

Sunshine Coast Council

Stormwater Management Strategy

Part A

AUGUST 2021



Sunshine Coast
COUNCIL

Our region.
Healthy. Smart. Creative.



August 2021 edition

sunshinecoast.qld.gov.au

T 07 5475 7272

Locked Bag 72 Sunshine Coast Mail Centre Qld 4560

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Acknowledgement of Country

Sunshine Coast Council acknowledges the traditional Country of the Kabi Kabi Peoples and the Jinibara Peoples of the coastal plains and hinterlands of the Sunshine Coast and recognises and appreciates their contribution to effective land and stormwater management. We wish to pay respect to their Elders – past, present and emerging – and acknowledge the important role Aboriginal and Torres Strait Islander people continue to play within the Sunshine Coast community.

Acknowledgements

Council wishes to thank all contributors and stakeholders involved in the development of this document.

Disclaimer

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Vision for stormwater management in 2041

The Stormwater Management Strategy sets the direction for stormwater management. Implementation of this strategy will help to deliver a healthy environment and liveable Sunshine Coast in 2041.

By 2041 population growth in the region has been conducted in a well managed and responsible manner, with minimal impacts to receiving waterways and proper consideration of stormwater flooding and other stormwater constraints.

The waterways and beaches that provide the Sunshine Coast with a sense of place, lifestyle and a connection to the environment have been protected and enhanced. They continue to offer amenity, contributing to community wellbeing and the economy.

Stormwater and rainwater are valued as a resource by the community. Rainwater harvesting and passive stormwater irrigation is standard practice. Appropriate stormwater harvesting measures have been implemented.

The volume of pollutants discharged to waterways has been reduced through the provision of stormwater treatment and water sensitive urban design. These stormwater treatment assets are well managed and maintained.

Recreation parks and sports grounds have been planned and designed to be more resilient to extremes of drought and flood and are irrigated by alternative water sources where feasible.

Urban areas are greener, with increased street trees and vegetation. Impervious areas that are directly connected to stormwater drainage have been minimised and infiltration and/or reuse of stormwater is encouraged.

Overland flow paths in urban areas have been provided and protected, ensuring that stormwater flooding of properties is minimised even if blockages of the

stormwater network occur.

Stormwater design guidelines provide contemporary, practical and useful guidance that helps the development industry and ensures effective stormwater infrastructure is ultimately contributed to Council.

The priority of infrastructure projects is based on which ones will achieve the most community benefit; investment is targeted to achieve a reasonable standard of service and improve resilience across the region.

Council has a thorough understanding of the performance, extent, specification and condition of the stormwater network and is able to prioritise, plan and coordinate maintenance and capital works appropriately.

Council is well placed to deliver necessary stormwater infrastructure while maintaining affordability for ratepayers.

Through defining desired standards of service and prioritising stormwater projects Council is well placed to manage the impacts of climate change on the stormwater network.

Improved agricultural practices, erosion and sediment control measures and riparian corridor regeneration has reduced sediment and nutrient loads entering local waterways.

The community understands and values effective stormwater management and plays an important role in maintaining clean and healthy waterways.





Introduction

Sunshine Coast Council's vision for the region is 'Australia's most sustainable region – Healthy. Smart. Creative'. Meeting the stormwater management needs of a growing community in a changing environment is critical to ensuring this vision can be realised.

The *Sunshine Coast Council Stormwater Management Strategy* (the strategy) outlines the future direction of stormwater management in the region.

With the support of Council and the wider community, the successful implementation of the strategy can address existing issues and help prepare the region for future challenges relating to stormwater management.

What is stormwater management?

Stormwater is runoff from rainfall. In urban areas it is captured by a series of pits and then conveyed underground through pipes and culverts. It also travels as surface flow in open drains, roadways, natural channels and overland flow paths. Stormwater is ultimately discharged to local waterways, which drain to the ocean.

The stormwater network is intended to be separate from the sewerage system. Unfortunately, illegal connections and/or overflows from the sewerage network do occur.

The stormwater network is designed to convey runoff from moderately intense rainfall events. During very intense rainfall events, or if the stormwater network is blocked, runoff volumes can exceed the capacity of the underground stormwater network. In these conditions, excess stormwater is conveyed over the surface which results in short term flooding of roads and other overland flow paths. Stormwater flooding is typically very localised. It is sometimes referred to as flash flooding. It is different to creek or river flooding and storm surge events, which are regional types of flooding. Inundation does not result from rising flood waters, as is often the case in regional flood events, but from conveyance of runoff overland. There is typically minimal warning time available prior to a stormwater flood event.

Stormwater flooding can be a risk to property and life, and negatively impact on the wellbeing of the community. It is therefore critical that there is sufficient awareness of the risk so that it can be appropriately managed and mitigated. This can include protection of conveyance pathways.

As stormwater runoff is conveyed over the landscape it becomes polluted with litter, sediment, nutrients, oils, chemicals and heavy metals. Water quality usually gets worse when stormwater is stored, leading to low oxygen levels, algal blooms, and other nuisance conditions. To protect the community and the environment, contaminated stormwater runoff needs to be intercepted and treated to remove pollutants before it is discharged or reused.

As the demand for water grows due to prolonged dry periods and increased population, stormwater will become a more valuable resource.

Stormwater management is the term used for planning, setting policy, implementing actions, and providing and managing stormwater infrastructure. Stormwater management aims to protect people and property from unacceptable flooding risks, ensure that adverse impacts to the natural and built environment are minimised, and utilise stormwater as a resource.



Purpose of the strategy

This *Sunshine Coast Council Stormwater Management Strategy* supports Council's Environment and Liveability Strategy (ELS). The ELS recognised that by planning and making sensible and timely choices, the Sunshine Coast could achieve a sustainable future. This strategy seeks to identify the key issues for Council specifically relating to stormwater management and to establish a series of objectives, strategic directions and actions to address these issues.

The strategy will build upon the work done in the ELS and other Council documents to provide a consistent, strategic direction for stormwater management on the Sunshine Coast. Like the ELS, the strategy will be used to:

- inform planning, including the drafting, review and amendments of Planning Schemes;
- guide decision making;
- drive implementation; and
- engage stakeholders.

An effective strategy helps to ensure that the importance of stormwater management is properly understood and valued by Council and the wider community.

As outlined in the ELS, development within flood storage preservation areas will continue to be avoided in order to protect the environmental, social and economic value of our regional floodplains. The preservation of regional flood storage is typically separate to stormwater management concerns.

Why we need to act now

This strategy seeks to provide long-term strategic direction to help shape the region and encourage immediate action to:

- limit damage to the natural environment
- respond to population growth in different and better ways
- actively prepare for growth and meet the needs and expectations of future communities
- appropriately prioritise, allocate and manage resources
- protect existing and future communities from stormwater flood hazards
- build resilience to climate change.

The stormwater management vision for 2041 is: Stormwater is managed for community wellbeing and resilience, facilitated by an integrated stormwater network that is effective, sustainable and contributes to waterway health.

It is necessary to act now so that Council's vision for stormwater management can be achieved. Through informed decision making, supported by smart planning and innovative use of technology and resources, Council can set the framework and direction for effective stormwater management.



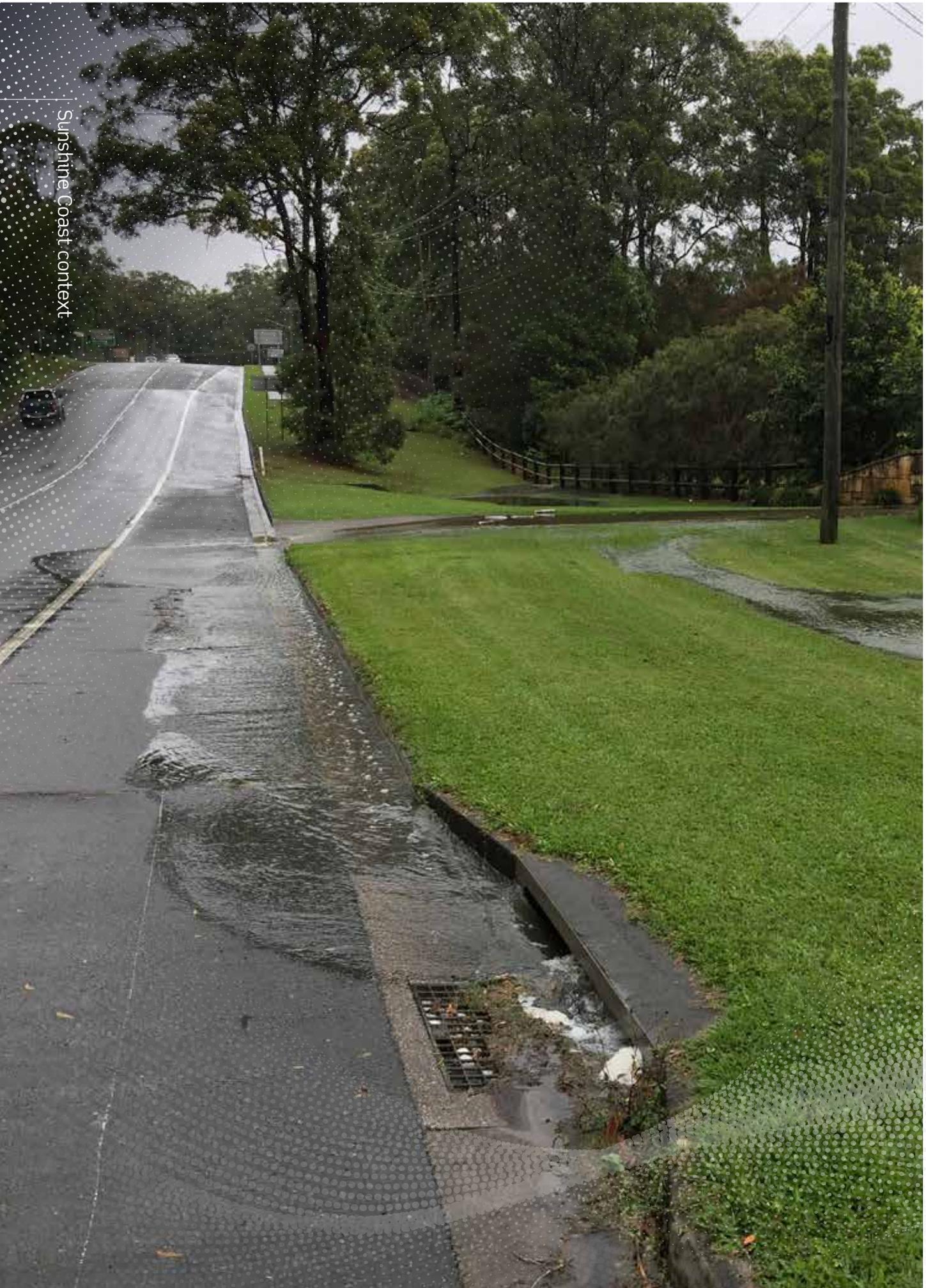
Drivers of change

The key drivers of change in relation to stormwater management include:

- more intense storms and rising sea levels, which will reduce the performance of existing stormwater networks
- forecast prolonged dry periods, which will increase demand on potable water supplies. Reuse of stormwater for non-potable uses will become more important to sustainable growth in the region
- increased impervious areas due to growth in the region, which will lead to increased runoff putting pressure on existing stormwater networks
- population growth in the region, which can place further stress on the health and stability of our waterways due to increased pollutant, nutrient and sediment loads together with more frequent and intense stormwater runoff
- ensuring that developable land provides for sufficient space for stormwater infrastructure and allowance for overland flows through urban areas
- land proposed for development is often challenged by flooding and stormwater constraints

- asset management and maintenance requirements are evolving with the growing volume, diversity and complexity of stormwater assets, particularly relating to those which implement water sensitive urban design (WSUD) principles
- changes to design information, standards and guidelines leads to different standards of service within individual stormwater networks. This creates complexities for integration with existing infrastructure
- preparation of policies and plans to help mitigate the risks associated with a changing climate and increased coastal hazards
- growing community expectations regarding the levels of service provided by the stormwater network
- new technology and resources enabling Council to better understand the condition, extent and performance of the stormwater network. This will allow Council to implement more effective planning and asset management.





Sunshine Coast context

The Sunshine Coast is widely acknowledged as a highly desirable place to live, work and play. This is due to abundant natural resources, subtropical climate, the health and amenity of waterways and beaches and the high quality of the built environment.

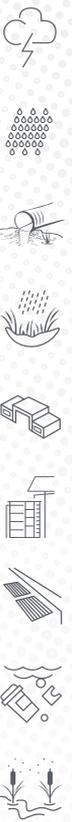
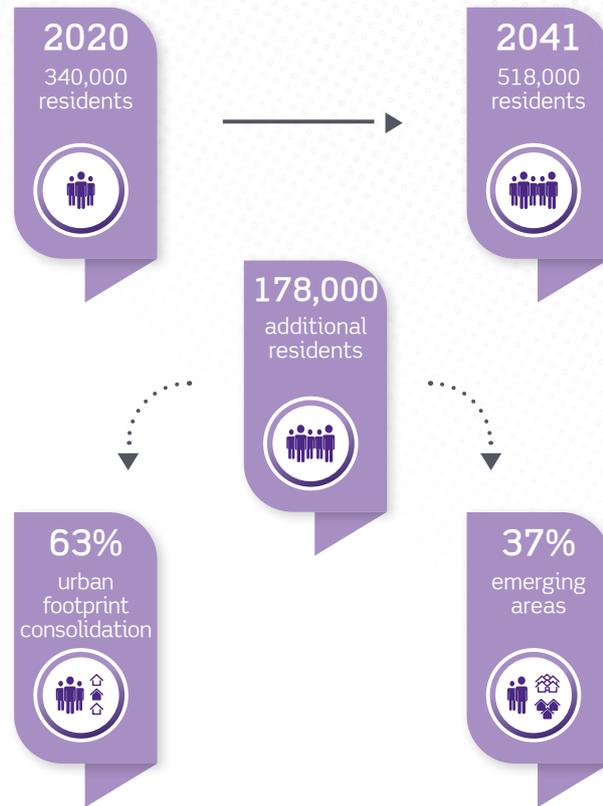
The Sunshine Coast Council Local Government Area (LGA) covers an area of 2,285 square kilometres. It currently has a population of approximately 340,000, expected to increase to around 518,000 by 2041. Roughly 37% of this growth is expected to occur in emerging areas, with the balance spread through consolidation of the defined urban footprint (SEQ Regional Plan 2017, DILGP).

The Sunshine Coast has an average annual rainfall of around 1700mm. This is characterised by intense storms over summer and early autumn, and a relatively dry period over winter and spring.

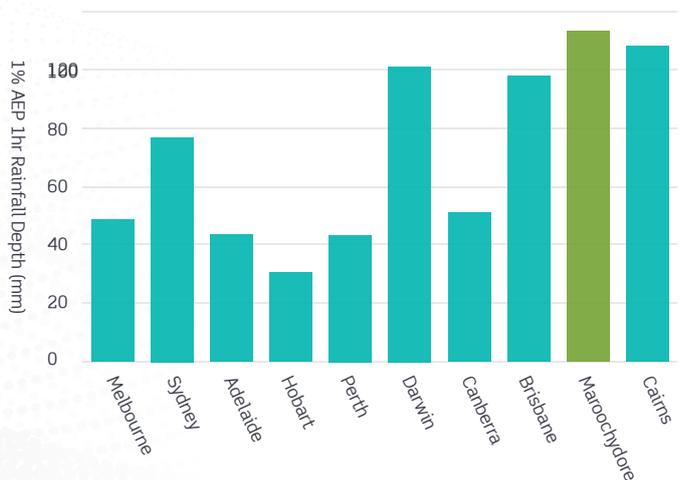
As shown in the graph, when compared to the rest of Australia, the Sunshine Coast can experience very intense rainfall during storm events. This creates many challenges for stormwater management.

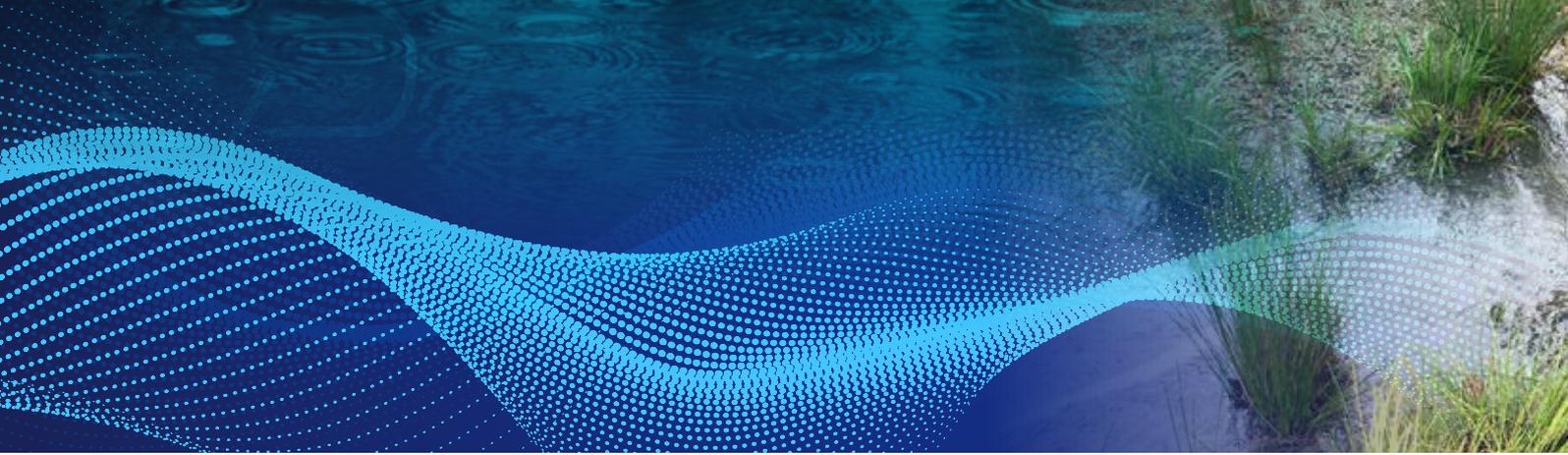
The region contains six major catchments – the Mary, Maroochy, Mooloolah, Noosa, Pumicestone Passage and Stanley – and 58 creeks. Creeks, rivers and beaches are an integral part of the healthy lifestyle of the Sunshine Coast community and they also support our economic prosperity. The ongoing health and amenity of the waters of the Sunshine Coast are often taken for granted. Effective stormwater management contributes to the protection of the environment and lifestyle we enjoy on the Sunshine Coast.

The actions and achievements of successive councils in partnership with the community have established a healthy and liveable region, creating a strong platform to respond proactively to change and the challenges that Council now faces.



Australian Government Bureau of Meteorology, 2016 IFD Design Rainfall





On the Sunshine Coast, stormwater is treated through a mix of engineered structures such as gross pollutant traps and more natural features such as wetlands, vegetated swales, bio-retention basins, bio-retention gardens and passively irrigated street trees. Stormwater treatment and flow detention structures are commonly co-located with parks, sportsgrounds and other areas at the boundary between the natural and built environments.

Rainwater is used in rural residential areas as a potable water supply. The uptake of rainwater harvesting for irrigation and toilet flushing in urban areas has been limited.

The Sunshine Coast is a region made up of contrasting landscapes and styles of development. These range from hinterland rural towns to coastal canal estates. Stormwater management and standards within urban areas have also changed over time. Older areas of urban development relied heavily upon pits, pipes and concrete lined channels, and did not appropriately consider extreme events or potential for blockage. As a result, there was often a lack of stormwater easements or formalised overland flow paths, which would convey excess stormwater in major events. Newer areas of urban development are characterised by denser styles of development and have provided more integration with Water Sensitive Urban Design (Stormwater Quality Improvement Infrastructure). They typically have better provision for stormwater easements and overland flow. This diversity of development, stormwater infrastructure, topography and geology creates different challenges for stormwater management in the Sunshine Coast region.

The majority of residents live within established urban areas along the coast. The coastal area is characterised by relatively flat, dense, urban development discharging to tidal waterways. With increased development and the impact of climate change, the effectiveness of existing stormwater networks will be reduced. Some low-lying areas will become more frequently inundated by backwater flooding and groundwater levels will

be more elevated. Backwater inundation through the stormwater network during high tides will mean that some low-lying roads will be frequently closed. Increased saltwater intrusion due to rising sea levels will also impact on the design life of stormwater infrastructure in these areas.

There are also some areas of older, low density urban development in the hinterland that can have steep topography. The stormwater networks in these areas will not be as affected by climate change as the coastal regions. However, due to changing design standards, these areas have typically been provided with low capacity stormwater networks without formalised easements or sufficient overland flow paths. Similar issues exist for older urban areas along the coast. Delivering development in existing urban areas to current standards can be challenging. Well managed urban transformation projects can provide an opportunity to improve the standard of service provided by the stormwater network by incorporating water sensitive design.

In new development areas, the density of housing is higher than has been previously observed in the region, with more slab on ground construction. WSUD measures have been incorporated into these developments, with varying levels of success. Council has needed to continually adapt its asset management and development guidelines to ensure that new technologies and denser styles of development are appropriately implemented.

Council's stormwater network has a current (2019) asset value of around \$1.5 billion. Since 2014 Council has acquired \$180 million of contributed stormwater assets. It is estimated that the stormwater network will have an asset value of around \$2 billion in 2041.

This significant infrastructure portfolio has to be maintained, renewed or upgraded to ensure an acceptable level of service for the entire community.



Council's stormwater assets are extensive and continually growing. Council currently owns and maintains approximately:

1500km
of stormwater
pipes and
culverts

63,000
stormwater
pits and end
standards

1300
gross pollutant
types or litter
baskets?

1550
bio retention
treatment
device

150km
of open drains





Planning for change

Key challenges and opportunities

In order to develop appropriate management strategies, it is necessary to first identify the key challenges and opportunities that will inform the direction of stormwater management on the Sunshine Coast.

Perceived value and visibility of effective stormwater assets

Unlike other types of infrastructure that are more visible or used by the community on a regular basis, the importance of effective stormwater assets is generally underappreciated by the community. It is typically only during severe storm events, or when waterways are noticeably polluted that the value of effective stormwater infrastructure is recognised and appreciated.

During prolonged dry periods the benefit of rainwater or stormwater harvesting is realised. Proactive planning is required to ensure that the necessary infrastructure is in place prior to it being needed.

Some stormwater assets, such as overland flow paths, will only be activated during severe storm events. Their function and value to the community can therefore go largely unrecognised.

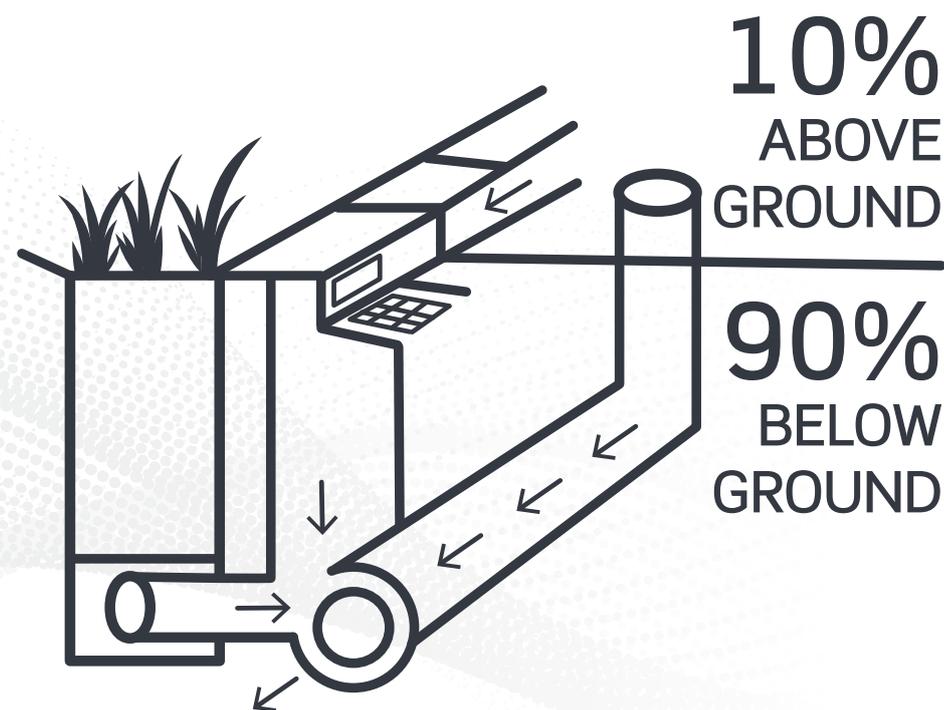
Moving forward, greater awareness of the importance of effective stormwater management is required.

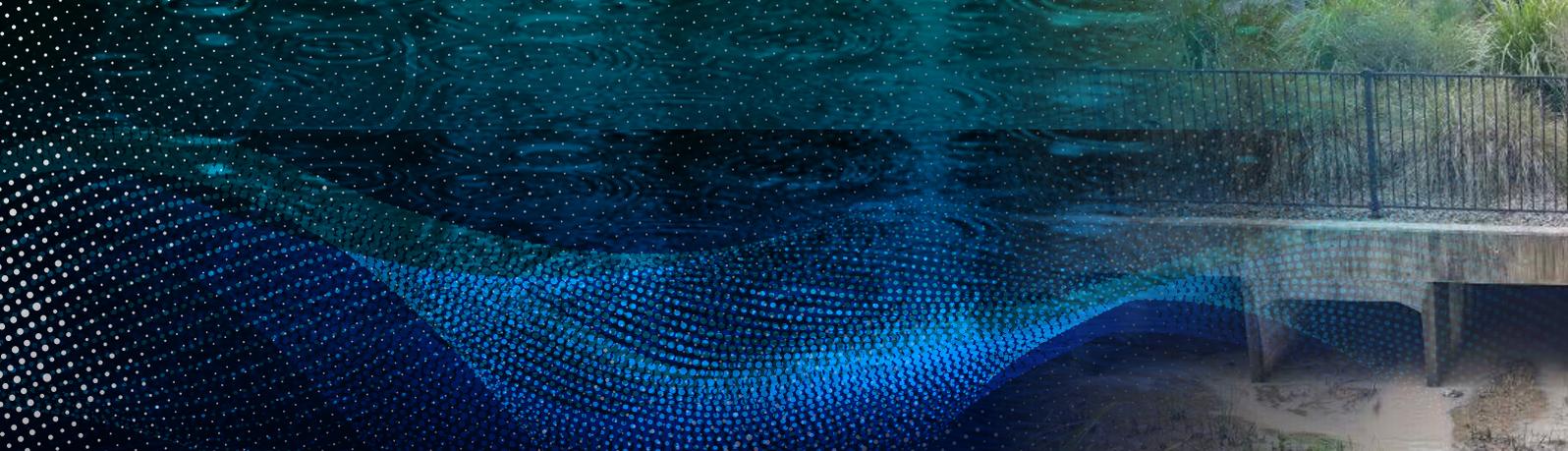
Climate change

Projected increases in rainfall intensity and increased sea levels will increase the magnitude, frequency and duration of local stormwater flooding. Some low lying areas will become more frequently inundated by backwater flooding and groundwater levels will be more elevated. Increased saltwater intrusion due to rising sea levels will also impact on the design life of stormwater infrastructure in these areas.

The Sunshine Coast is currently planning for a 20% increase in rainfall intensity, a 0.8m increase in sea level by 2100 and prolonged dry periods.

There will likely be a need to adjust Council policy responses as new climate change science and State and Federal policy becomes available. Further detail of the required responses is provided in Council's Coastal Hazard Adaptation Strategy.





Improved modelling and mapping

Recent developments in flood and drainage modelling will enable Council and the community to get a better understanding of the performance and capacity of the stormwater network and the extent of stormwater flooding.

Council is currently undertaking detailed modelling and mapping of overland flow paths with the inclusion of underground stormwater infrastructure. This will provide Council with comprehensive stormwater flood and drainage performance information.

This information will have multiple uses. It will assist sustainable and responsible development by:

- raising awareness of stormwater flood and drainage issues
- aiding in prioritisation of upgrade projects and assisting with asset management
- avoiding future stormwater flood issues, particularly for urban densification.

The ELS specified a target for the Flooding and Stormwater theme that ‘all urban areas have local area drainage models by 2041’. In recognition of the importance of this information, Council has accelerated the program of delivery of these models and is currently on track to deliver this outcome by 2022. These models will require regular updates.

Improved stormwater quality modelling, particularly on a catchment wide scale, can enable stormwater treatment to be targeted to areas where it will provide the most benefit to the environment, or identify areas where additional treatment may be required.

Increased impervious area

Increased impervious areas due to development leads to less infiltration of rainfall and therefore increased runoff. This places additional pressure on existing stormwater networks.

Increased impervious area can also place further stress on the health and stability of our waterways due to increased pollutant, nutrient and sediment loads and more frequent and intense stormwater runoff.

Development in existing urban areas

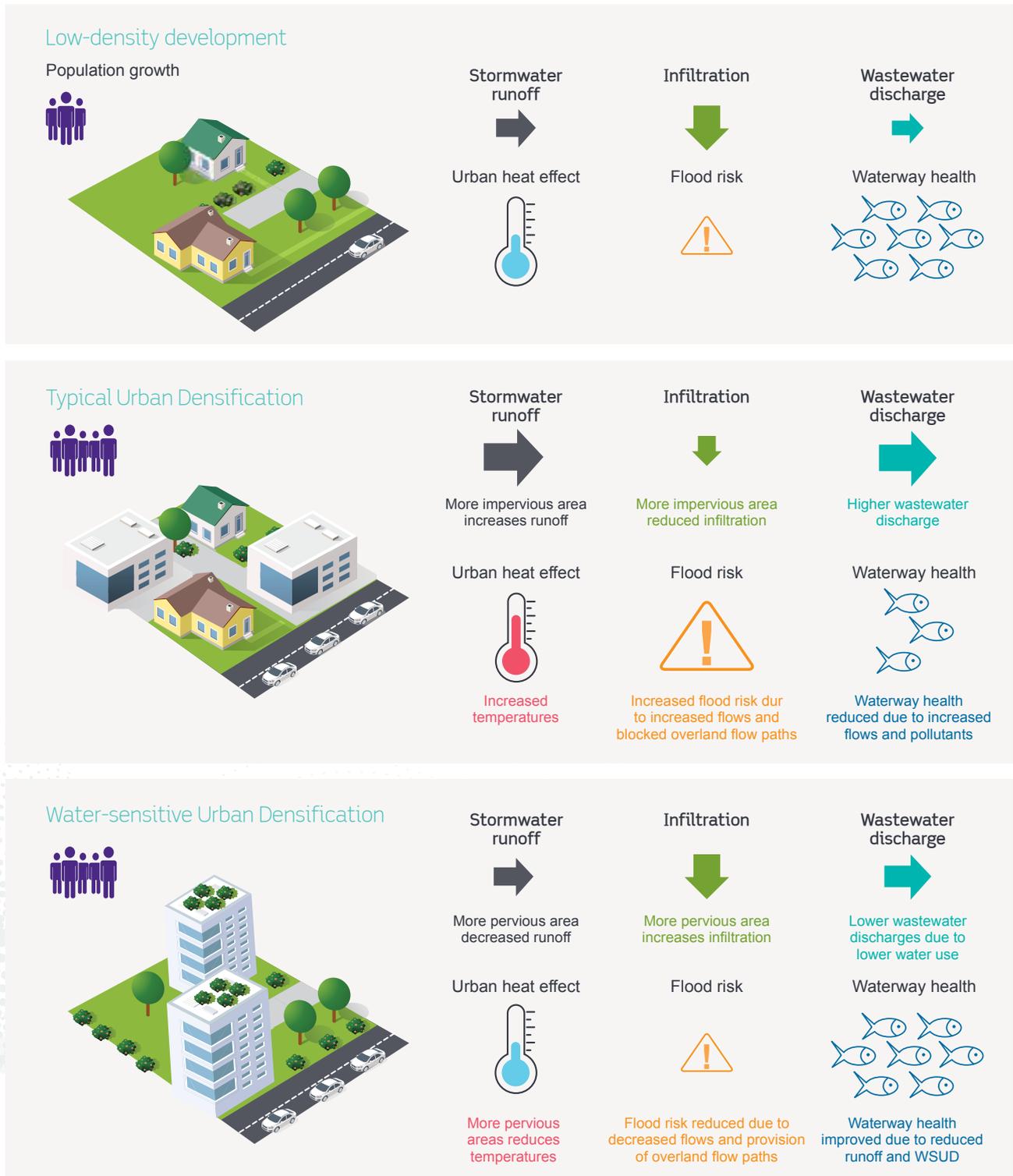
Increased development in existing areas, such as subdividing one lot into two, or building a larger house on an existing lot, or denser forms of development such as multiple dwelling units, can all increase the amount of impervious area. Due to the increase in impervious area, holistic stormwater network planning is required in order to ensure that increased flows can be accommodated and appropriate overland flow paths are provided.

Council’s ELS and the SEQ Regional Plan encourage urban densification (increased density in existing urban areas) in order to reduce the environmental and economic costs of urban sprawl. Any development in existing urban areas needs to properly consider all constraints relating to stormwater, so that existing and future communities are provided with sufficient safety and amenity.

When urban renewal and densification is done in a water sensitive manner, the potential increase in impervious area and changes to local hydrology can be minimised and potable water demands can be reduced. The incorporation of WSUD principles can further enhance the liveability of these spaces by providing biodiversity, landscape and urban cooling benefits.



The following image shows the potential benefits of water sensitive urban densification.



Diversity and volume of stormwater assets

As the urban footprint continues to expand, the challenges for Council relating to asset management and maintenance will also grow. The diversity, volume and complexity of the types of stormwater assets, particularly assets relating to stormwater quality, is rapidly increasing. Appropriate processes and resources for asset management and maintenance are required for this growing asset base. This will help to ensure the ongoing effectiveness of the stormwater network for the entire region.

Stormwater computer models are also considered to be stormwater assets that will require ongoing maintenance and regular updates to ensure that information is current.

Modern asset management and digital technology

An improved asset management framework and asset management strategy, coupled with improved knowledge of the stormwater assets, will allow Council to implement more effective asset management and planning.

Advances in asset management and digital technology have increased the volume of data that can be collected and used for asset management purposes.

Asset management based on understanding the performance and condition of the stormwater network will improve the informed decision making process that supports effective stormwater management.

Changing design standards and methodology

New development in existing urban areas will typically require different standards of service to surrounding development. This creates complexities for integration with existing infrastructure. Ensuring compliance with changing standards and design methods is an important but challenging aspect of Council's role in effective stormwater management.

In many cases the design standard may not have changed but new design methods or changes in design rainfall information may identify shortcomings in existing infrastructure.

Sustainable design

Sustainable design is a holistic approach that takes into consideration climatic, ecological, social and economic needs and is key to supporting healthy, affordable, and functional buildings and neighbourhoods while minimising impacts on the natural environment. Council is producing guidance on how to implement sustainable design on the Sunshine Coast. Council also has measures within the Planning Scheme to encourage:

- reductions in directly connected impervious area
- reuse of rainwater and stormwater
- natural treatment measures
- infiltration of stormwater
- more effective stormwater treatment
- increased open space.

Sustainable design practices will reduce pressures on the stormwater network, potable water supplies and waterway health.

Prioritisation

Developing a transparent prioritisation framework to assess the benefit an individual project provides will improve capital works and Local Government Infrastructure Plan (LGIP) planning. It will also ensure that projects with the greatest community benefit are prioritised when funding is limited.



Planning for climate change

Assessing the performance of the stormwater network for different climate change scenarios will assist Council and the community to prepare for a changing climate and prioritise resources accordingly.

Resilient homes

In some instances it may not be possible or practicable to upgrade the stormwater network to resolve existing stormwater flooding issues. In these circumstances it may be more cost effective and efficient to improve the resilience of properties impacted by stormwater flooding. This can be done through measures such as wet proofing, raising electrical appliances and raising structures.

'Resilient homes' is the collective term for mitigating the risk of flooding by the modification of existing building materials and design.

New buildings and renovations must ensure that potential stormwater flooding issues, and measures to improve resilience are considered in the design.

Community awareness and engagement

Existing programs that promote environmental awareness and disaster resilience can be leveraged to help educate the community about the value and importance of effective stormwater management. New programs may also be necessary to assist with communicating information or promoting action.

Increased environmental awareness and engagement of the community will help to maintain the liveability of the region. By providing opportunities to participate in conservation and waterway protection programs, the community will be able to:

- experience the natural environment
- play their part in a sustainable and resilient future
- build social connections.

Other considerations

The remaining challenges and opportunities that need to be considered when planning for change have been summarised below.

Lack of access and control

Easements often do not exist over older public stormwater infrastructure located on private land. The Local Government Act provides Council with the rights to access, maintain and rehabilitate infrastructure as required, even if easements do not exist. However, practical access for maintenance is often limited.

Sufficient drainage easements have often not been provided for overland flow paths, which are required to convey major storm flows when the underground network capacity is exceeded.

When urban densification occurs, it is often necessary to acquire easements as part of the development approval to ensure a lawful point of discharge is available.

Increased development – growth areas

Ensuring new development in greenfield areas is designed and constructed correctly, and does not cause unacceptable impacts to the environment or existing development is an ongoing requirement of Council.

The large-scale developments in the region classified as Priority Development Areas (PDA) are administered by Economic Development Queensland (EDQ). Council does not have a planning assessment role for these areas and has no control over the timing, quantity or quality of infrastructure being delivered to Council for ongoing operation and maintenance. Council can help to inform the design standards used during the infrastructure agreement negotiations.





Good

Overland flow accommodated underneath building. Flow conveyance capacity maintained.



Bad

Filling within overland flow path. Flow conveyance capacity reduced. Flooding above floor level.

Changing housing styles

Older styles of housing were typically smaller and were often built on structure, which would allow flows underneath the building during large storm events. In recent years, new styles of housing have usually taken up the majority of the lot and are built on concrete pads. These types of buildings can be more susceptible to stormwater flooding and can block existing flow paths if not designed and sited correctly. They can also increase the amount of runoff being discharged to existing stormwater networks.

By incorporating good Sunshine Coast design principles and WSUD, many of the stormwater management issues related to housing can be minimised.

Staging of works

The staging of works can be complicated, as upgrades can often rely on surrounding works to be completed in order to provide a well functioning drainage solution. Interim works are sometimes required in order to manage impacts to surrounding properties.

Development within infill areas with a Master Drainage Plan (MDP) may be reliant on trunk infrastructure that might not be delivered in the near future (for example: recreation parks and

sports grounds). It is therefore necessary to ensure urban densification is managed in a way that provides sufficient local flood immunity for interim and ultimate design solutions.

Land use planning

Previous land use zone changes often did not sufficiently consider stormwater and local flooding requirements due to a lack of information. Development of land based on its zoned use and rectification of drainage issues can therefore be problematic.

The new Planning Scheme will be informed by the outcomes of this strategy and additional stormwater information obtained by improved modelling. This will help to ensure that stormwater constraints and local flood risks are considered during land use planning.

Complementary co-location of uses

Stormwater infrastructure and overland flow paths are often located in areas used for multiple purposes, such as parks, environmental reserves, roads and carparks. This is done to efficiently use available land. These multiple uses are not typically able to be completely separated. The co-location of uses needs to be understood and appropriately accommodated in a manner that is complementary and in doing so does not



compromise any one use and ensures that safety, equity and amenity are maintained. If done well, the complementary co-location of uses can enhance the urban environment and improve the function of the stormwater network.

In some cases, successful incorporation of WSUD may provide an additional benefit to public open space by encouraging interaction, providing education and improving aesthetics.

Privately owned stormwater quality assets

Privately owned and maintained stormwater infrastructure forms an important part of the network. Their continued effectiveness is crucial to the ongoing health of the region's waterways. The volume and complexity of these assets is also increasing and can become an ongoing maintenance burden for property owners. When conditioned as part of a development approval, the ongoing maintenance of these devices can be enforced. Council does not currently have a program in place to ensure that these privately owned assets are being properly maintained.

Data management

Information on the performance and capacity of stormwater networks is often limited to anecdotal evidence. Information on the condition of stormwater assets can be difficult and expensive to capture and relies on technologies such as CCTV.

Unlike other infrastructure such as roads, deterioration or failure of the stormwater network is not easily identifiable.



Information on stormwater assets has been compiled into corporate GIS datasets. This has been sourced from old drawings, development plans, site surveys and Asset Design as

Constructed (ADAC) files. This dataset is an important resource and the work required to gather and manage this data has contributed to Council's strong stormwater management position. However, the quality of the source information is often poor or missing completely, particularly for older assets delivered prior to digital ADAC information being required. Information on the condition of stormwater assets is also limited.

Information on state government stormwater assets is not included in Council's datasets and is often difficult to source. This can make it problematic to undertake stormwater modelling on a catchment wide scale.

By taking advantage of continual improvements to data management practices and technologies involved in the capture and storage of stormwater network information, Council will be able ensure that informed decisions are being made.

Renewal or upgrade requirements

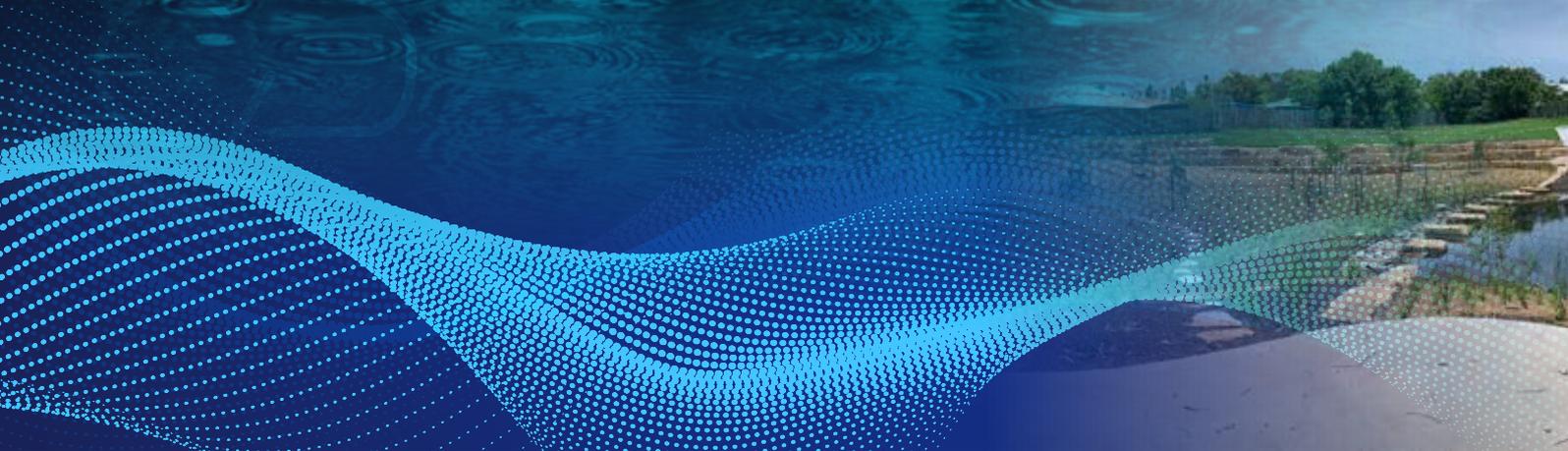
Region wide stormwater modelling is currently being undertaken. Without this information, renewal works (replacing or extending the life of existing infrastructure) were often reactionary and did not take into account the overall performance of the network and the potential need for upgrades. While renewal can increase operating performance through improved condition, this may not be sufficient to address shortfalls in the network.

Knowledge sharing

In order to achieve coordination of the many disciplines and objectives relating to stormwater management, the sharing of knowledge within Council is required.

Council's WSUD Working Group is an excellent example of how a collaborative approach can improve outcomes for Council, the development industry and the community.





Improved land management practices

Better agriculture and land management practices that reduce the amount of sediment and nutrients entering waterways are an important aspect of catchment management.

Farming practices which minimise the use of fertilisers, chemicals, herbicides and pesticides, and prevent the loss of topsoil are becoming more common. This type of agriculture will help to improve waterway health.

Land management practices which focus on minimising erosion and protecting and revegetating waterway corridors should continue to be encouraged through Land for Wildlife and Environment Levy programs.

Tree planting

Increased tree planting has multiple benefits such as:

- reducing the urban heat effect
- intercepting rainfall
- reducing stormwater runoff
- improved amenity.

Partnerships with external stakeholders

Partnerships and collaboration with the development industry, universities, other service utilities, state or federal governments and community groups can be explored and leveraged where there are clear benefits to Council, the community and the environment that can be achieved in a cost effective manner.

Infrastructure agreements with and between private developers may help to deliver better outcomes for the environment and the community.

Design guidance for development

Useful and clear design guidance for development can help to ensure that stormwater infrastructure that is contributed to Council is:

- functional
- well designed

- minimises hazards to the community
- reduces impacts to the environment
- utilises opportunities for effective service co-location.

Practical guidelines may reduce the complexity of stormwater designs and simplify the development assessment process.

Ongoing monitoring of contributed assets to understand what works and what does not is critical to the improvement of design guidelines.

On-site detention storage

When development increases impervious area there is a corresponding increase in stormwater runoff volume and peak discharge. On-site detention aims to reduce peak discharge to match the existing conditions and can therefore reduce the need to upgrade trunk stormwater infrastructure.

If infiltration and/or stormwater re-use is not incorporated, the volume of runoff will be increased even when on-site detention is used. This can lead to an increase in the duration of bankfull flows, which accelerates the rate of creek erosion. Measures to reduce the volume of stormwater runoff are therefore also required when discharging to unlined natural waterways.

The effectiveness of on-site detention is dependent on the catchment drainage characteristics and correct application throughout a catchment. In some locations, on-site detention can be difficult to design and install.

Rainwater tanks

Due to our high rainfall totals and water demands, studies have found that the Sunshine Coast is the most cost-effective location for a rainwater tank in South East Queensland (Hall, 2013).

In addition to reducing potable water demands, rainwater tanks reduce the volume of runoff and pollutants being discharged to the stormwater network. The use of rainwater tanks is therefore encouraged for new and existing development.



Rainwater tanks cannot be relied upon to reduce peak stormwater discharges as they are typically full prior to intense rainfall bursts and can be easily modified by the property owner.

Stormwater harvesting

Stormwater harvesting enables stormwater runoff to be used for non-potable water demands such as irrigation. Stormwater harvesting has traditionally required storage, treatment, pumping and dual reticulation. The alternative to traditional stormwater harvesting is passive stormwater harvesting, which removes or reduces the need for storage, treatment, pumping and dual reticulation, and so has a relatively low cost. Passive stormwater harvesting directs runoff from impervious surfaces such as car parks and roads to garden areas; decreasing irrigation demands on potable water, improving plant health and reducing the volume of runoff (and associated pollutants) that enters the stormwater network.

Traditional stormwater harvesting can significantly reduce reliance on potable water. In suitable locations it can be retrofitted into existing stormwater networks; diverting low flows to underground storage or using existing open water storages when appropriate. Traditional stormwater harvesting is often constrained by high costs and the availability of storage.

Both types of stormwater harvesting (passive and traditional) can significantly reduce the volume of pollutants and runoff being discharged to local waterways. They can therefore be used as part of a stormwater treatment train and so be delivered as part of development.

New technologies

New technologies, such as stormwater pipe relining, automated flood barriers, flooded road sensors, high efficiency sediment control basins, hydro mulches and backflow prevention valves can lead to improved stormwater management outcomes.

Prior to broadscale adoption on the Sunshine Coast, new technologies and innovations need to demonstrate effectiveness and that they will not be a burden or liability for Council to maintain and operate over the life of the asset.

Ageing infrastructure

Older areas of the region have deteriorating and often under-sized stormwater infrastructure, which requires renewal or upgrades in order to improve the standard of service. It is estimated that approximately 15% of the stormwater network will require some rehabilitation over the next 20 years.

Auditing privately owned assets

Council has the ability to audit private developments to ensure that they are maintaining their stormwater assets to the desired standard.

Given the significant proportion of the network that is privately owned, auditing could help to achieve improvements for the region in relation to both stormwater quality and quantity.

The following issues will also need to be considered when determining the future direction of stormwater management in the region:

- Inappropriate construction and materials
- Illegal works
- Multiple stakeholders
- Difficulty estimating costs of stormwater projects
- Resourcing
- Funding
- Added complexity of detailed design and construction in built up environments
- Changing legislative requirements
- Service conflicts and site constraints
- Quality of stormwater assets contributed to Council and property owners.





Roles and responsibilities

Council

Council has a key role, as an infrastructure provider and custodian, to plan, deliver and manage the stormwater network. Council is responsible for addressing problem drainage or water quality areas, maintaining the function of the Council owned stormwater network and renewing or replacing degraded or damaged infrastructure.

It is the responsibility of Council to plan and deliver the stormwater quality and conveyance infrastructure required to meet the demands of regional growth. Council can encourage and facilitate good design outcomes through the Planning Scheme and its supporting policies, manuals and guidelines.

Council also has a responsibility to determine policies and plans to respond to a changing climate and to identify and implement cost effective adaptation options.

As the lead agency for the assessment of development applications on the Sunshine Coast, Council has a role in ensuring that all aspects of new developments are delivered to the expected standard and meet planning scheme requirements. Contributed stormwater assets, delivered by development, must be fit for purpose. Where these standards are not met, Council may pursue the responsible party for rectification works, professional misconduct or negligence.

Council is also a regulatory agency that is responsible for ensuring the community complies with Council local laws, some of which relate to stormwater.

Council has a role in helping to maintain a healthy and safe community. Stormwater infrastructure hazards, dangerous stormwater flooding and unsafe water quality conditions need to be avoided and/or appropriately managed.

It is also important for Council to play a leadership role by demonstrating the implementation of best practice through the sustainable design and construction of its own buildings, infrastructure and public spaces. This includes implementing best practice erosion and sediment control measures.

State government

The state government is responsible for the planning, delivery and maintenance of state roads, and the stormwater infrastructure associated with these roads.

The state's road and stormwater network has impacts on how Council's stormwater network functions. Collaboration and understanding are critical to the ongoing performance of state and Council infrastructure.

The large-scale developments in the region are administered by EDQ, which is the state government's land use planning and property development unit. The state government sets the regional planning and policy framework to sustainably manage change and growth.

The state government is responsible for monitoring the quality of surface freshwater and groundwater systems across Queensland. They determine the water quality guidelines for stormwater and set out environmental policy and legislative requirements for development and other environmentally relevant activities.

The Queensland Reconstruction Authority (QRA) provides funding and resources for disaster management, resilience, recovery and mitigation policy. QRA works collaboratively with other agencies and key stakeholders such as Council to reduce risk and bolster disaster preparedness.

Development industry

Stormwater networks and stormwater quality treatment measures which service urban developments are generally designed and constructed by developers and handed to Council as contributed assets. A large proportion of assets constructed by developers remain as private assets but are relied upon by Council for the proper functioning of the network. The design of stormwater assets is required to comply with Council's Planning Scheme (unless within a PDA), the Queensland Urban Drainage Manual (QUDM) and other relevant guidelines.

Before assets are contributed to Council they must go through the on/off maintenance process and any defects must be rectified. All relevant



Drainage easements located in private property remain the responsibility of the property owner to maintain, keep clear of debris and ensure that the natural flow of stormwater is not inhibited. Council has the right to access and maintain drainage easements in private property if necessary.

Property owners should seek drainage and flood information from Council when undertaking works on their property. Property owners should engage suitably qualified providers to undertake works.

Urban property owners can contribute to the health of local waterways and an effective stormwater network by:

- regularly cleaning gutters and drains
- installing gutter guards
- maintaining existing rainwater tanks
- installing rainwater tanks for outdoor irrigation and/or toilet flushing
- installing downpipe diverters for passive irrigation of garden areas
- minimising exposed bare soil
- minimising impervious surfaces
- installing permeable pavement
- installing raingardens
- ensuring leaf litter is not swept into stormwater drains
- suitable storage and disposal of fuels and chemicals
- limiting use of fertilisers, herbicides and pesticides, particularly prior to rainfall and in riparian areas
- ensuring erosion and sediment control practices are implemented during construction or building works.

Rural property owners have a responsibility to minimise the impact their industry has on the environment and surrounding community. Catchment modelling of pollutant loads of the Maroochy, Mooloolah and Pumicestone

catchments was conducted for Healthy Land and Water (BMT, 2018). As shown in the next image, this report identified that total loads of sediment and nutrients from non-urban sources were higher than from urban sources, due to the greater area of non-urban land use in the Sunshine Coast region.

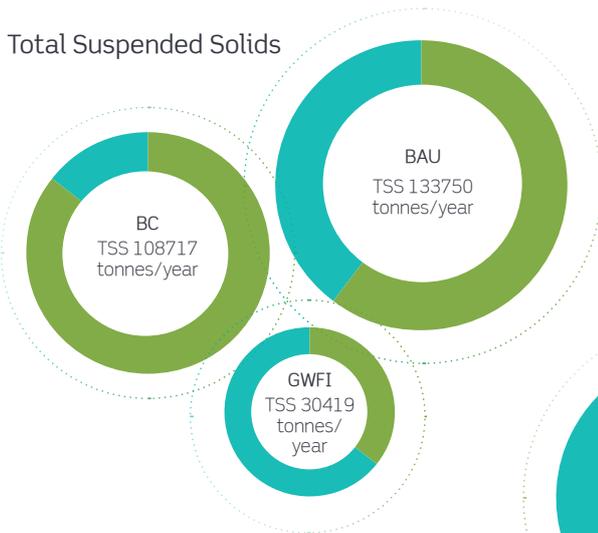
Environmentally sensitive agricultural practices and land management are therefore an important component of effective stormwater management. Rural property owners can contribute to the health of local waterways by:

- maintaining and enhancing riparian vegetation and undertaking activities with sufficient setbacks from waterway corridors
- riparian fencing
- install formalised waterway crossings
- off-stream watering, reducing access of livestock to riparian areas
- weed and farm management practices that minimise soil disturbance, particularly prior to rainfall
- minimising exposed bare soil and using erosion and sediment control measures
- suitable livestock effluent management
- suitable storage and disposal of fuels and chemicals
- regular maintenance of septic tanks and rainwater tanks
- land slip stabilisation
- limiting use of fertilisers, herbicides and pesticides, particularly prior to rainfall and in riparian areas.

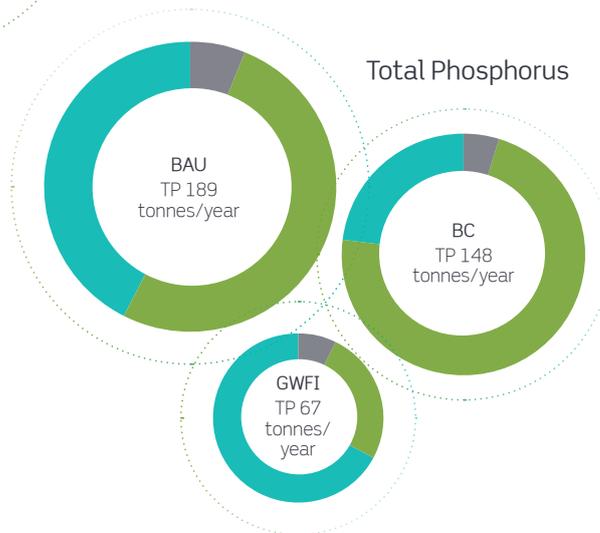


This image shows how total pollutant loads in the Maroochy, Mooloolah and Pumicestone catchments will increase if growth occurs without sufficient investment in stormwater management.

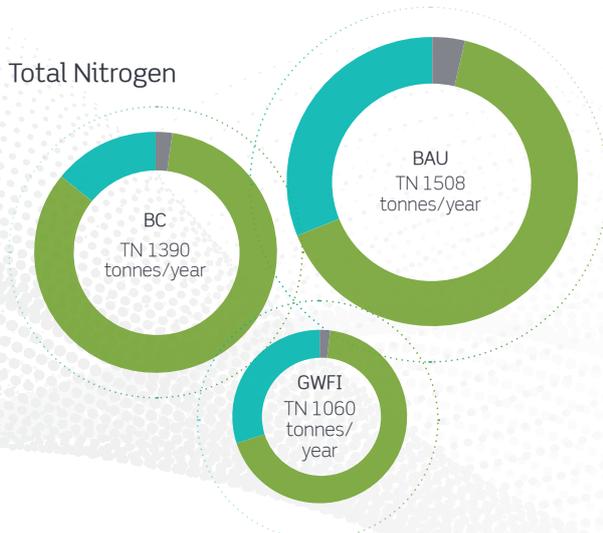
Total Suspended Solids



Total Phosphorus



Total Nitrogen



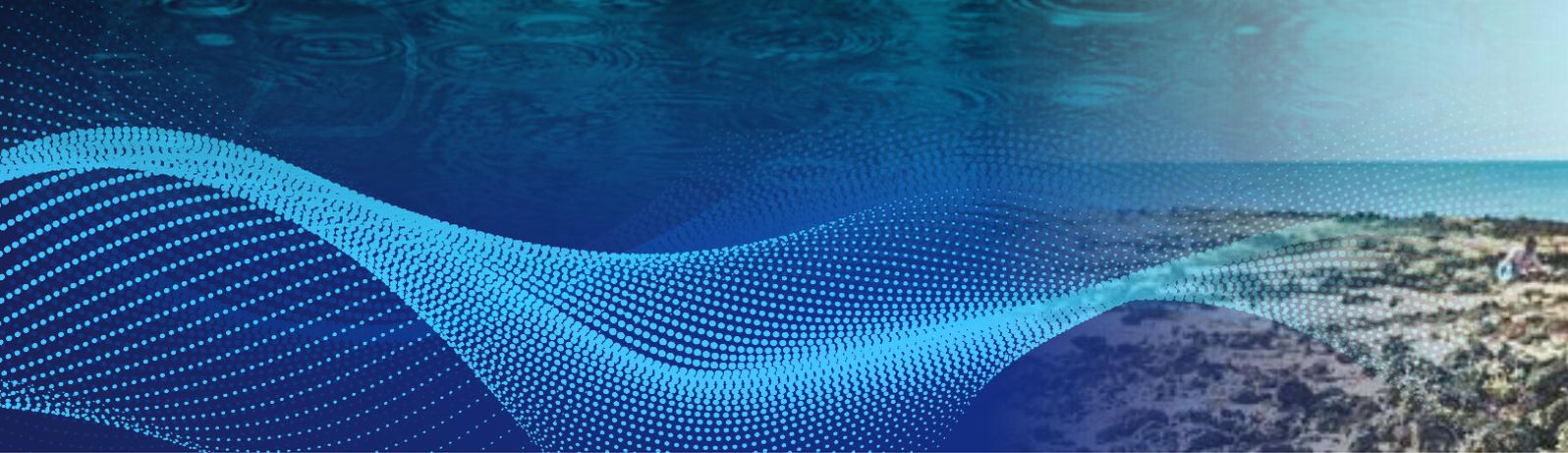
Legend

- STP
- Non Urban
- Urban

BAU Business as Usual
 BC Base Case
 GWFI Growth with Full Investment

BMT 2018, EHP Target Loads Modelling, February 2018





information for ongoing management and maintenance should be provided to Council prior to off-maintenance being reached.

When assets remain in private ownership the professionals involved must certify that the assets have been constructed to the required standard prior to the use of the development commencing.

Professionals who provide design and/or construction services on the Sunshine Coast are responsible for the effectiveness and integrity of the infrastructure they deliver. Design and construction is required to be certified by a Registered Professional Engineer of Queensland (RPEQ).

During construction, the developer is required to implement appropriate erosion and sediment control measures, and ensure chemicals and litter do not enter the stormwater network. This is critical to maintaining the health of downstream waterways, as the potential load of sediment and pollutants during the construction stage is typically much higher than when a site is fully established.

Property owners

Property owners can include:

- individuals owning rural land or detached urban houses
- body corporates controlling townhouse or unit developments
- corporations operating large industrial or commercial properties.

Property owners are responsible for maintaining private internal drainage (including driveway culverts) and inter-allotment drainage, even when located within an easement. Council will not become involved in civil disputes between neighbours regarding the obstruction of inter-allotment drainage and any relating defects.

It is the property owner's responsibility to ensure that stormwater is managed in an acceptable way within their property boundaries, and that known blockages are cleared prior to storm events.

Owners of property are required to accept natural overland flow from adjoining properties, public land and roads, and must not concentrate or redirect the flow from its natural path onto neighbouring properties, unless directing flow to a lawful point of discharge. Downstream property owners cannot erect any type of barrier that interferes with the natural path of stormwater if this may prevent upstream owners from enjoying the 'normal' use of their land. For example, when constructing a boundary fence across an overland flow path, the downstream property owner must take reasonable care to ensure that the fence design minimises nuisance to other persons or properties.

Persons blocking or altering natural run-off of water on public land may be held responsible for the damages caused under Council's local laws.

Property owners are required to manage run-off on their property by installing suitable drainage infrastructure and directing flow to a lawful point of discharge without unacceptably impacting on other parties. Common lawful points of discharge include a formal Council drain, road reserve, on-site dispersion system, natural watercourse or stormwater drainage easement. When discharging to a lawful point of discharge, written consent will be required and it must be demonstrated that when this flow passes to private property there will not be a worsening or loss of enjoyment.

Drainage easements may be required on private land to preserve and protect overland flow paths or to provide certainty that developed land is able to be drained in perpetuity.

These drainage easements provide Council or the upstream property owner the ability to direct stormwater through or discharge onto the property. Some easements may just be for overland flow while others will contain stormwater infrastructure. Generally no structures or landscaping works are allowed in easements unless it can be demonstrated that the function of the easement is not compromised and access is maintained.



Community

The community has an important role to play regarding effective stormwater management. Examples of how the community can contribute to the health of local waterways include:

- correct disposal of litter, chemicals and animal waste
- washing vehicles on grassed areas or at designated car washes
- involvement with local environmental groups and clean-up events
- picking up litter
- notifying Council of problems and potential hazards
- providing feedback to Council when documents like the ELS and this strategy are prepared.

Only with the involvement and support of the community can the environmental values and lifestyle of the Sunshine Coast region be protected and enhanced

The community also has a responsibility to abide with all local laws and avoid hazards relating to stormwater, e.g. not driving on flooded roads, not playing in stormwater drains or not swimming in lakes and rivers immediately after rain.



Policy and planning context

Statutory requirements

There are statutory requirements for stormwater management that must be complied with. These include:

- Queensland Land Act 1994
- Environmental Protection (EP) Act 1994
- Queensland Local Government Act 2009 (e.g. Chapter 3 Part 3 Division 2 Stormwater Drains)
- Sunshine Coast Council Local Laws (e.g. No. 3 Part 5 17 (g), (h), (ha))
- Queensland Development Code
- State Planning Policy (SPP) July 2017
- Queensland Planning Act 2016 and associated regulations and guidelines.

Council guidelines, policies and strategies

Council has several guidelines, policies and strategies which relate to stormwater

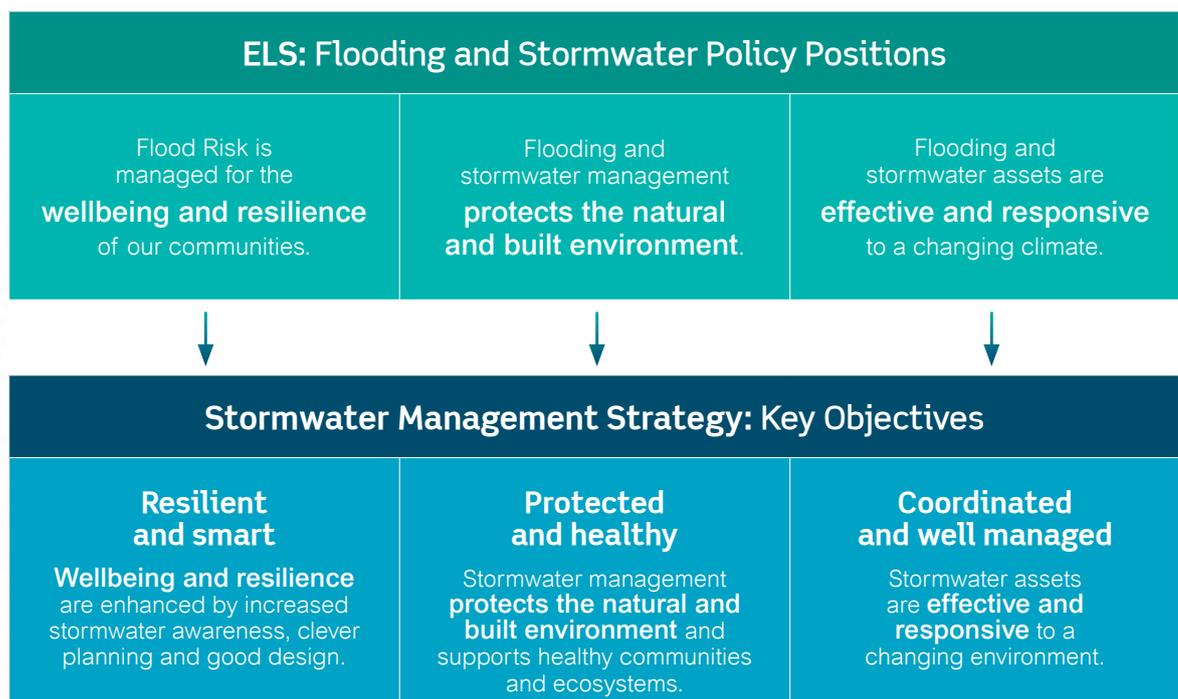
management. These include:

- Flooding and Stormwater Management Guidelines
- Stormwater Asset Management Plan 2017/18-2022/23
- Environment and Liveability Strategy 2017
- Sunshine Coast Planning Scheme.

This strategy builds upon and informs these documents in order to provide a consolidated, strategic direction for stormwater management on the Sunshine Coast. These documents should still be referred to for more specific information and guidance.

Since the amalgamation of Sunshine Coast Council in 2008 this is the first Stormwater Management Strategy that has been prepared.

This strategy supports the Flooding and Stormwater theme in Council's Environment and Liveability Strategy 2017 (ELS), with additional detail specific





to stormwater management. Preparation of this strategy was also a task identified in Part B of the ELS. The strategy does not replace or supersede the Flooding and Stormwater theme in the ELS.

The three main Flooding and Stormwater policy positions of the ELS have informed the three key objectives of this strategy as shown in the image on the previous page.

The ELS Outcome 2041 for Flooding and Stormwater, that “flood risk is managed for community wellbeing, facilitated by an integrated stormwater network that contributes to waterway health”, has been used as the basis of the vision for this strategy. Many of the policy positions outlined in this strategy have been derived from those in the ELS. The strategy will help to deliver the five strategic pathways defined in the ELS:

- 1 A resilient region shaped by clever planning and good design.
- 2 Protection and enhancement of our natural assets and distinctive landscapes.
- 3 Responsive, accessible and well managed assets and infrastructure.
- 4 Transitioning to a sustainable and affordable way of living.
- 5 A reputation for innovation and sustainability.

The ELS, along with the Regional Economic Development Strategy and the Community Strategy form the three long-term strategic policy positions of Council and work together to inform corporate and operational planning and delivery.

The Sunshine Coast Council Corporate Plan sets the vision, goals, strategic pathways and priorities for a five year period and directly informs the operations of Council. The Corporate Plan’s vision to be ‘Australia’s most sustainable region – Healthy. Smart. Creative.’ reflects a balance in the economic, social and

environmental objectives. The ELS provides detail on the delivery of outcomes which aim to maintain and enhance the region’s natural assets, liveability and environment.

This strategy will provide a structured framework of objectives, strategic directions and actions which complement the ELS.

In conjunction with the Integrated Transport Strategy, the Waste Management Strategy, the Coastal Hazard Adaptation Strategy and the Sunshine Coast Design Strategy, the Stormwater Management Strategy is integral to achieving a healthy environment and liveable Sunshine Coast.

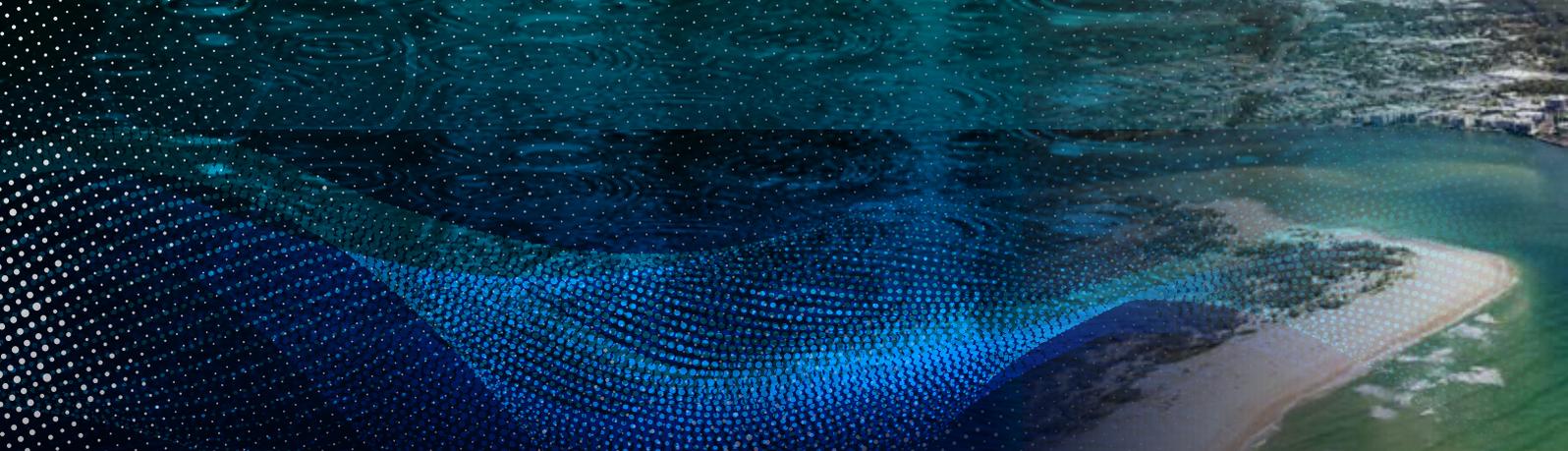
The Planning Scheme is used to guide the implementation of Council’s long term policy positions through the development process and articulate how sustainable development is to occur in the region. It is a living document which can be amended through a statutory plan making process.

Council’s Flooding and Stormwater Management Guidelines provide detail on how to satisfy the codes and policies of the Planning Scheme. These guidelines also provide practical interpretation of how to apply recent updates to Australian Rainfall and Runoff (ARR) and the Queensland Urban Drainage Manual (QUDM).

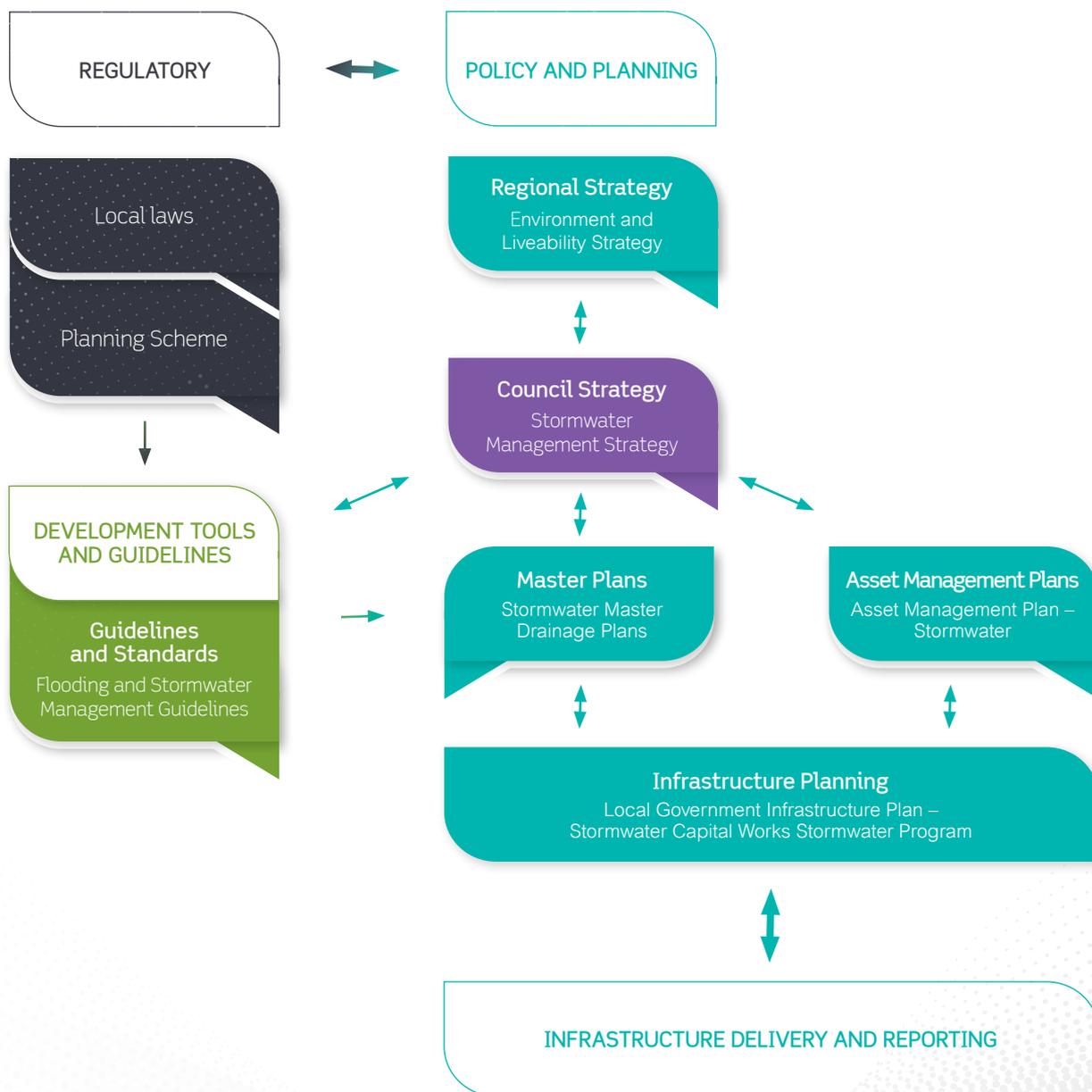
This strategy supports Council’s strategic asset management planning by providing clear policy and strategic direction that seeks to ensure coordinated management and maintenance of stormwater assets and improved asset management and knowledge of stormwater assets.

The image on the next page demonstrates the relationship between this strategy and Council’s other plans and strategies.





Policy and planning context





Local Government Infrastructure Plans

Under the Planning Act 2016 local governments are required to have a Local Government Infrastructure Plan (LGIP). An LGIP is a part of the Planning Scheme that identifies the trunk infrastructure that is necessary to service urban development at the desired standard of service in a coordinated, efficient and financially sustainable manner.

The purpose of an LGIP is to:

- integrate infrastructure planning with the land use planning identified in the Planning Scheme
- provide transparency regarding a local government's intentions for the provision of trunk infrastructure
- enable a local government to estimate the cost of infrastructure provision to assist its long term financial planning
- ensure that trunk infrastructure is planned and provided in an efficient and orderly manner
- provide a basis for the imposition of conditions about infrastructure on development approvals.

The Sunshine Coast Council LGIP identifies stormwater quality and stormwater capacity infrastructure qualifying as trunk infrastructure.

The planning methodology for the stormwater network considers the trunk infrastructure required to service growth and meet the desired standard of service.

New development places additional demand on existing infrastructure beyond the extent of the development footprint, as new residents make use of:

- community facilities, beaches, waterways and open space
- shopping centres and commercial precincts
- industrial areas
- tourist facilities.

In recognising the impact external to development, developers are required to pay infrastructure charges.

Maximum Infrastructure Charges are set by the State Government through the Planning Regulation.

The Stormwater Infrastructure Charges are directed towards the design and construction of stormwater quality and stormwater capacity infrastructure identified in the Stormwater Network Schedule of Works. Consistent with the legislative framework, Infrastructure Charges do not contribute towards the ongoing maintenance of existing trunk stormwater networks or to addressing problems that are not associated with servicing growth.





Strategic vision and objectives

The vision is that stormwater is managed for community wellbeing and resilience, facilitated by an integrated stormwater network that is effective, sustainable and contributes to waterway health. The stormwater vision for the Stormwater Management Strategy has been informed by Council's corporate goals.



The vision will be realised through three key objectives:

1. Resilient and smart.
2. Protected and healthy.
3. Coordinated and well managed.

To achieve the key objectives a range of strategic directions has been identified. Strategic directions describe the main principles guiding how each of the key objectives can be accomplished.

The ten strategic directions are:

- 1 **Resilient and smart:**
 - 1.1. Understanding stormwater flood risk and stormwater network performance.
 - 1.2. Strategic identification and designation of land and assets.
 - 1.3. Sustainable, smart and functional design.
- 2 **Protected and healthy:**
 - 2.1. Effective stormwater treatment and water quality management.

- 2.2. An informed and engaged community and industry.
- 2.3. Compliance and accountability.

- 3 **Coordinated and well managed:**
 - 3.1. Coordinated management and maintenance of stormwater assets.
 - 3.2. Sustainable levels and standards of service that are fit for purpose.
 - 3.3. Improved asset management and knowledge of stormwater assets.
 - 3.4. Prioritised and coordinated delivery of works.

Policy positions and detailed actions

Policy positions and detailed actions have been developed for each key objective. The detailed actions are provided in Part B of the strategy. It is expected that these will be regularly updated to incorporate new initiatives and changing technology.

What will it mean for the community?

Implementation of an effective strategy will provide the Sunshine Coast community with:

- an increased understanding of stormwater flood risk – this will help to ensure that properties and infrastructure are properly designed and situated. Improved understanding and management of risks will reduce the frequency and extent of storm damage and therefore improve the resilience of the community and sustainability of development
- healthy waterways and beaches – these will continue to provide valued amenity and contribution to the region's economy
- a more liveable, safe and green urban environment. Integration of WSUD measures and incentives for sustainable design should reduce the urban heat effect and provide an urban landscape more connected to nature
- better defined desired standards of service coupled with strategic and targeted investment in stormwater infrastructure aimed at maximising community benefit
- better coordination of stormwater projects with other Council projects in the same area, reducing costs and inconvenience to ratepayers
- reduced reliance on potable water and increased resilience during droughts, as rainwater and stormwater will be better utilised as resources.
- improved guidance for development to reduce the costs and complexity of stormwater design and provide more comprehensive consideration of stormwater issues
- increased awareness within the community of the value and importance of effective stormwater management
- increased resilience to the effects of climate change
- the ability to accommodate future population growth in the region.



Strategic framework

In order to provide a clear direction for stormwater management, a way of easily communicating how the vision can be achieved was required. This is the purpose of the strategic framework provided in the following image. The strategic framework demonstrates how implementing the policy positions and direct actions, from the strategic directions, will achieve the strategy's key objectives. When these objectives are achieved the vision for stormwater management in the region will be realised.

Our Strong Community	Our Environment and Liveability	Our Resilient Economy	Our Service Excellence	Our Outstanding Organisation
Stormwater Vision 2041 Stormwater is managed for community wellbeing and resilience, facilitated by an integrated stormwater network that is effective, sustainable and contributes to waterway health.				

Objective 1: Resilient and smart Wellbeing and resilience are enhanced by increased stormwater awareness, clever planning and good design	Objective 2: Protected and healthy Stormwater management protects the natural and built environment and supports healthy communities and ecosystems	Objective 3: Coordinated and well managed Stormwater assets are effective and responsive to a changing environment
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Strategic directions		
1.1 Understanding stormwater flood risk and stormwater network performance	2.1 Effective stormwater treatment and water quality management	3.1 Coordinated management and maintenance of stormwater assets
1.2 Strategic identification and designation of land and assets	2.2 An informed and engaged community and industry	3.2 Sustainable levels and standards of service that are fit for purpose
1.3 Sustainable, smart and functional design	2.3 Compliance and accountability	3.3 Improved asset management and knowledge of stormwater assets 3.4 Prioritised and coordinated delivery of works
Policy positions	Policy positions	Policy positions
Detailed actions	Detailed actions	Detailed actions





Objective 1: Resilient and smart

Wellbeing and resilience are enhanced by increased stormwater awareness, clever planning and good design.

The first key objective of the strategy is to improve the wellbeing of the community and resilience of our infrastructure through clever planning and good design.

In order to achieve the resilient and smart key objective, three strategic directions have been identified:

- 1.1 Understanding stormwater flood risk and stormwater network performance.
- 1.2 Strategic identification and designation of land and assets.
- 1.3 Sustainable, smart and functional design.

Strategic direction 1.1: Understanding stormwater flood risk and stormwater network performance.

With new or further development in existing urban areas, an understanding of the performance of the existing stormwater network and the extent and capacity of overland flow paths are crucial to managing flood risks. New development must be situated and designed so that it is not subject to stormwater flooding and does not negatively impact on existing properties. Additional guidance on how to appropriately accommodate overland flow paths within infill development areas is required.

Improved understanding of stormwater flooding is also essential for disaster management, so that safe evacuation routes can be determined, and at-risk properties can be identified.

Identification of areas subject to backwater flooding is critical to determining where backwater prevention devices or other adaptation strategies are required. With the impact of climate change, coastal stormwater networks may require protection in order to maintain serviceability and ensure trafficability of local roads.

It is necessary that the existing and future capacity of the stormwater network is well understood so that existing and future drainage issues can be differentiated and risks can be managed.

Detailed flood modelling using 1D/2D rainfall on grid analysis can be used to identify complex overland flow paths in urban environments as well as determining the capacity of the stormwater network and the impact of a changing climate. Stormwater flood maps can be prepared for a range of Annual Exceedance Probabilities (AEP), and the potential impact of structure blockage can be understood.

Planning must be able to quantify the risks resulting from a changing climate so that cost effective and appropriate adaptation options can be implemented.

Master Drainage Plans (MDPs) are being prepared for urban areas. These plans will identify the necessary upgrades to trunk stormwater drainage and drainage easements that are required to maintain the desired standard of service. Well managed urban transformation projects can provide an opportunity to upgrade the standard of service provided by the stormwater network.

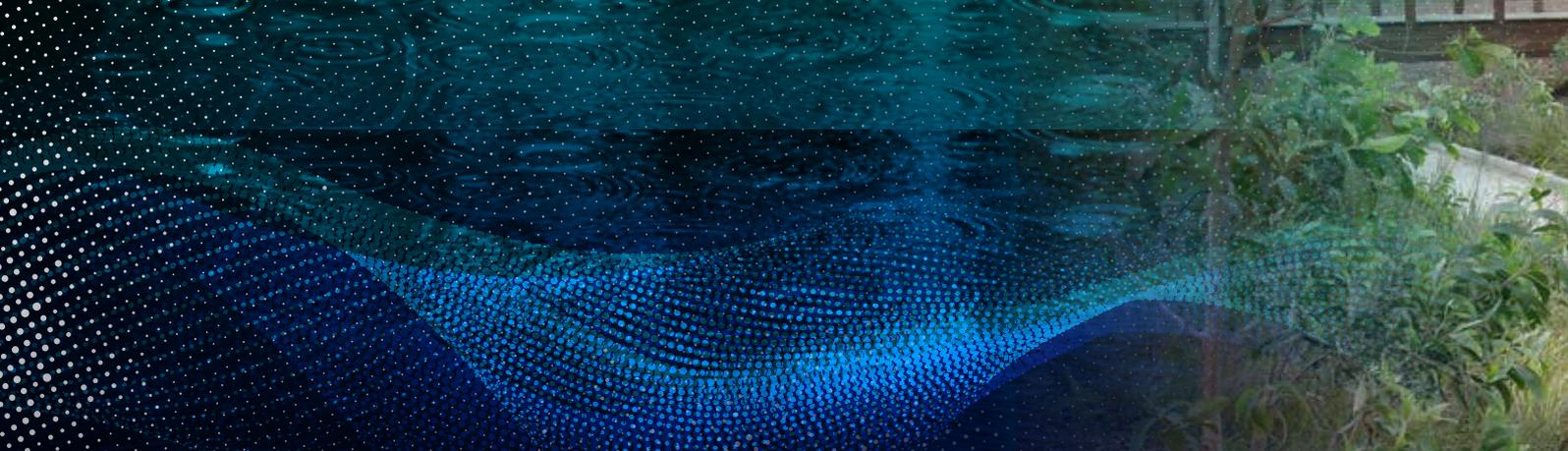
It is important to ensure that urban densification is guided by the recommendations of MDPs. The recommendations in MDPs therefore need to be flexible enough to ensure development can proceed without unacceptable interim flood or drainage impacts.

Flood and overland flow path mapping should be publicly available so that the community is informed and resilience can be improved.

Flood searches should aim to identify all forms of potential flooding for a lot and provide guidance on appropriate minimum floor levels where possible.

Flood depth markers or flooded road warnings can be used where stormwater flood modelling has identified roads where depths may be untrafficable.





Strategic direction 1.2: Strategic identification and designation of land and assets.

In order to undertake strategic identification of land and the assets required to maintain a functioning stormwater network, sufficient understanding is required of the:

- performance of the stormwater network
- extent of stormwater flooding
- existing and future land uses
- potential impacts of climate change
- opportunities to cost effectively mitigate the impact of development and climate change.

Drainage easements and overland flow paths need to be identified and protected. MDPs should inform not only trunk infrastructure planning but the conditioning of private development. This planning should be communicated to the development industry and the broader community. Development conditions for affected lots need to be accessible, easily understood and lawful.

Land that may be required for regional stormwater quality management purposes should be identified and designated for this purpose. A broad understanding of catchment pollutant loads, the needs of the receiving environment and applicable stormwater treatment measures is required to identify suitable locations.

Critical future stormwater assets and upgrade requirements (identified by MDPs, backflow analysis or the asset manager) should be included in corporate datasets, so that works can be more easily coordinated with other Council, government or private developer works.

Council owned land that serves a stormwater function must be correctly identified and designated for management and maintenance purposes. The integration of stormwater projects/assets onto land that has another use needs to be complementary and must not compromise the other use.



Strategic direction 1.3: Sustainable, smart and functional design

Design guidelines and conditions that can be easily understood, applied and assessed are essential to ensuring development can proceed in a sustainable and responsible manner. Council’s guidelines should be regularly updated so that they provide contemporary and relevant design advice to the industry. Council’s codes and policy should also be regularly updated, as they provide the benchmarks for assessment.

Practical guidelines should help to ensure that stormwater infrastructure contributed to Council is functional, well designed, safe and unlikely to become a burdensome maintenance issue for Council.

Sustainable, smart and functional design will help to maintain the resilience of the community and liveability of the region. Council’s Sunshine Coast Design Strategy aims to inspire good design of new communities, building, streets and spaces.

New development is required to provide a lawful point of discharge. Council’s definition of lawful point of discharge is provided in Council’s Flooding and Stormwater Management Guidelines. Council’s requirement for lawful point of discharge is that it provides certainty that development is able to be adequately drained in perpetuity.

A key policy position of this strategy is to protect and enhance local flood conveyance pathways by providing overland flow paths under easement when lots are redeveloped. In existing urban areas, the mapping of local overland flow paths will identify overland flow paths that need to be protected as part of the conditions of development.

Development is to provide and/or protect overland flow paths so that flooding is minimised in extreme events or if blockage of the stormwater network occurs. To achieve this outcome, mapping and proper consideration of overland flow paths must be incorporated into assessment benchmarks, including those for self-assessable development.

Alternative flood resilience measures for existing properties impacted by stormwater flooding should be considered in order to improve sustainability and functionality.



Policy positions

The policy positions that support the 'resilient and smart' strategy objective include:

- 1.1. Land for stormwater management is appropriately allocated, located and designated for its purpose.
 - a) Rezoning is informed by Master Drainage Plans, overland flow paths and stormwater network capacity.
 - b) Developer contributed land which is inundated in a 5% AEP (1 in 20) local or regional flood event is designated for stormwater purposes.
 - c) The integration of stormwater assets into land that has another use needs to be complementary and must not compromise the other use.
 - d) Land for stormwater purposes is provided in addition to minimum land requirements for open space recreation, sport and landscape purposes.
- 1.2. Development will be provided with acceptable flood risk and will not burden emergency services.
 - a) Appropriate stormwater flood immunity and freeboard provisions are provided.
 - b) Floor levels are set above the severe storm or complete blockage scenario.
 - c) The stormwater network is designed to be safe at all times.
 - d) An overland flow path should be provided. Where this is not possible it must provide underground drainage with PMF capacity.
 - e) Habitable floor levels are not reliant on backflow prevention systems or flood barriers.
- 1.3. Stormwater flood immunity or resilience of existing communities is improved through the exploration of effective flood mitigation or resilience measures where practical and cost effective.
 - a) The cost of flood mitigation measures should not exceed the value of assets being protected.
 - b) Flood mitigation measures should consider future climate conditions.
 - c) Where flood mitigation measures are impractical, alternative approaches to improve resilience to flooding are to be considered.
 - d) Staging of stormwater network upgrades and development works must consider and manage impacts.
- 1.4. Stormwater network planning considers the potential impact of climate change on performance and condition and responds to climate change adaptation strategies and plans.
- 1.5. Disaster management planning considers flood risks from stormwater.
- 1.6. Stormwater flood risk information is made publicly available in a form that is easily understood.
 - a) Flood information searches are required for all development.
 - b) Community safety and lifestyle amenity is improved through awareness and education initiatives.
 - c) Publicly available mapping is to include local overland flow path information where available.
 - d) Roads subject to flooding are identified.



- 1.7. Stormwater flood conveyance pathways are protected and enhanced.
- a) Overland flow paths are identified and protected.
 - b) Drainage easements are kept free from structures or modifications that may impede overland flow.
 - c) Approval is required to conduct work within drainage reserves and easements.
 - d) Protection of overland flow paths has precedence over filling for flood immunity, in locations where filling is permissible.
 - e) Opportunities to enhance overland flow are explored in order to improve the performance of existing stormwater networks, and should not be constrained to existing Council owned or managed land.
 - f) The use of Council owned land for the purpose of improving the performance of the existing stormwater network must not compromise the primary function or ecological value of the land.
 - g) When modifications are made to overland flow paths it must be ensured that impacts are contained within the same property.
 - h) Existing Council owned or controlled land that is inundated in a 5% AEP local flood event is recognised as having a stormwater purpose.

- 1.8. Appropriate stormwater infrastructure and easements are provided with new development.
- a) Overland flow paths and stormwater infrastructure are provided under drainage reserve or easement when lots are developed.
 - b) Overland flow paths created as a result of new development should not traverse private urban residential property.
 - c) Stormwater networks are designed to accommodate fully developed upstream catchments.
 - d) Detention systems are used when necessary to control peak discharges.
 - e) The design and construction of new open channels follows natural channel design principles and includes freeboard provisions.
 - f) The performance of the stormwater network must not be reliant on rainwater tanks.
- 1.9. Lawful point of discharge arrangements must provide certainty that development is able to be adequately drained in perpetuity.
- 1.10. Infrastructure is designed to be effective until the end of its design life.
- a) The effects of climate change are considered in design.
 - b) Saltwater protection is used in locations where the stormwater network may be subject to tidal inundation within the design life of the pipe.



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Objective 2: Protected and healthy

Stormwater management protects the natural and built environment and supports healthy communities and ecosystems.

The second key objective of the strategy is to ensure stormwater management contributes to and supports a healthy and sustainable natural and built environment. This is essential to the lifestyle and health of our community.

Effective stormwater treatment and implementation of water sensitive urban design (WSUD) is critical for the management of pollutants in stormwater and to support good Sunshine Coast design in the built environment.

WSUD aims to:

- minimise impervious surfaces and use of formal drainage systems
- encourage infiltration (where appropriate) and stormwater reuse
- preserve natural watercourses
- protect water quality of surface and ground waters
- minimise demand on potable water supply
- minimise sewage cross connections
- integrate stormwater drainage into the landscape, enhancing amenity for the community.

In order to achieve the protected and healthy key objective, three strategic directions have been identified:

- 2.1 Effective stormwater treatment and water quality management.
- 2.2 An informed and engaged community and industry.
- 2.3 Compliance and accountability.

Strategic direction 2.1: Effective stormwater treatment and water quality management.

During rainfall, pollutants such as litter, sediment, nutrients, oils and chemicals are washed into local waterways. Nutrients originate from leaf litter, animal waste and fertilisers. Sediment comes from the exposed soil of land cleared for housing, industry, roads, farming and other infrastructure work.

This polluted runoff can:

- reduce water quality in creeks and rivers
- smother in-stream habitats
- reduce fish numbers
- negatively affect aquatic life
- cause toxic algal blooms
- cause sediment plumes off recreational beaches
- block stormwater systems.

Most waterway pollution is preventable.

Litter loads can be reduced by correct disposal of rubbish, regular street sweeping and volunteer clean-up programs. Gross pollutant traps and stormwater inlet litter baskets should also be considered for use in high litter areas.

Sediment loads can be managed by using appropriate erosion and sediment controls during construction and agriculture activities.

It can also be prevented by:

- protecting, revegetating and rehabilitating land and waterway corridors
- installing appropriate scour protection on hydraulic structures or areas of concentrated flow.

Waterway buffers as required by the Biodiversity, Waterways and Wetlands Overlay Code, are an important feature of sustainable development. In urban and rural zoned areas a buffer width of 10 to 25 metres is required from the high bank of mapped waterways or wetlands.

Nutrient loads can be reduced by improved agricultural practices, preventing leaf litter and animal waste from entering drains, responsible application of fertilisers and biological stormwater treatment.

Oils, chemicals and other toxic pollutants should be prevented from entering stormwater and/or appropriately treated. Methods to prevent these pollutants from entering waterways include correct storage and disposal, protection from rainfall or runoff and adequate spill containment.



Stormwater treatment measures include:

- gross pollutant traps (GPTs)
- oil and sediment separators
- litter baskets
- trash racks
- vegetated or grassed swales
- permeable pavement
- sedimentation basins
- passively irrigated street trees
- wicking beds
- green roofs
- buffer strips
- bio-retention tree pits, swales, gardens and basins
- media filtration systems
- constructed wetlands.

These stormwater treatment measures target different types of pollutants with varying degrees of treatment efficiency. Stormwater treatment measures must consider site constraints and the pollutants of most concern. Above a specified threshold set by the State Planning Policy (SPP), the Planning Scheme requires reductions in unmitigated development pollutant loads for applicable development and attenuation of frequent peak flows when draining to an unlined waterway.

For development which falls below the specified threshold, alternative stormwater treatment measures are still required to be implemented. These alternative approaches provide simplified solutions which focus on stormwater and rainwater reuse, passive irrigation and increased infiltration of runoff. These simplified solutions for small developments provide better stormwater quality outcomes than are currently required by the SPP.

The State Planning Policy – Water Quality is currently being reviewed by the State. A review of Council's guidance for stormwater management will be required when the State Planning Policy is updated.

With increased development and population

density in the region, the volume of pollutants will be increased. Developers are required to provide stormwater treatment that reduces pollutant loads as part of their development. This level of treatment reduces the amount of pollutants from a development relative to no treatment being provided; however it may still result in an increase in pollutant loads compared to a natural catchment condition. For greenfield development sites this can mean that there is a shortfall in treatment provided by development. Additional regional stormwater treatment measures provided through LGIP help make up this shortfall.

Off-site stormwater solutions have been implemented by a small number of other Councils in Queensland. This solution allows the developer to defer their obligation to provide stormwater treatment in lieu of a voluntary payment to Council. The intent being that this money is then used by Council to deliver an equivalent regional stormwater treatment solution elsewhere.

In order for off-site stormwater treatment to be effective, an equivalent regional treatment device(s) should be installed in the same catchment at a similar time to the development being offset. Planning and detailed design of regional off-site stormwater treatment would need to occur before funds are collected from development. Similarly, integrity principals require a transparent governance system to account for the collection and expenditure of funds and to demonstrate temporal and spatial equivalence of stormwater treatment is being achieved. This shift in responsibility from developers represents a significant burden and risk for Council. Until such time that this burden and risk is suitably addressed, Council does not support a policy of off-site stormwater treatment that transfers developer responsibilities to Council.

Council recognises that it is possible for off-site solutions to occur where there is no transference of developer responsibility to Council. This could occur



when nearby developments collaborate through an infrastructure agreement to deliver holistic stormwater treatment measures that satisfy the pollutant load reduction requirements for the combined sites. This may be a particularly effective approach for some challenging sites that find it impractical to satisfy stormwater treatment requirements on-site or on their own. It is also recognised that traditional approaches for such sites can result in ineffective stormwater outcomes and stormwater assets that become a burden and liability for the ultimate owner. Approaches that deliver more effective stormwater treatment are encouraged.

Development that implements off-site solutions would still need to ensure that it was complemented by passive irrigation, stormwater or rainwater harvesting on-site.

Council is delivering regional stormwater treatment and catchment management programs in addition to the treatment required of development. This will help to improve the overall stormwater quality outcomes for the region.

It is necessary to ensure that stormwater treatment infrastructure being contributed to Council, or any other owner, is fit for purpose and will not become an unnecessary maintenance burden or liability within its design life.

Underperformance of Council's existing stormwater treatment infrastructure can occur due to maintenance, design or construction issues. Rectification and renewal works are often required to ensure that effective treatment is provided for the life of the asset.

Innovations in stormwater treatment that are shown to be practical and effective, cost efficient, support good Sunshine Coast design and are unlikely to become a maintenance burden, should continue to be investigated and implemented where appropriate.

Strategic direction 2.2: An informed and engaged community and industry

The behaviour and actions of the community and industry have a substantial influence on the water quality of waterbodies, creeks, rivers and oceans. Increased environmental awareness and engagement of the community is critical to managing the impacts of development and maintaining the liveability of the region.

There are numerous existing community groups and events that target land management and water quality improvement. The work of these groups should continue to be supported and promoted. Partnerships with industry should be encouraged.

Educating the community about local laws, the function and benefits of WSUD, and actions they can take to improve stormwater quality will be included in Council communications.

Collaborative partnerships should be fostered to deliver the best outcomes for catchment health.

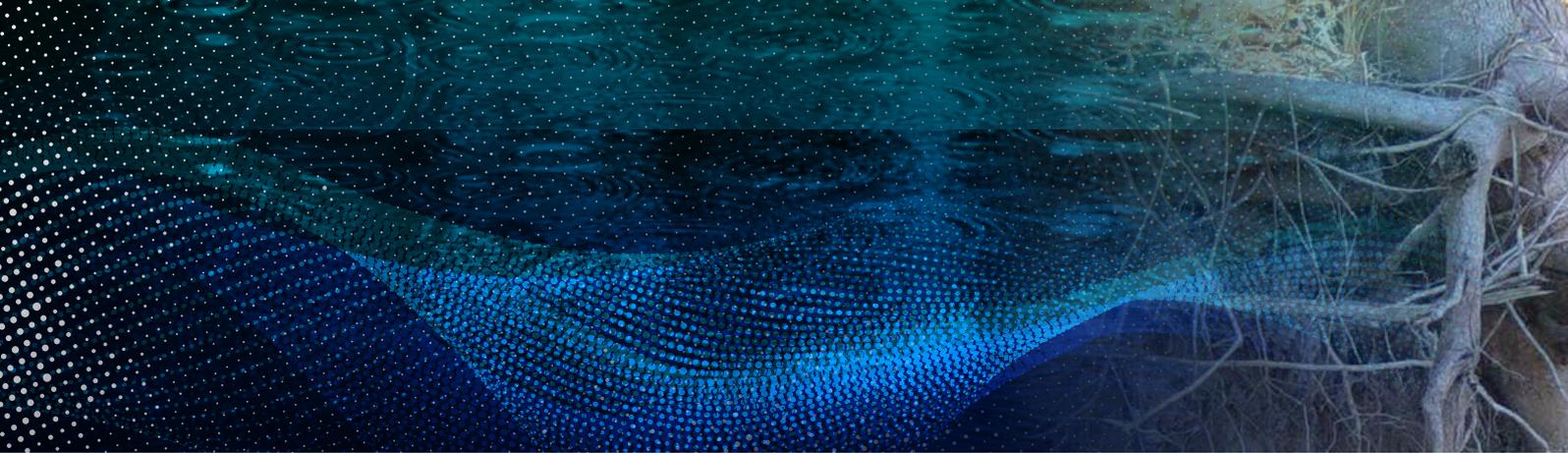
Organisations like Healthy Land and Water undertake reporting on the health of rivers, provide design and modelling guidance and drive initiatives to assist in the protection of South East Queensland's environment.

Initiatives and incentives to increase the environmental sustainability of our region should continue to be developed and encouraged.

It is also necessary to appropriately inform the community of stormwater flood hazards, overland flow paths and measures they should take to avoid or manage drainage issues on their properties. Council websites and fact sheets should include easy to understand tips and advice.

Guidance on the design and construction of WSUD and the effective co-location within public open space is provided in Council's Open Space Landscape Infrastructure Manual (LIM).





Strategic direction 2.3: Compliance and accountability

If environmental regulations, design guidance and maintenance requirements are not adhered to, there will be unacceptable impacts to the environment, community and the built environment. Compliance and accountability is critical to effective stormwater management as it will prevent and discourage undesirable outcomes and environmental harm.

Development applications are assessed by specialists in flooding and stormwater management for their compliance against the provisions of the Planning Scheme. Low risk applications may be fast tracked. However, these are still required to be signed off by a Registered Professional Engineer of Queensland (RPEQ). Ensuring that RPEQs and building certifiers are complying with stormwater management and local flooding requirements is crucial to maintaining the sustainability of development in the region.

Stormwater assets being contributed to Council should be able to deliver the outcomes for which they were designed. Part of Council's stormwater renewal budget is currently spent rectifying issues with newly contributed assets. RPEQs, builders and building certifiers must be accountable for poor construction and design practices.

During construction, effective erosion and sediment control is necessary to minimise the impact on receiving waters. Illegal clearing of vegetation by agricultural and development industries can also increase the amount of sediment entering waterways.

Under Section 440ZG of the EP Act 1994 it is an offence to deposit prescribed water contaminants in waters, roadside gutters, stormwater drainage or any other place where the contaminant could reasonably be expected to move into these. Examples of prescribed contaminants include

sediment, chemicals, paint, oils, animal matter, plant matter, rubbish and sewage. Substantial penalties can be applied if unlawful disposal of prescribed contaminants occurs.

Works that do not comply with environmental regulations can be fined by Council. Compliance should be a focus of Council operations, as prevention is the most effective form of stormwater quality management. An on the spot fine of \$2000 for erosion and sediment control infringements can currently be issued by Council officers. Fines may reach over \$1 million for major offences causing environmental harm.

Entities responsible for the operation of private stormwater quality assets must be held responsible for ongoing maintenance and renewal. Council must ensure that the stormwater quality assets delivered to these entities are fit for purpose and do not represent an unreasonable burden to maintain and renew.

The State Planning Policy review by Water by Design suggests that privately owned stormwater quality devices should require registration, licencing and servicing similar to on-site sewerage facilities (OSF). Council currently runs a program, in partnership with Seqwater, which oversees the operation of OSFs. Coupled with improvements to state legislation, a similar program for stormwater quality devices would help to ensure that contamination of waterways was avoided.

The community and industry are required to comply with numerous local and state laws that relate to stormwater. Revisions to local laws and fines may be required so that infringements are more clearly defined and enforcement is more practicable. However, improved education should be the first strategy used to increase compliance.

Council is also required to comply with numerous local, state and federal environmental laws when undertaking construction and maintenance works.



Policy positions

The policy positions that support the 'protected and healthy' strategy objective include:

- 2.1. Stormwater quality treatment is provided to protect receiving waters and the health of our community.
 - a) LGIP stormwater quality projects will be delivered to help offset the regional impacts of development.
 - b) Stormwater treatment targets pollutants of concern for intensive land uses.
- 2.2. New development minimises impacts to receiving waterways.
 - a) Stormwater treatment is to occur prior to discharge to receiving waters, constructed waterbodies or waterway buffer areas and must comply with the requirements of Council's Planning Scheme Policy.
 - b) Effective erosion and sediment control measures are used during construction.
 - c) Stormwater outlets are to be provided with appropriate scour and erosion protection.
 - d) Impervious surfaces are minimised and runoff is directed towards landscaped areas for passive irrigation.
 - e) Rainwater and stormwater harvesting are encouraged.
 - f) Development considers waterway stability and frequent flow management requirements.
 - g) Development delivers stormwater treatment infrastructure that is effective and efficient while maintaining the health of local waterways.
 - h) Off-site stormwater treatment solutions in lieu of on-site treatment are only acceptable when delivered by development within the same creek catchment and within a 5 kilometre radius. Alternative minimum stormwater quality management measures to harvest and reuse stormwater on-site will also be required.
- 2.3. Natural waterways are not diverted.
- 2.4. Stormwater treatment is complementary and integrated within the public realm, using natural processes to the greatest extent possible.
 - a) Treatment systems are used to support good Sunshine Coast design by enhancing biodiversity and landscape benefits.
 - b) Treatment systems are designed to minimise maintenance requirements.
 - c) Treatment systems are designed to eliminate or minimise health and safety hazards.
 - d) Maintenance plans are to demonstrate that weed management is not reliant on the use of glyphosates or any other chemical spray.
- 2.5. Water quality monitoring is used to help inform planning, asset management and compliance where practicable.
- 2.6. Sustainable land management practices are encouraged to minimise the impact of stormwater runoff on receiving waterways.
- 2.7. The participation of the community is required to achieve effective stormwater management.
- 2.8. Compliance with legislative and Planning Scheme requirements is enforced.
 - a) Registered Professional Engineers of Queensland (RPEQ) and other professionals are to be accountable for their designs, construction and certifications.
 - b) RPEQs are required to certify that contributed assets comply with design objectives and specifications.
 - c) Entities responsible for the operation of private stormwater assets are to be accountable for maintenance and renewal.
- 2.9. Collaborative partnerships which do not compromise Council's independence are fostered to deliver the best outcomes for catchment health.





Objective 3: Coordinated and well managed

Stormwater assets are effective and responsive to a changing environment.

The third key objective of the strategy is to ensure that the stormwater network remains effective, now and in the future.

In order to achieve the coordinated and well managed key objective, four strategic directions have been identified:

- 3.1 Coordinated management and maintenance of stormwater assets.
- 3.2 Appropriate and sustainable levels and standards of service.
- 3.3 Improved asset management and knowledge of stormwater assets
- 3.4 Prioritised and coordinated delivery of works.

Strategic direction 3.1: Coordinated management and maintenance of stormwater assets

Stormwater assets are extensive and the multiple aspects of lifecycle management are the responsibility of numerous teams within Council. Coordination of activities between teams has avoided duplication of works and maximised efficiencies. Processes and procedures that enhance this coordination will be required with a growing and complex asset base.

Council has an asset responsibility matrix which documents responsibility for different elements of stormwater assets. Refinement of roles and responsibilities is an ongoing process requiring collaboration between asset managers.

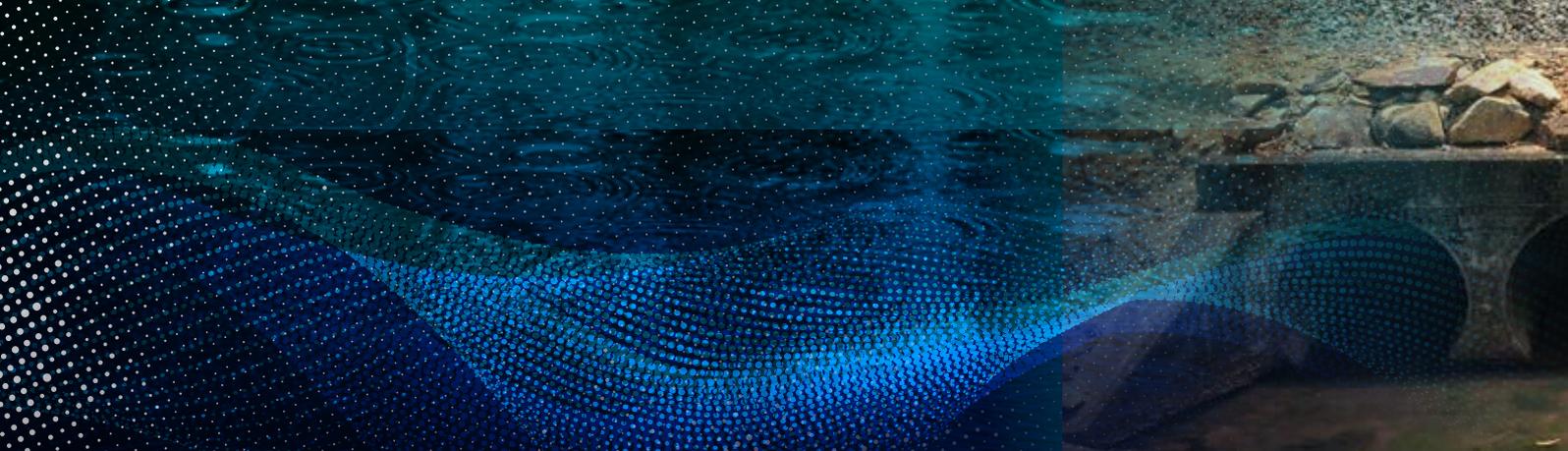
The growing range and complexity of WSUD assets presents additional challenges to stormwater asset management. Advance notice and information of when WSUD assets are planned to go 'off maintenance' is required in order to assist asset managers with budget and resource planning; unlike traditional stormwater infrastructure, intensive operations and maintenance are required from the beginning of the asset's life.

Working groups have been established within Council to encourage collaboration between different teams dealing with stormwater. These have been found to be extremely useful and informative and have delivered cost saving initiatives. Working groups should be maintained and/or expanded in order to foster collaboration.

Council's asset information system CONFIRM will provide a framework to support asset management of the stormwater network.

Maintenance operations will need to be continually reviewed to ensure that all types of stormwater assets, particularly those identified as being high risk, are performing their intended function.





Strategic direction 3.2: Sustainable levels and standards of service that are fit for purpose

Desired Standards of Service (DSS) are different to the levels of service (LOS). LOS are defined in the Stormwater Asset Management Plan. LOS reflect how the DSS are to be delivered. LOS are a combination of parameters which reflect social, political, environmental and economic outcomes that Council delivers for the stormwater network. The parameters can include safety, customer satisfaction, quality, quantity, capacity, reliability, responsiveness, environmental impact, legislative requirements and cost.

Desired standards of service (DSS) document the technical and measurable performance characteristics that the stormwater network is expected to achieve in order to deliver a reasonable and practical community outcome. The DSS provided in Part B of this strategy will inform some LOS targets in the Asset Management Plan.

Standards of service have changed over time, with newer developments, if designed well, often providing a higher standard of service than older urban areas. This is either due to changes in DSS or changes to information or methodology used in design. Development within all urban areas is now required to account for existing stormwater risks and flow behaviour. The potential impacts of climate change and what can occur during a severe storm event or if there is blockage of the stormwater network also needs to be considered. Development should not rely on future upgrades of the stormwater network. When urban renewal works occur, there will likely be improvements to existing drainage performance. However, it can be cost prohibitive and impractical to provide the same standards as greenfield sites. The DSS should therefore be different for existing, infill and greenfield development areas.

Public infrastructure works often occur within constrained footprints with competing existing

uses, and as a result have limited opportunity to practicably contain the extent of impacts. The potential stormwater impacts of public infrastructure works on adjacent private property should be considered in relation to the overall community benefit provided by the project and the additional costs and feasibility of mitigating all impacts. Public infrastructure works may therefore result in tolerable consequences (as defined in Part B) on adjacent private property, if the works provide an overriding community benefit. Owners of affected properties should be consulted with prior to works proceeding.

With the impact of climate change and increased development, the capacity of existing stormwater infrastructure will be exceeded more frequently. Rising sea levels are expected to change the maintenance activities that can practically occur. For most areas, the safety and amenity provided by stormwater infrastructure will not be significantly compromised; upgrading infrastructure to provide original standards of service would therefore not be warranted or economically feasible. Alternative measures that increase resilience may be necessary.

It is necessary to identify where existing and future drainage issues exist in order to prioritise capital works.

Development controls and advice for future development in areas affected by stormwater overland flow paths will help ensure new properties are provided with sufficient stormwater flood immunity, even if stormwater upgrades are not completed.

In order to extend the life of stormwater pipes and/or avoid the high costs and inconvenience of replacement, Council undertakes a pipe relining program which restores the condition of the stormwater asset. This can extend the asset life by around 50 years but does not increase capacity. In most instances this is a practical approach to restore an acceptable level of service. Improved stormwater modelling and a prioritisation framework



will be used to determine locations where pipe upgrades rather than pipe relining are required.

The ongoing performance of the stormwater network is reliant on all types of stormwater assets, including natural stormwater assets, being maintained and renewed.

Strategic direction 3.3: Improved asset management and knowledge of stormwater assets

Information on stormwater assets has been compiled into corporate GIS datasets. This has been sourced from old drawings, development plans, site surveys, CCTV and ADAC files. This dataset is an extremely important resource and the work required to gather and manage this data has contributed to Council's strong stormwater management position. However, information is often of poor quality or data is missing completely. Information on the condition of stormwater assets is sourced from CCTV and site inspections. CCTV has been carried out for around 12 percent of the underground stormwater network.

The quality and extent of stormwater data influences numerous aspects of stormwater management, such as:

- asset accounting
- maintenance and renewals
- capital works planning
- development assessment
- determining the capacity of existing stormwater networks.

The quality of Council's stormwater corporate dataset is continually being improved when new information becomes available.

When stormwater infrastructure is going through the 'on maintenance' and 'off maintenance' process, developers are required to submit information such as certificates, ADAC files, management plans and other information necessary to assist with the ongoing management

and maintenance of the asset. Unfortunately this information is not always provided. Improved processes for information transfer and checking compliance are therefore required. There is opportunity for developers to provide site survey of existing stormwater infrastructure to Council so that corporate datasets can be updated and duplication of survey works is avoided.

Maintenance plans and critical maintenance requirements should be registered with the asset in the asset management system. Data that will assist with ongoing maintenance, e.g. required density of vegetation and maintenance frequency, needs to be easily accessible by the asset managers for the life of the asset.

Council's asset information system should enable consolidation of asset information into one asset register and facilitate the collection of key asset information such as management plans. The effective use of asset information systems will be an important component of stormwater management for Council.

Information on the water quality of waterbodies and waterways should be retained in an easily accessible database. This will assist with planning and management of water quality improvement initiatives.

Computer models that are developed for stormwater management also require renewal and maintenance. The information from stormwater models should be readily available for all sections of Council to assist with asset management and development assessment.

Council's processes for maintenance and renewals should be informed by accurate information. This includes a realistic estimate of the life of the asset, determined by the asset manager and the expected timing of handover of contributed assets, to ensure maintenance is provided.



Strategic direction 3.4: Prioritised and coordinated delivery of works

Community consultation for the Draft Stormwater Management Strategy ranked the three most important outcomes for new stormwater infrastructure as:

- waterway health
- public health and safety
- flood prevention.

A specialised prioritisation framework is required for the assessment of stormwater projects to inform capital works planning and strategic asset management. Such a framework will provide transparency and accountability for Council, and will help to ensure that funds and resources are directed to where the need and potential benefit is greatest.

The outcomes of the Coastal Hazard Adaptation Strategy will also inform the prioritisation process, as this will identify areas that are zoned for transition.

The prioritisation framework will seek to score stormwater conveyance projects based on a multi criteria analysis (MCA). This will consider factors such as the level of risk, frequency of flooding, cost and potential benefit to the community. The realisation of a project's benefit may also be dependent upon other projects being completed. Sequence of delivery will often be an important consideration for stormwater conveyance projects within the same local network.

LGIP projects will receive a secondary prioritisation based on the need for the project to manage impacts that result from population growth.

Stormwater quality projects will be assessed with a different MCA prioritisation framework that considers benefit based on receiving waters but also in terms of supporting the transformational actions of the Environment and Liveability Strategy, such as 'greening our neighbourhoods'.

A number of factors affect the determination of cost and therefore influence priority. These factors include:

- design complexity
- ease of construction (conflicts with existing services)
- land acquisition costs
- approval requirements
- initial capital costs to construct
- ongoing maintenance costs
- opportunity to access renewal funding dependant on age and condition of existing infrastructure
- ability to be scheduled with other works in the area
- potential benefits for other Council stakeholders, such as Transport, Open Space and Social Policy, Biodiversity and Waterways, Sustainability Policy and Parks and Gardens.



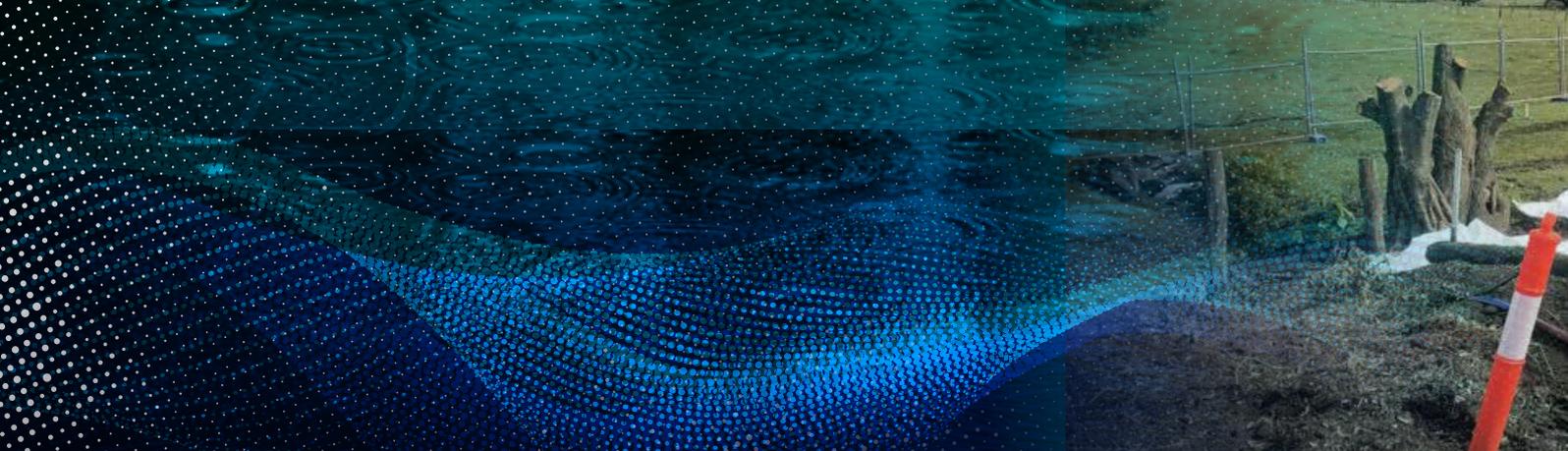
Each stormwater project will be provided with a prioritisation rating that is consistent with other infrastructure projects, in order to inform Council's strategic asset management.

Partial delivery of MDP infrastructure works as part of infill development may not be effective or appropriate without associated surrounding trunk infrastructure scheduled for delivery through the capital works program. The interest of private development should not influence the scheduling or prioritisation of capital works delivered by Council. Infill development must ensure that it can accommodate interim and ultimate catchment conditions and minimise impacts to existing properties.

In some instances, the cost of projects may be so great and the benefit-cost ratio so low that some projects are unlikely to ever proceed. In such instances it may be prudent to assess the effectiveness and viability of alternative measures such as subsidising works on private property that improve flood resilience of existing buildings, acquiring properties or requiring that development proceed with alternative approaches to accommodating stormwater flood risks.

It is desirable to ensure that costs, duplication of works and disruption to the community are minimised. If other works or infrastructure is required in the same area, it is advantageous to coordinate with other relevant stakeholders from Council, state government or utility service providers to plan and deliver works. Such coordination requires effective inter-agency communication supported by good relationships and knowledge sharing tools.





Policy positions

The policy positions that support the 'co-ordinated and well managed' strategy objective include:

- 3.1. Stormwater assets are well managed and maintained so that they remain effective over their asset life.
 - a) Asset maintenance is to consider the natural responses to climate change and whether ongoing maintenance activities are appropriate.
- 3.2. WSUD assets are recognised as living infrastructure with complex and variable asset management and maintenance requirements.
- 3.3. A clear and comprehensive governance framework is used to define roles and responsibilities.
- 3.4. Accurate and current models, mapping and other corporate datasets inform the understanding of flood risk and stormwater network effectiveness.
- 3.5. Performance and condition of private and public stormwater assets are monitored to ensure effectiveness.
- 3.6. Stormwater information within Council's asset information systems is accessible and continually improved.
- 3.7. Stormwater assets remain effective over their asset life.
 - a) The asset manager is responsible for determining asset life.
 - b) Renewal of stormwater infrastructure recognises all types of stormwater assets, including hard, vegetated and digital stormwater infrastructure.
 - c) The value of assets represents the true cost of replacement and accounts for the variable cost of installation based on location.
 - d) The resourcing requirements of infrastructure that is to be contributed are understood prior to handover and inform future operational budgeting.
- 3.8. Projects are prioritised using an accountable process that delivers the most community benefit.
- 3.9. Private property impacts from public infrastructure works are acceptable when the impacts have tolerable consequences and the works provide an overriding community benefit.



- 3.10. Infrastructure that is located within a zone identified for transition as part of the Coastal Hazard Adaptation Strategy and only services property within that zone, shall not be upgraded, renewed or maintained unless there is an overriding community benefit.
- 3.11. Capital works are planned and coordinated to take advantage of project synergies, potential cost savings and to minimise disruption to the community.
- 3.12. Private development should not dictate the scheduling or priority of capital works delivered by Council.
- 3.13. All works within the public realm are to consider opportunities to provide complementary improvements to stormwater management.
 - a) Opportunities to incorporate passive stormwater harvesting and irrigation are explored.
 - b) Opportunities to improve piped or overland flow conveyance are explored.
- 3.14. Maintenance of allotment stormwater infrastructure on private land remains the responsibility of the property owner.

- 3.15. Infrastructure that is a burden or liability for future private property owners is avoided.
- 3.16. Infrastructure that is a burden or liability for Council is avoided.
 - a) WSUD assets are designed to minimise maintenance and the need for renewal.
 - b) Proprietary products with specialised componentry are not accepted as contributed infrastructure except for devices aimed solely at capture of gross pollutants.
 - c) The performance of proprietary products is validated through a national protocol for the evaluation of stormwater quality improvement devices.
 - d) Local field testing is used to demonstrate that proprietary products will not be a burden or liability.
 - e) Stormwater harvesting systems, proprietary products or emerging technologies dedicated to Council as public assets have a sinking fund to manage and maintain the asset over its design life.



Implementation

The implementation of this strategy will include, but not be limited to, the following activities:

- determination of a future investment plan for stormwater management
- prioritisation of projects and actions
- establishment of a working group to assist with delivery of the strategy
- reporting on completion of detailed actions supporting the strategic directions
- record of customer complaints relating to stormwater flooding
- engagement surveys with internal stakeholders
- modern asset management practises
- state of the assets reporting
- asset age and condition assessments
- program delivery reporting
- promotion of community awareness.

Although the strategy provides the strategic direction for stormwater management to 2041, new technologies and initiatives developed in the interim may be able to be incorporated.

The detailed actions that will drive the implementation are provided in Part B of the strategy, which will be regularly updated.



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Glossary

ADAC

Asset Design As Constructed

AEP

Annual Exceedance Probability

ARR

Australian Rainfall and Runoff

Backflow

Flood waters backing up through a stormwater network to inundate connected areas of low-lying land.

Bankfull

The channel flow rate that exists when water is at the elevation of the channel bank, above which water begins to spill out onto the floodplain.

Bio-retention

The process in which contaminants and sediment in stormwater runoff are removed through filtering and biological uptake.

CCTV

Closed Circuit Television

DFE

Defined Flood Event. The flood event adopted by a local government for the management of development in a particular area.

Drainage Easement

A public utility easement in favour of Council for drainage purposes.

DSS

Desired Standards of Service. Technical and measurable performance characteristics.

Freeboard

A factor of safety used to compensate for factors such as wave action, blockage and modelling uncertainties.

GIS

Geographic Information System

GPT

Gross Pollutant Trap. A stormwater treatment device that targets the removal of gross pollutants.

Gross Pollutant

Litter and debris larger than 5mm and coarse sediments greater than 0.5mm diameter.

HAT

Highest Astronomical Tide

Impervious

A surface where rainfall cannot infiltrate and the majority of rainfall becomes runoff.

Inundation

Flooded with water.

LGIP

Local Government Infrastructure Plan

LOS

Level of Service. A combination of parameters which reflect social, political, environmental and economic outcomes that Council delivers for the stormwater network. The parameters can include safety, customer satisfaction, quality, quantity, capacity, reliability, responsiveness, environmental impact, legislative requirements and cost.

MCA

Multi Criteria Analysis

MDP

Master Drainage Plan. Drainage studies conducted to determine stormwater infrastructure and easement requirements to achieve the DSS.

Natural Treatment

Stormwater treatment measures that are typically vegetated and use or mimic natural processes to protect water quality and reduce stormwater runoff.

OSF

On-site Sewerage Facilities

On-site Detention Storage

A small open basin or enclosed stormwater tank used to reduce and attenuate peak flows from development.



Open Space

Open space is the network of land and water that supports recreation and sport, trails and paths, nature conservation and visual relief from the urban environment.

Overland Flow

Concentrated runoff that flows across land before it enters a watercourse or underground drainage system. Overland flow can also occur if a drainage system is blocked or has exceeded its capacity.

Permeable Pavement

Formally constructed porous, light-traffic pavements that allow runoff to infiltrate into the underlying soil or a sub-surface drainage system.

Pervious

A surface where some of the rainfall will infiltrate thus resulting in a reduced volume and rate of runoff.

PMF

Probable Maximum Flood. The theoretically greatest runoff event from a particular drainage basin.

QUDM

Queensland Urban Drainage Manual

Raingarden

Also called bio-retention gardens, they are specially designed vegetated, free draining garden beds that collect, filter and treat runoff from surrounding impervious surfaces.

Renewal

Existing infrastructure that is replaced or has its life extended.

Resilience

The ability of a system, community or society exposed to hazards to resist, absorb, adjust to and recover from their effects in a timely and efficient manner, including initiatives to preserve and restore essential structures and functions (United Nations, 2009).

Riparian

Part of the landscape adjacent to a watercourse that influences, and is influenced by, watercourse processes. Usually include instream habitats, beds, banks and floodplains of watercourses, or their parts.

Runoff

That part of rainfall which is not lost to infiltration, evaporation, transpiration or depression storage.

Standard of Service

An objectively measurable performance measure for the stormwater network.

Stormwater Flooding

Flooding that is directly associated with the movement of stormwater runoff flowing over land towards a watercourse, but prior to the water entering the watercourse. This type of flooding is not influenced by the backing-up of waters from a downstream watercourse.

Trunk Stormwater Capacity Infrastructure

Infrastructure servicing infill development identified in a Master Drainage Study (or plan) for Council delivery and endorsed by Council at the recommendation of the stormwater network LGIP planner.

Trunk Stormwater Quality Infrastructure

Any Council nominated infrastructure that will provide improvements to the overall water quality objectives, assessed at a regional level.

Uninsurable

Annual insurance premiums more than 1% of replacement costs.

WSUD

Water Sensitive Urban Design.





www.sunshinecoast.qld.gov.au

mail@sunshinecoast.qld.gov.au

T 07 5475 7272

Locked Bag 72 Sunshine Coast Mail Centre Qld 4560

[f @sunshinecoastcouncil](#) [t @councilscc](#) [i @sunshinecoastcouncil](#)