Unit rates were initially provided by Council noting that they were based on the year 2016. Those rates were then escalated to the year 2020 using the Producer Price indexes Australia (derived from Australian Bureau of Statistics (ABS)), using the average between the building construction Queensland index and the Road and Bridge construction Queensland. The change from June 2016 to June 2020 is 8.65%. The unit rates are provided in Appendix I of BMT's Stormwater Quantity Network Planning Report 2020 (i.e. background report) and summarised in Appendix A.1.
- Cost estimates available from previous studies were used and escalated to 2020.
- Cost for houses were estimated using 'onthehouse'[4] information and are separate to the land valuation costs outlined in Section 8.1 above.
- The costs for each mitigation element include a site establishment cost (% or factor of the total cost).
- The pavement thickness for all roads was assumed to be 0.3m.
- The cost estimate for bridges were guided by unit rates for culverts, however the costs for bridges have a higher uncertainty and need to be refined as part of the detailed design.

8.3 Stormwater quality network cost estimates and unit rates

The following assumptions were developed in consultation with Council for the cost estimates:

- A capital cost of \$15/m^2 for riparian revegetation has been adopted as recommended in MBRC's 2012 report Capital Works Program Opportunities, Water Quality Network: Riparian Corridor Protection, Rehabilitation and Revegetation. Using a cost escalation tool provided by MBRC, the 2020 cost for riparian revegetation was assumed to be \$17.67/m^2.
- Capital cost for stormwater quality infrastructure is detailed in the BMT's Stormwater Quality Network Planning Report 2020 (i.e. background report).
- The unit rates are provided in Section 2 of BMT's Stormwater Quality Network Planning Report 2020 (i.e. background report) and summarised in Appendix A.2. Costing of existing infrastructure.

The value of existing trunk infrastructure for stormwater quantity and quality networks in each of the catchments have been identified and all costs are current as at 2020/21.

Assets identified in the GIS system (based on the definition of trunk) were valued as follows:

- Firstly, using the asset value (recorded in the financial register)

[4] https://www.onthehouse.com.au/

- Secondly, for assets that are not recorded in the financial register, the unit rate was applied

The value of the existing stormwater quantity infrastructure is summarised in Table 3.

For the purposes of valuing the stormwater quantity network, a pipe diameter of 1350mm (or equivalent hydraulic capacity for box culverts) or greater was assumed, based on the definition of trunk.

Table 3: Existing trunk stormwater quantity infrastructure value

Catchment	Land	Infrastructure
STANLEY RIVER CATCHMENT	$782,660	$5,194,378
PUMICESTONE PASSAGE CATCHMENT	$1,921,517	$14,724,868
BRIBIE ISLAND CATCHMENT	-	$11,220,352
CABOOLTURE RIVER CATCHMENT	$36,085,460	$73,106,629
BURPENGARY CREEK CATCHMENT	$20,960,183	$27,504,062
UPPER PINE RIVER CATCHMENT	$508,938	$10,115,235
LOWER PINE RIVER CATCHMENT	$41,404,638	$99,438,285
SIDELING CREEK CATCHMENT	-	$3,046,548
HAYS INLET CATCHMENT	$21,789,619	$73,441,431
REDCLIFFE CATCHMENT	$1,609,950	$36,267,888
BRISBANE COASTAL CATCHMENT	$19,753,988	$6,883,796

The value of the existing stormwater quality infrastructure is summarised in Table 4.

Table 4: Existing trunk stormwater quality infrastructure value

Catchment	Land	Infrastructure
STANLEY RIVER CATCHMENT	$60,968	$213,084
PUMICESTONE PASSAGE CATCHMENT	$9,426	$111,330
BRIBIE ISLAND CATCHMENT	-	$85,530
CABOOLTURE RIVER CATCHMENT	$1,304,312	$649,874
BURPENGARY CREEK CATCHMENT	$1,183,071	$590,158
UPPER PINE RIVER CATCHMENT	$23,665	-
LOWER PINE RIVER CATCHMENT	$3,160,156	$516,248
SIDELING CREEK CATCHMENT	-	$91,638
HAYS INLET CATCHMENT	$4,148,823	$2,123,456
REDCLIFFE CATCHMENT	$1,567,939	-
BRISBANE COASTAL CATCHMENT	$143,185	$23,835

9 Cost estimates for planned stormwater network

9.1 Cost estimate for stormwater quantity network

Cost estimate of identified stormwater quantity mitigation solutions across PIA is outlined in Table 5. All costs are current as at 2020/21.

Table 5: Cost estimate for stormwater quantity network

Mitigation Solutions	**Costing** (as at 2020/21)
Network upgrade (non-return valves, stormwater network establishment and upgrades)	$31,573,474
Culvert upgrade (culvert establishment and upgrades)	$28,473,425
Detention basins (establishment and upgrades)	$24,659,091
Road raising	$4,985,763
Channel upgrade (channel works)	$13,652,550
Levee (establishment and upgrades)	$2,472,432
Total	**$105,816,735**

9.2 Cost estimate for stormwater quality network

Cost estimate of identified stormwater quality mitigation solutions across PIA is outlined in Table 6. All costs are current as at 2020/21.

Table 6: Cost estimate for stormwater quality network

Mitigation Solutions	**Costing** (as at 2020/21)
Bioretention basins	$2,532,275
Constructed wetlands (Conventional and Ephemeral)	$30,228,577
Riparian vegetation	$3,061,644
Natural channel design	$36,928,565
Streetscape raingardens	$21,644,196
Total	**$94,395,257**

10 Schedule of Works

The Schedule of Works (SoW) for stormwater quantity (Table 7) and stormwater quality (Table 8) are tables that identify the future trunk infrastructure for the stormwater network for the region based on the LGIP criteria and planning time horizons.

Summary tables of the SOW for stormwater network, presented in Table 7 and Table 8, outline the future stormwater trunk infrastructure network items including:

- The LGIP identification code (this matches references in the mapping and previous LGIP)
- Map reference to cross reference with the LGIP mapping
- Service catchment
- Suburb
- Trunk infrastructure type
- Description of mitigation solution
- Estimated timing (expressed as an estimated year of completion)
- Cost for land (if in private ownership)
- Cost of works.

This cost is stated in 2020/21-dollar values (where the value at 2021 was estimated or previous values have been escalated to the 2021-dollar values with PPI[5]). The cost of works escalated to 2021 dollars includes contingencies and project owner's cost (e.g. design costs).

In deciding what infrastructure to include in the PFTI and SOW, Council has considered the matters stated in Part 6 - Requirements for an LGIP and Schedule 6 - Indicative trunk and non-trunk infrastructure of the Minister's Guidelines and Rules (September 2020).

---

[5]PPI - Producer price index https://www.abs.gov.au/statistics/economy/price-indexes-and-inflation/producer-price-indexes-australia/latest-release

Table 7: Schedule of Works for Stormwater Quantity

LGIP ID	Map Ref	Service Catchment	Suburb	Trunk Infrastructure	Description	No / Barrel	Length [m]	Width / Diameter [m]	Depth / Height [m]	Area [m2]	Estimated timing	Baseline Cost (Works)	Baseline Cost (Land)	Establishment Cost (Works)	Establishment Cost (Land)
BUR_045	LGIP-48 SW	Burpengary Creek	Burpengary	Culvert Upgrade	Osborne Drive, Burpengary - Culvert Upgrade	5	21	2.40	0.90	-	2021-2026	$347,850	$0	$452,535	$0
BUR_043	LGIP-48 SW	Burpengary Creek	Burpengary	Road Raising	Osborne Drive, Burpengary - Road Raising	0	203	7.00	0.20	-	2021-2026	$209,224	$0	$272,190	$0
CAB_054a	LGIP-25 SW	Caboolture River	Caboolture	Channel Upgrade	Hospital, Caboolture - Channel Upgrade	0	243	10.00	1.50	-	2021-2026	$259,135	$0	$337,121	$0
CAB_055	LGIP-25 SW	Caboolture River	Caboolture	Culvert Upgrade	McKean Street, Caboolture - Culvert Upgrade	6	18	1.20	1.20	-	2021-2026	$263,988	$0	$343,434	$0
BUR_092	LGIP-42 SW	Burpengary Creek	Burpengary	Culvert Upgrade - DIA	O'Brien Road, Burpengary - Culvert Upgrade - DIA	0	0	-	-	-	2021-2026	$1,123,927	$0	$1,462,170	$0
LPR_068	LGIP-65 SW	Lower Pine River	Bray Park	Network Upgrade	Leone Street Sag Pit, Bray Park - Network Upgrade	4	380	2.10	1.20	-	2021-2026	$822,602	$0	$1,070,163	$0
CAB_054	LGIP-32 SW	Caboolture River	Caboolture	Channel Upgrade	Hospital, Caboolture - Channel Upgrade	0	742	10.00	1.00	-	2021-2026	$586,901	$0	$763,528	$0
CAB_056	LGIP-32 SW	Caboolture River	Caboolture	Culvert Upgrade	Hospital Entrance, Caboolture - Culvert Upgrade	4	12	1.20	1.20	-	2021-2026	$120,472	$0	$156,728	$0
RED_031	LGIP-61 SW	Redcliffe	Clontarf	Network Upgrade - DIA	Clontarf - Network Upgrade - DIA	0	0	-	-	-	2021-2026	$2,326,000	$0	$3,026,006	$0
CAB_057	LGIP-32 SW	Caboolture River	Caboolture	Network Upgrade	Hospital, Caboolture - Network Upgrade	6	17	1.20	1.20	-	2021-2026	$326,617	$0	$424,912	$0
LPR_103	LGIP-64 SW	Lower Pine River	Joyner	Road Raising - DIA	Youngs Crossing Road South, Joyner - Road Raising - DIA	0	0	-	-	-	2021-2026	$0	$0	$0	$0
LPR_104	LGIP-64 SW	Lower Pine River	Joyner	Road Raising - DIA	Youngs Crossing Road North, Joyner - Road Raising - DIA	0	0	-	-	-	2021-2026	$0	$0	$0	$0
BUR_055	LGIP-48 SW	Burpengary Creek	Narangba	Culvert Upgrade	Oakley Flat Road/New Settlement Road, Narangba - Culvert Upgrade	3	98	1.35	-	-	2021-2026	$911,028	$0	$1,185,201	$0
BUR_056	LGIP-47 SW	Burpengary Creek	Narangba	Culvert Upgrade	Oakley Flat Road, Narangba - Culvert Upgrade	0	95	7.00	0.10	-	2021-2026	$93,753	$0	$121,968	$0
BUR_088	LGIP-47 SW	Burpengary Creek	Narangba	Culvert Upgrade	Oakey Flat Road, Narangba - Culvert Upgrade	1	15	1.05	-	-	2021-2026	$22,556	$0	$29,344	$0
BUR_044	LGIP-48 SW	Burpengary Creek	Burpengary	Detention Basin	Osborne Drive, Burpengary - Detention Basin, land acquisition required	0	0	-	2.00	12,480	2021-2026	$2,644,122	$2,350,370	$3,439,866	$2,481,995
BUR_046	LGIP-48 SW	Burpengary Creek	Burpengary	Road Raising	Leonard Ct, Burpengary - Road Raising	0	50	6.00	0.15	-	2021-2026	$20,021	$0	$26,047	$0
BUR_047	LGIP-48 SW	Burpengary Creek	Burpengary	Culvert Upgrade	Leonard Ct, Burpengary - Culvert Upgrade	8	22	2.40	0.90	-	2021-2026	$618,734	$0	$804,940	$0
BUR_053	LGIP-48 SW	Burpengary Creek	Narangba	Road Raising	MacDonald Drive, Narangba - Road Raising	0	90	7.00	0.30	-	2021-2026	$94,101	$0	$122,420	$0
BUR_054	LGIP-48 SW	Burpengary Creek	Narangba	Culvert Upgrade	MacDonald Drive, Narangba - Culvert Upgrade	15	17	1.50	-	-	2021-2026	$793,527	$0	$1,032,337	$0
BCC_017	LGIP-73 SW	Brisbane Coastal	Everton Hills	Culvert Upgrade	Bennetts Road upgrade, Everton Hills - Culvert Upgrade	2	23	1.65	1.65	49	2021-2026	$181,430	$0	$236,031	$0
RED_010	LGIP-61 SW	Redcliffe	Woody Point	Network Upgrade	Area 5 Stormwater Upgrades, Woody Point - Network Upgrade	144	6523	9.83	-	-	2021-2026	$4,639,631	$0	$6,035,919	$0
CAB_015	LGIP-25 SW	Caboolture River	Caboolture	Road Raising	Pettigrew Street, Caboolture - Road Raising	0	300	8.00	0.30	-	2021-2026	$358,480	$0	$466,364	$0
CAB_017	LGIP-25 SW	Caboolture River	Caboolture	Culvert Upgrade	Pettigrew Street, Caboolture - Culvert Upgrade	2	18	2.40	1.50	-	2021-2026	$167,891	$0	$218,417	$0
CAB_071	LGIP-25 SW	Caboolture River	Caboolture	Network Upgrade	BS7, Caboolture - Network Upgrade	1	159	0.60	-	-	2026-2031	$25,377	$0	$35,318	$0
CAB_076	LGIP-32 SW	Caboolture River	Caboolture South	Network Upgrade - DIA	Morayfield Road, Caboolture South - Network Upgrade - DIA	0	0	-	-	-	2026-2031	$684,418	$0	$952,513	$0
RED_009	LGIP-60 SW	Redcliffe	Clontarf	Network Upgrade	Area 4 Stormwater Upgrades, Clontarf - Network Upgrade	150	7166	13.13	2.10	-	2026-2031	$851,599	$0	$1,185,181	$0
BUR_003	LGIP-49 SW	Burpengary Creek	Deception Bay	Detention Basin	Little Burpengary Creek, Deception Bay - Detention Basin	0	0	-	1.50	4,732	2026-2031	$611,560	$0	$851,115	$0
CAB_074	LGIP-32 SW	Caboolture River	Caboolture South	Detention Basin - DIA	Sheepstation Creek, Caboolture South - Detention Basin - DIA	0	0	-	-	-	2026-2031	$2,230,557	$0	$3,104,293	$0
CAB_079	LGIP-32 SW	Caboolture River	Morayfield	Culvert Upgrade - DIA	50 Buchanan Road, Morayfield - Culvert Upgrade - DIA	0	0	-	-	-	2026-2031	$331,873	$0	$461,872	$0

LGIP ID	Map Ref	Service Catchment	Suburb	Trunk Infrastructure	Description	No / Barrel	Length [m]	Width / Diameter [m]	Depth / Height [m]	Area [m2]	Estimated timing	Baseline Cost (Works)	Baseline Cost (Land)	Establishment Cost (Works)	Establishment Cost (Land)
BUR_008	LGIP-49 SW	Burpengary Creek	Deception Bay	Culvert Upgrade	Old Bay Road, Deception Bay - Culvert Upgrade	14	16	1.50	1.20	-	2026-2031	$595,344	$0	$828,547	$0
BUR_050	LGIP-48 SW	Burpengary Creek	Narangba	Detention Basin	Marshman Road, Narangba - Detention Basin	0	0	-	1.60	13,857	2026-2031	$1,722,364	$0	$2,397,035	$0
BUR_039	LGIP-48 SW	Burpengary Creek	Narangba	Road Raising	Omara Road, Narangba - Road Raising	0	74	6.00	0.30	-	2026-2031	$66,498	$0	$92,546	$0
BUR_040	LGIP-48 SW	Burpengary Creek	Narangba	Culvert Upgrade	Omara Road, Narangba - Culvert Upgrade	6	15	1.20	-	-	2026-2031	$176,253	$0	$245,293	$0
BUR_041	LGIP-48 SW	Burpengary Creek	Narangba	Culvert Upgrade	Railway line near Omara Road, Narangba - Culvert Upgrade	1	15	2.20	-	-	2026-2031	$66,351	$0	$92,341	$0
BUR_042	LGIP-48 SW	Burpengary Creek	Narangba	Culvert Upgrade	Burpengary Road, Narangba - Culvert Upgrade	0	0	-	-	-	2026-2031	$98,078	$0	$136,496	$0
CAB_068	LGIP-25 SW	Caboolture River	Caboolture	Detention Basin	Henzell Road, Caboolture - Detention Basin	0	0	-	2.20	10,400	2026-2031	$1,777,427	$0	$2,473,667	$0
CAB_069	LGIP-25 SW	Caboolture River	Caboolture	Culvert Upgrade	Henzell Road, Caboolture - Culvert Upgrade	3	60	1.80	-	-	2026-2031	$723,950	$0	$1,007,530	$0
CAB_070	LGIP-25 SW	Caboolture River	Caboolture	Levee	Henzell Road, Caboolture - Levee	0	700	5.00	1.50	-	2026-2031	$370,768	$0	$516,002	$0
UPR_001	LGIP-45 SW	Upper Pine River	Dayboro	Levee	Showgrounds, Dayboro - Levee	0	156	5.00	1.50	-	2026-2031	$82,628	$0	$114,995	$0
UPR_002	LGIP-45 SW	Upper Pine River	Dayboro	Culvert Upgrade	Showgrounds East, Dayboro - Culvert Upgrade	1	29	1.20	1.50	-	2026-2031	$75,685	$0	$105,332	$0
UPR_003	LGIP-45 SW	Upper Pine River	Dayboro	Culvert Upgrade	Showgrounds West, Dayboro - Culvert Upgrade	1	36	1.20	1.50	-	2026-2031	$92,816	$0	$129,173	$0
BUR_048	LGIP-48 SW	Burpengary Creek	Burpengary	Detention Basin	Old Gympie Road, Burpengary - Detention Basin, land acquisition required	0	0	-	1.70	15,680	2026-2031	$2,315,662	$816,325	$3,222,735	$862,041
BUR_051	LGIP-48 SW	Burpengary Creek	Narangba	Road Raising	Marshman Road, Narangba - Road Raising	0	83	7.00	0.30	-	2026-2031	$86,259	$0	$120,048	$0
BUR_052	LGIP-48 SW	Burpengary Creek	Narangba	Culvert Upgrade	Conduit Street, Narangba - Culvert Upgrade	0	0	-	-	-	2026-2031	$53,296	$0	$74,172	$0
LPR_050	LGIP-68 SW	Lower Pine River	Warner	Culvert Upgrade	Kremzow Rd West - Warner Culvert Upgrade, Warner - Culvert Upgrade	10	11	1.50	-	-	2026-2031	$399,586	$0	$556,109	$0
CAB_075	LGIP-32 SW	Caboolture River	Morayfield	Detention Basin - DIA	Grant Road Sports and Community Complex, Morayfield - Detention Basin - DIA	0	0	-	-	-	2026-2031	$752,630	$0	$1,047,444	$0
CAB_078	LGIP-25 SW	Caboolture River	Caboolture	Culvert Upgrade - DIA	Smiths Road, Caboolture - Culvert Upgrade - DIA	0	0	-	-	-	2026-2031	$820,623	$0	$1,142,071	$0
RED_007	LGIP-61 SW	Redcliffe	Clontarf	Network Upgrade	Area 3 Stormwater Upgrades, Clontarf - Network Upgrade	46	1581	5.93	-	-	2026-2031	$669,684	$0	$932,007	$0
PUM_010	LGIP-35 SW	Pumicestone Passage	Sandstone Point	Culvert Upgrade	Bestmann Road, Sandstone Point - Culvert Upgrade	7	35	2.10	0.60	-	2026-2031	$775,613	$0	$1,079,430	$0
BUR_011	LGIP-49 SW	Burpengary Creek	Deception Bay	Channel Upgrade	Deception Road Drainage, Deception Bay - Channel Upgrade	0	682	15.00	-	10,230	2026-2031	$219,630	$0	$305,662	$0
BUR_049	LGIP-49 SW	Burpengary Creek	Burpengary East	Levee	Burpengary Creek Road, Burpengary East - Levee	0	1443	5.00	1.00	-	2026-2031	$509,541	$0	$709,135	$0
BUR_001	LGIP-49 SW	Burpengary Creek	Deception Bay	Road Raising	Yallatup Street, Deception Bay - Road Raising	0	102	10.00	0.15	-	2026-2031	$144,250	$0	$200,754	$0
BUR_002	LGIP-49 SW	Burpengary Creek	Deception Bay	Culvert Upgrade	Yallatup Street, Deception Bay - Culvert Upgrade	6	20	1.50	-	-	2026-2031	$370,313	$0	$515,368	$0
BUR_004	LGIP-49 SW	Burpengary Creek	Deception Bay	Road Raising	Eveshan Road, Deception Bay - Road Raising	0	127	10.00	0.20	-	2026-2031	$187,453	$0	$260,881	$0
BUR_005	LGIP-49 SW	Burpengary Creek	Deception Bay	Culvert Upgrade	Eveshan Road, Deception Bay - Culvert Upgrade	8	18	2.40	1.80	-	2026-2031	$740,689	$0	$1,030,826	$0
BUR_061	LGIP-48 SW	Burpengary Creek	Narangba	Culvert Upgrade	Young Road, Narangba - Culvert Upgrade	5	29	2.10	1.80	-	2026-2031	$672,757	$0	$936,284	$0
BUR_064	LGIP-42 SW	Burpengary Creek	Burpengary	Levee	Belford Drive, Burpengary - Levee	0	670	5.00	1.00	-	2026-2031	$236,585	$0	$329,259	$0
HAY_009	LGIP-59 SW	Hays Inlet	Murrumba Downs	Road Raising	Entry Parade, Murrumba Downs - Road Raising	0	40	10.00	0.30	-	2026-2031	$53,391	$0	$74,304	$0
HAY_012	LGIP-59 SW	Hays Inlet	Kallangur	Road Raising	Allison Drive, Kallangur - Road Raising	0	200	10.00	0.60	-	2026-2031	$330,513	$0	$459,979	$0
HAY_013	LGIP-59 SW	Hays Inlet	Kallangur	Culvert Upgrade	Duffield Rd, Kallangur - Culvert Upgrade	10	14	3.00	3.00	-	2026-2031	$1,047,435	$0	$1,457,728	$0
HAY_014	LGIP-59 SW	Hays Inlet	Kallangur	Road Raising	Duffield Rd, Kallangur - Road Raising	0	130	10.00	1.20	-	2026-2031	$256,148	$0	$356,484	$0

LGIP ID	Map Ref	Service Catchment	Suburb	Trunk Infrastructure	Description	No / Barrel	Length [m]	Width / Diameter [m]	Depth / Height [m]	Area [m2]	Estimated timing	Baseline Cost (Works)	Baseline Cost (Land)	Establishment Cost (Works)	Establishment Cost (Land)
HAY_015	LGIP-59 SW	Hays Inlet	Kallangur	Road Raising	Orchid Ave, Kallangur - Road Raising	0	140	10.00	1.70	-	2026-2031	$270,908	$0	$377,026	$0
HAY_016	LGIP-59 SW	Hays Inlet	Kallangur	Levee	Goodfellows Road, Kallangur - Levee	0	207	5.00	1.60	-	2026-2031	$116,951	$0	$162,762	$0
RED_030	LGIP-57 SW	Redcliffe	Scarborough	Channel Upgrade	Area 10 Stormwater Upgrades, Scarborough - Channel Upgrade	134	4096	10.83	2.40	-	2026-2031	$1,890,532	$0	$2,631,076	$0
LPR_042	LGIP-69 SW	Lower Pine River	Brendale	Network Upgrade	Brendale Commercial Area, Brendale - Network Upgrade	281	6859	21.13	4.80	-	2026-2031	$3,334,697	$0	$4,640,937	$0
LPR_043	LGIP-69 SW	Lower Pine River	Brendale	Culvert Upgrade	Leitchs Rd North, Brendale - Culvert Upgrade	2	31	3.60	1.20	-	2026-2031	$329,375	$0	$458,396	$0
LPR_107	LGIP-69 SW	Lower Pine River	Albany Creek	Network Upgrade - DIA	Albany Creek - Network Upgrade - DIA	0	0	-	-	-	2031-2036	$3,389,880	$0	$4,922,856	$0
LPR_105	LGIP-70 SW	Lower Pine River	Clear Mountain	Culvert Upgrade - DIA	Mount Glorious Rd, Clear Mountain - Culvert Upgrade - DIA	0	0	-	-	-	2031-2036	$1,262,589	$0	$1,833,558	$0
CAB_073	LGIP-17 SW	Caboolture River	Elimbah	Culvert Upgrade - DIA	King John Creek Crossing, Elimbah - Culvert Upgrade - DIA	0	0	-	-	-	2031-2036	$485,991	$0	$705,766	$0
RED_028	LGIP-57 SW	Redcliffe	Newport	Culvert Upgrade	Ashmole Rd, Newport - Culvert Upgrade	16	42	3.60	1.20	-	2031-2036	$3,913,603	$0	$5,683,417	$0
BUR_093	LGIP-49 SW	Burpengary Creek	Deception Bay	Channel Upgrade - DIA	Deception Bay - Channel Upgrade - DIA	0	0	-	-	-	2031-2036	$6,301,700	$0	$9,151,463	$0
LPR_077	LGIP-64 SW	Lower Pine River	Joyner	Detention Basin	Samsonvale Rd, Joyner - Detention Basin	0	0	-	4.00	9,645	2031-2036	$2,724,616	$0	$3,956,745	$0
CAB_024	LGIP-31 SW	Caboolture River	Upper Caboolture	Road Raising	Dobson Lane, Upper Caboolture - Road Raising	0	65	10.00	0.50	-	2031-2036	$103,974	$0	$150,993	$0
CAB_049	LGIP-42 SW	Caboolture River	Morayfield	Levee	Grogan Road, Morayfield - Levee	0	330	5.00	0.40	-	2031-2036	$46,611	$0	$67,689	$0
CAB_062	LGIP-25 SW	Caboolture River	Caboolture	Road Raising	Pumicestone Road, Caboolture - Road Raising	0	185	8.00	0.30	-	2031-2036	$221,063	$0	$321,032	$0
CAB_063	LGIP-25 SW	Caboolture River	Caboolture	Detention Basin	Pumicestone Road, Caboolture - Detention Basin	0	0	-	0.80	1,221	2031-2036	$84,161	$0	$122,220	$0
CAB_064	LGIP-25 SW	Caboolture River	Caboolture	Network Upgrade	BS7, Caboolture - Network Upgrade	2	270	0.60	-	-	2031-2036	$86,188	$0	$125,164	$0
CAB_065	LGIP-25 SW	Caboolture River	Caboolture	Culvert Upgrade	Jensen Road, Caboolture - Culvert Upgrade	2	24	0.75	-	-	2031-2036	$66,400	$0	$96,427	$0
CAB_066	LGIP-25 SW	Caboolture River	Caboolture	Culvert Upgrade	Ruby Street, Caboolture - Culvert Upgrade	3	15	0.90	-	-	2031-2036	$73,905	$0	$107,327	$0
CAB_067	LGIP-25 SW	Caboolture River	Caboolture	Channel Upgrade	BS7, Caboolture - Channel Upgrade	0	291	12.00	0.50	-	2031-2036	$166,053	$0	$241,146	$0
HAY_001	LGIP-59 SW	Hays Inlet	Kallangur	Detention Basin	Gallipoli Way, Kallangur - Detention Basin	0	0	-	2.00	2,797	2031-2036	$481,976	$0	$699,936	$0
HAY_002	LGIP-59 SW	Hays Inlet	Kallangur	Culvert Upgrade	Gallipoli Way, Kallangur - Culvert Upgrade	4	45	2.40	1.80	-	2031-2036	$1,018,952	$0	$1,479,744	$0
HAY_003	LGIP-59 SW	Hays Inlet	Kallangur	Channel Upgrade	Gallipoli Way, Kallangur - Channel Upgrade	0	90	15.00	-	1,350	2031-2036	$69,281	$0	$100,611	$0
HAY_004	LGIP-59 SW	Hays Inlet	Kallangur	Levee	Goodfellows Road, Kallangur - Levee	0	131	5.00	1.00	-	2031-2036	$46,258	$0	$67,176	$0
HAY_005	LGIP-59 SW	Hays Inlet	Kallangur	Road Raising	Goodfellow Road, Kallangur - Road Raising	0	70	70.00	0.40	-	2031-2036	$792,455	$0	$1,150,820	$0
HAY_006	LGIP-59 SW	Hays Inlet	Kallangur	Culvert Upgrade	Duffield Rd, Kallangur - Culvert Upgrade	9	18	2.40	2.10	-	2031-2036	$883,723	$0	$1,283,361	$0
HAY_007	LGIP-59 SW	Hays Inlet	Kallangur	Road Raising	Duffield Rd, Kallangur - Road Raising	0	170	10.00	0.70	-	2031-2036	$289,941	$0	$421,058	$0
LPR_038	LGIP-69 SW	Lower Pine River	Brendale	Road Raising	South Pine Road, Brendale - Road Raising	0	200	5.00	1.10	-	2031-2036	$77,685	$0	$112,815	$0
LPR_047	LGIP-65 SW	Lower Pine River	Brendale	Channel Upgrade	Stanley St East, Brendale - Channel Upgrade	0	145	7.50	0.75	-	2031-2036	$83,970	$0	$121,943	$0
LPR_106	LGIP-63 SW	Lower Pine River	Highvale	Network Upgrade - DIA	Clear Mountain, Highvale - Network Upgrade - DIA	0	0	-	-	-	2031-2036	$1,040,000	$0	$1,510,310	$0
RED_033	LGIP-61 SW	Redcliffe	Margate	Network Upgrade - DIA	Q3 Margate, Margate - Network Upgrade - DIA	0	0	-	-	-	2031-2036	$4,622,015	$0	$6,712,189	$0
UPR_004	LGIP-51 SW	Upper Pine River	Dayboro	Culvert Upgrade	Williams Street, Dayboro - Culvert Upgrade	6	15	3.60	1.50	-	2031-2036	$574,426	$0	$834,193	$0
UPR_005	LGIP-51 SW	Upper Pine River	Dayboro	Culvert Upgrade	Railway Street, Dayboro - Culvert Upgrade	4	10	1.50	1.20	-	2031-2036	$102,987	$0	$149,560	$0
UPR_005a	LGIP-45 SW	Upper Pine River	Dayboro	Levee	Terrors Creek, Dayboro - Levee	0	308	10.00	1.60	-	2031-2036	$348,028	$0	$505,413	$0
TOTAL												$73,458,485	$3,166,695	$102,472,699	$3,344,036

Table 8: Schedule of Works for Stormwater Quality

LGIP ID	Map Ref	Service Catchment	Suburb	Trunk Infrastructure	Description	Treatment area (m2)	Treatment length (m)	Estimated timing	Baseline Cost (Works)	Establishment Cost (Works)
BUR_WR12	LGIP-48 SW	Burpengary Creek	Narangba	Constructed Wetland	Matterhorn Drive Park, Narangba - Constructed Wetland	5,400	-	2021-2026	$934,200	$1,215,346
CAB_BB03	LGIP-25 SW	Caboolture River	Caboolture	Bioretention Basin	Lynfield Drive Park, Caboolture - Bioretention Basin	3,360	-	2021-2026	$1,081,900	$1,407,496
CAB_WR21	LGIP-32 SW	Caboolture River	Morayfield	Constructed Wetland	Beech Drive Park, Morayfield - Constructed Wetland	3,533	-	2021-2026	$713,700	$928,487
LPR_CW01	LGIP-69 SW	Lower Pine River	Brendale	Constructed Wetland	Scouts Crossing Rd Park, Brendale - Constructed Wetland	14,593	-	2021-2026	$2,947,800	$3,834,935
LPR_CW03	LGIP-65 SW	Lower Pine River	Strathpine	Constructed Wetland	Normanby Way Strathpine - Constructed Wetland	7,067	-	2021-2026	$1,427,500	$1,857,104
LPR_RV6	LGIP-58 SW	Lower Pine River	Petrie	Riparian Vegetation	Tweedale Reserve, Petrie - Riparian Vegetation	5,771	577	2021-2026	$102,000	$132,697
BC_RG01	LGIP-76 SW	Brisbane Coastal	Arana Hills	Streetscape Raingardens	Various locations Brisbane Coastal Catchment Arana Hills - Streetscape Raingardens			2021-2026	$920,800	$1,197,913
BRI_RG01	LGIP-29 SW	Bribie Island	Bongaree	Streetscape Raingardens	Various locations Bribie Island Catchment Bongaree - Streetscape Raingardens			2021-2026	$789,200	$1,026,708
BUR_WR06b	LGIP-48 SW	Burpengary Creek	Burpengary	Natural Channel Design	Symphony Crescent Park, Burpengary - Natural Channel Design	5,900	590	2021-2026	$3,290,700	$4,281,030
BUR_WR11	LGIP-49 SW	Burpengary Creek	Deception Bay	Bioretention Basin	May St Park, Deception Bay - Bioretention Basin	585	-	2021-2026	$188,400	$245,099
CAB_BB54	LGIP-32 SW	Caboolture River	Caboolture	Bioretention Basin	Wararba Cres, Caboolture - Bioretention Basin	1,000	-	2021-2026	$322,000	$418,905
CAB_NCD55	LGIP-32 SW	Caboolture River	Morayfield	Natural Channel Design	The Billabongs Parkland, Morayfield - Natural Channel Design	2,650	265	2021-2026	$1,478,000	$1,922,801
CAB_RV01	LGIP-32 SW	Caboolture River	Bellmere	Riparian Vegetation	Bel Air Estate Park, Bellmere - Riparian Vegetation	7,766	259	2021-2026	$137,200	$178,490
CAB_RV02	LGIP-32 SW	Caboolture River	Bellmere	Riparian Vegetation	Allan Road Park, Bellmere - Riparian Vegetation	21,077	703	2021-2026	$372,400	$484,473
CAB_RV03	LGIP-32 SW	Caboolture River	Caboolture South	Riparian Vegetation	3 Mainsail Drive, Caboolture South - Riparian Vegetation	10,077	336	2021-2026	$178,100	$231,699
CAB_RV13	LGIP-32 SW	Caboolture River	Morayfield	Riparian Vegetation	Beech Drive Park, Morayfield - Riparian Vegetation	17,294	1,235	2021-2026	$305,600	$397,570
CAB_RV19	LGIP-42 SW	Caboolture River	Burpengary	Riparian Vegetation	Shangrila Street Park, Burpengary - Riparian Vegetation	17,913	1,279	2021-2026	$316,500	$411,750
CAB_RV20	LGIP-32 SW	Caboolture River	Morayfield	Riparian Vegetation	Visentin Road Park, Morayfield - Riparian Vegetation	48,333	2,553	2021-2026	$854,000	$1,111,010
LPR_WR13	LGIP-71 SW	Lower Pine River	Samford Village	Constructed Wetland	Kupidabin Park, Samford Village - Constructed Wetland	2,400	-	2021-2026	$415,200	$540,154
LPR_WR15	LGIP-73 SW	Lower Pine River	Albany Creek	Bioretention Basin	Bleakley Park, Albany Creek - Bioretention Basin	1,100	-	2021-2026	$354,200	$460,796
PUM_RG01	LGIP-18 SW	Pumicestone Passage	Elimbah	Streetscape Raingardens	Various locations Pumicestone Passage Catchment Elimbah - Streetscape Raingardens			2021-2026	$1,096,200	$1,426,099
STAN_RG01	LGIP-03 SW	Stanley River	Stanmore	Streetscape Raingardens	Various locations Stanley River Catchment Stanmore - Streetscape Raingardens			2021-2026	$833,100	$1,083,820
BUR_CW02	LGIP-48 SW	Burpengary Creek	Burpengary	Constructed Wetland	Burpengary Sportsgrounds, Burpengary - Constructed Wetland	13,400	-	2026-2031	$2,706,800	$3,767,086
BUR_CW06	LGIP-49 SW	Burpengary Creek	Burpengary	Constructed Wetland	Claverton Drive Park & Reserve, Burpengary - Constructed Wetland	3,600	-	2026-2031	$727,200	$1,012,053
CAB_CW04	LGIP-32 SW	Caboolture River	Caboolture	Constructed Wetland	Lower King St Park, Caboolture - Constructed Wetland	38,800	-	2026-2031	$7,837,600	$10,907,682
CAB_WR2	LGIP-32 SW	Caboolture River	Morayfield	Natural Channel Design	Pinegrove Rd Park, Morayfield - Natural Channel Design	1,450	145	2026-2031	$808,700	$1,125,478
LPR_CW02	LGIP-65 SW	Lower Pine River	Strathpine	Constructed Wetland	Piggott Reserve, Strathpine - Constructed Wetland	1,467	-	2026-2031	$296,300	$412,364
LPR_WR18	LGIP-64 SW	Lower Pine River	Warner	Constructed Wetland	Boxwood Court Park, Warner - Constructed Wetland	3,033	-	2026-2031	$612,700	$852,702
CAB_NCD04	LGIP-25 SW	Caboolture River	Caboolture	Natural Channel Design	Male Road Park, Caboolture - Natural Channel Design	1,100	110	2026-2031	$613,500	$853,815
UPR_NCD01	LGIP-45 SW	Upper Pine River	Dayboro	Natural Channel Design	Tullamore Park, Dayboro - Natural Channel Design	2,250	225	2026-2031	$1,254,900	$1,746,459
CAB_NCD01	LGIP-25 SW	Caboolture River	Caboolture	Natural Channel Design	Ruby Street Park, Caboolture - Natural Channel Design	1,750	175	2026-2031	$976,100	$1,358,450
CAB_NCD03	LGIP-25 SW	Caboolture River	Caboolture	Natural Channel Design	Jensen Road Park, Caboolture - Natural Channel Design	1,550	155	2026-2031	$864,500	$1,203,135
CAB_NCD10	LGIP-32 SW	Caboolture River	Caboolture South	Natural Channel Design	Kate McGrath's Koala Park, Caboolture South - Natural Channel Design	8,100	810	2026-2031	$4,517,800	$6,287,477
CAB_RV17	LGIP-42 SW	Caboolture River	Burpengary	Riparian Vegetation	Havenwood Street Park, Burpengary - Riparian Vegetation	4,637	464	2026-2031	$81,900	$113,981
LPR_NCD01	LGIP-65 SW	Lower Pine River	Bray Park	Natural Channel Design	Francis Road Drainage Reserve, Bray Park - Natural Channel Design	3,500	350	2026-2031	$1,952,100	$2,716,761
LPR_WR11	LGIP-64 SW	Lower Pine River	Joyner	Constructed Wetland	One Mile Golf Course Reserve, Joyner - Constructed Wetland	1,700	-	2026-2031	$343,400	$477,914
PUM_RG02	LGIP-17 SW	Pumicestone Passage	Elimbah	Streetscape Raingardens	Various locations Pumicestone Passage Catchment Elimbah - Streetscape Raingardens			2026-2031	$1,271,600	$1,769,701
SID_NCD01	LGIP-54 SW	Sideling Creek	Narangba	Natural Channel Design	Desmond Street Park, Narangba - Natural Channel Design	1,900	190	2026-2031	$1,059,700	$1,474,797
STAN_RG02	LGIP-04 SW	Stanley River	Stanmore	Streetscape Raingardens	Various locations Stanley River Catchment Stanmore - Streetscape Raingardens			2026-2031	$811,200	$1,128,957
BC_RG02	LGIP-76 SW	Brisbane Coastal	Everton Hills	Streetscape Raingardens	Various locations Brisbane Coastal Catchment Everton Hills - Streetscape Raingardens			2026-2031	$613,900	$854,372
BRI_RG02	LGIP-29 SW	Bribie Island	Banksia Beach	Streetscape Raingardens	Various locations Bribie Island Catchment Banksia Beach - Streetscape Raingardens			2026-2031	$416,500	$579,648

LGIP ID	Map Ref	Service Catchment	Suburb	Trunk Infrastructure	Description	Treatment area (m2)	Treatment length (m)	Estimated timing	Baseline Cost (Works)	Establishment Cost (Works)
CAB_NCD02	LGIP-25 SW	Caboolture River	Caboolture	Natural Channel Design	Parish Park, Caboolture - Natural Channel Design	4,000	400	2031-2036	$2,231,000	$3,239,906
BUR_WR03	LGIP-48 SW	Burpengary Creek	Narangba	Natural Channel Design	Narangba Sports Centre, Narangba - Natural Channel Design	3,300	330	2031-2036	$1,840,600	$2,672,958
BC_RG03	LGIP-76 SW	Brisbane Coastal	Arana Hills	Streetscape Raingardens	Various locations Brisbane Coastal Catchment Arana Hills - Streetscape Raingardens			2031-2036	$613,900	$891,519
BRI_RG03	LGIP-29 SW	Bribie Island	Bongaree	Streetscape Raingardens	Various locations Bribie Island Catchment Bongaree - Streetscape Raingardens			2031-2036	$144,700	$210,136
BUR_RG01	LGIP-48 SW	Burpengary Creek	Burpengary	Streetscape Raingardens	Various locations Burpengary Catchment Burpengary - Streetscape Raingardens			2031-2036	$1,224,600	$1,778,390
BUR_WR05	LGIP-48 SW	Burpengary Creek	Burpengary	Natural Channel Design	Caccini Crescent Park Burpengary - Natural Channel Design	6,350	635	2031-2036	$3,541,700	$5,143,332
CAB_NCD05	LGIP-25 SW	Caboolture River	Caboolture	Natural Channel Design	Grace College, Caboolture - Natural Channel Design	3,750	375	2031-2036	$2,091,600	$3,037,466
PUM_RG03	LGIP-17 SW	Pumicestone Passage	Elimbah	Streetscape Raingardens	Various locations Pumicestone Passage Catchment Elimbah - Streetscape Raingardens			2031-2036	$613,900	$891,519
STAN_RG03	LGIP-03 SW	Stanley River	Stanmore	Streetscape Raingardens	Various locations Stanley River Catchment Stanmore - Streetscape Raingardens			2031-2036	$964,600	$1,400,813
LPR_RG01	LGIP-69 SW	Lower Pine River	Eatons Hill	Streetscape Raingardens	Various locations Lower Pine River Catchment Eatons Hill - Streetscape Raingardens			2031-2036	$5,056,000	$7,342,431
BUR_WR01	LGIP-48 SW	Burpengary Creek	Burpengary	Constructed Wetland	Crendon Street Park, Burpengary - Constructed Wetland	3,733	-	2031-2036	$754,100	$1,095,120
LPR_CW04	LGIP-65 SW	Lower Pine River	Strathpine	Constructed Wetland	Learmonth Street, Strathpine - Constructed Wetland	9,733	-	2031-2036	$1,966,100	$2,855,212
CAB_CW09	LGIP-32 SW	Caboolture River	Morayfield	Constructed Wetland	Christopher Place Park Morayfield - Constructed Wetland	2,267	-	2031-2036	$457,900	$664,972
TOTAL									$68,325,800	$94,660,986

Appendix A - Unit Rates

- A.1 Stormwater Quantity Unit Rates
- A.2 Stormwater Quality Unit Rates

Appendix A.1 - Stormwater Quantity Unit Rates

The following unit rates were used in estimating the costs of future trunk infrastructure works only.

2020 Unit Rates Infrastructure	Stormwater Quantity Description	Unit	Rate per unit
Detention Basin	Volume <15,000 m3	m^3	$66
	Volume <30,000 m3	m^3	$60
	Volume <50,000 m3	m^3	$54
	Volume <80,000 m3	m^3	$51
	Volume <120,000 m3	m^3	$47
	Volume <150,000 m3	m^3	$45
Culverts / Pipes	Circular DN600	m	$123
	Circular DN900	m	$282
	Circular DN1200	m	$461
	Circular DN1800	m	$946
	Box (mm x mm) 1200x600	m	$454
	Box (mm x mm) 1200x900	m	$528
	Box (mm x mm) 1200x1200	m	$566
	Box (mm x mm) 1800x900	m	$753
	Box (mm x mm) 1800x1200	m	$829
	Box (mm x mm) 1800x1500	m	$907
	Box (mm x mm) 2400x1200	m	$1,165
	Box (mm x mm) 2400x2400	m	$1,558
	Trenching	m^3	$307
Open Channel	Earthworks	m^3	$30
	Retaining	m	$185
	Landscaping/stabilisation	m^2	$12
Earthworks	Earthworks to cut (including Final Trim)	m^3	$33
	Earthworks to Fill (including Final Trim)	m^3	$54
	Profiling of Asphalt and Base course from 50mm to 300mm deep	m^3	$342

Note: If the cost for pipes and culvert with the exact dimensions weren't available in the unit rates, the cost for the next larger size was used.

Appendix A.2 - Stormwater Quality Unit Rates

2020 Unit Rates | Stormwater Quality		
Infrastructure	**Unit**	**Rate per unit**
Riparian Vegetation	m^2	$18
Natural Channel Design*	m	$5,000
Bioretention Basin	m^2	$270
Raingardens	m^2	$1,000
Conventional Constructed Wetlands	m^2	$175
Ephemeral Constructed Wetlands	m^2	$150

* Base width: 2m, Top width: 10m, Depth: 1m, Vegetation height: 1m, Stream slope: 1%.