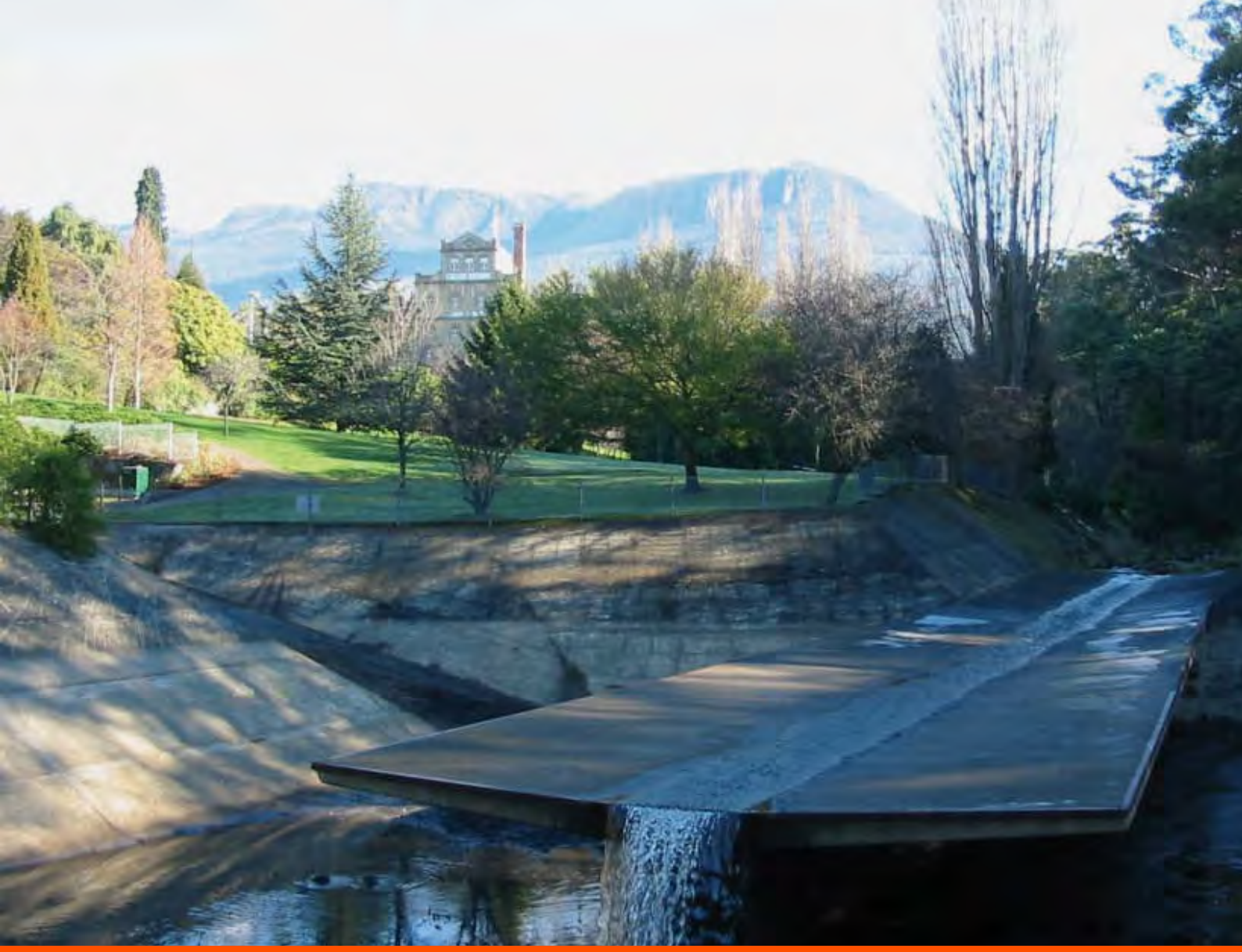

STORMWATER STRATEGY
2012–2017

HOBART
CITY COUNCIL

STORMWATER STRATEGY ADOPTED BY COUNCIL
10TH DECEMBER 2012

PREPARED BY ENVIRONMENTAL ENGINEERING UNIT

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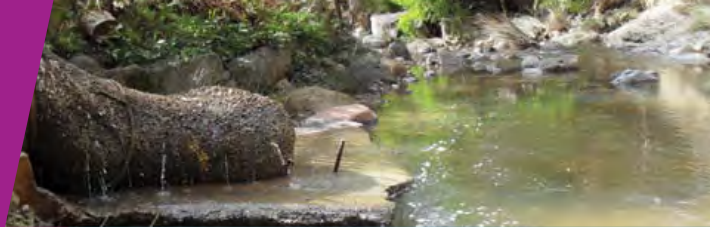


Contents

Introduction

Hobart is a city which is more than 200 years old. The installation of stormwater infrastructure has only been a relatively recent consideration. As such, many parts of Hobart either lack or have inadequate infrastructure. This deficiency in stormwater infrastructure can lead to properties and roads being subject to inundation or water-related nuisances.

Many properties discharge stormwater from their roofs onto the ground or into sewer pipes. This may cause problems for neighbouring properties and the sewer network.

Stormwater within sewer mains has resulted in some sewer systems not having adequate capacity during wet weather. This causes sewer overflows onto roads and private properties during heavy rainfall.

Where properties discharge onto the ground, downhill properties can be inundated or their land is subject to ongoing soakage.

In addition there is an increasing public realisation that waterways should not be contaminated by humans' activity. As such any new or existing developments need to be reviewed to take into account the health of waterways and the River Derwent.

Council has acknowledged the above issues and identified the need for a Stormwater Strategy. This Strategy has been based on key stormwater-related activities and seeks to provide high level guidance and communication to and from the more focused and detailed management plans, including the Master Drainage Schemes, Catchment Management Plans and Asset Management Plans.

Council's Strategic Plan

Council adopted its Strategic Plan for 2008–2013 in February 2008. The Stormwater Strategy has been developed to resonate with Council's Strategic Plan.

There are seven key areas (Future Directions) in the Strategic Plan that effectively cover every aspect of Council's operations.

The Future Directions that has most relevance to this Stormwater Strategy are:

FUTURE DIRECTION 2 – Is recognised for its natural beauty and quality of environment.

FUTURE DIRECTION 4 – Achieves good quality development and urban management.

In particular the following Strategies are relevant:

2.1.3 Improve the management of the River Derwent and tributaries through working with other councils, governments, private sector and local communities.

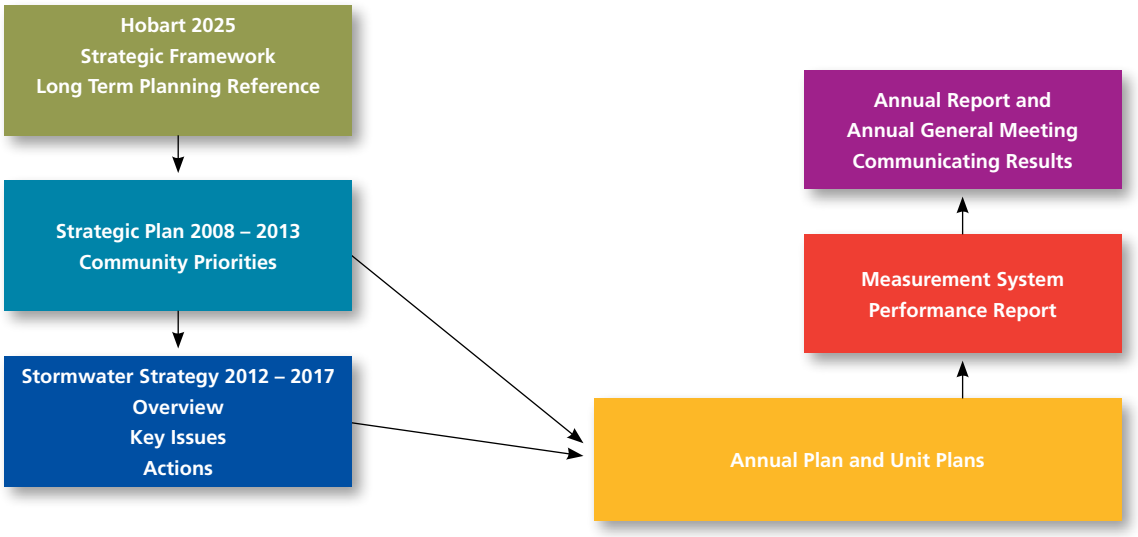
2.1.5 Support the community's appreciation of the city's natural environmental assets and promote their value. 2.3.2 Enhance the water quality of the Derwent River and its tributaries through the introduction of an integrated water management approach.

2.3.5 Maintain and enhance physical infrastructure and essential services.

4.2.2 Provide and maintain quality infrastructure and services that enhance the efficient operation of the city.

Strategic Framework

The following diagram summaries the strategic framework for planning, implementation, monitoring and evaluation.



Legislation and Regulations

There are several pieces of legislation and regulations that are relevant to stormwater operations.

These include:

- Local Government Act 1993;
- Drains Act 1954;
- Hydraulic Services By-Law 2008;
- Local Government (Building and Miscellaneous Provisions) Act 1993;
- Environmental Management and Pollution Control Act 1994;
- Building Act 2000; and
- Plumbing Regulations 2004 and Building Regulations 2004.

In 2010 the State Government requested submissions from Councils and the public on the Drains Act 1954 regarding whether this legislation is capable of dealing with modern stormwater and waterway issues. Submissions were received from a number of interested parties including the Hobart City Council. The State Government made the following findings:

- the existing Act is outdated and should be replaced with clear modern English;
- management of stormwater should reside in stand-alone legislation;
- on-site wastewater treatment should be removed from the Act;
- more clarity needs to be provided in relation to the powers and rights of stormwater managers including local government;
- clarity is required regarding the responsibility of landowners; and
- stormwater management legislation should not be the governing legislation in relation to public health and water quality.

The State Government will be drafting new legislation to replace the Drains Act 1954. It would be beneficial for there to be input from the Hobart City Council to ensure its requirements are taken into account. Council participation on the reference group that will review the draft legislation would be beneficial.

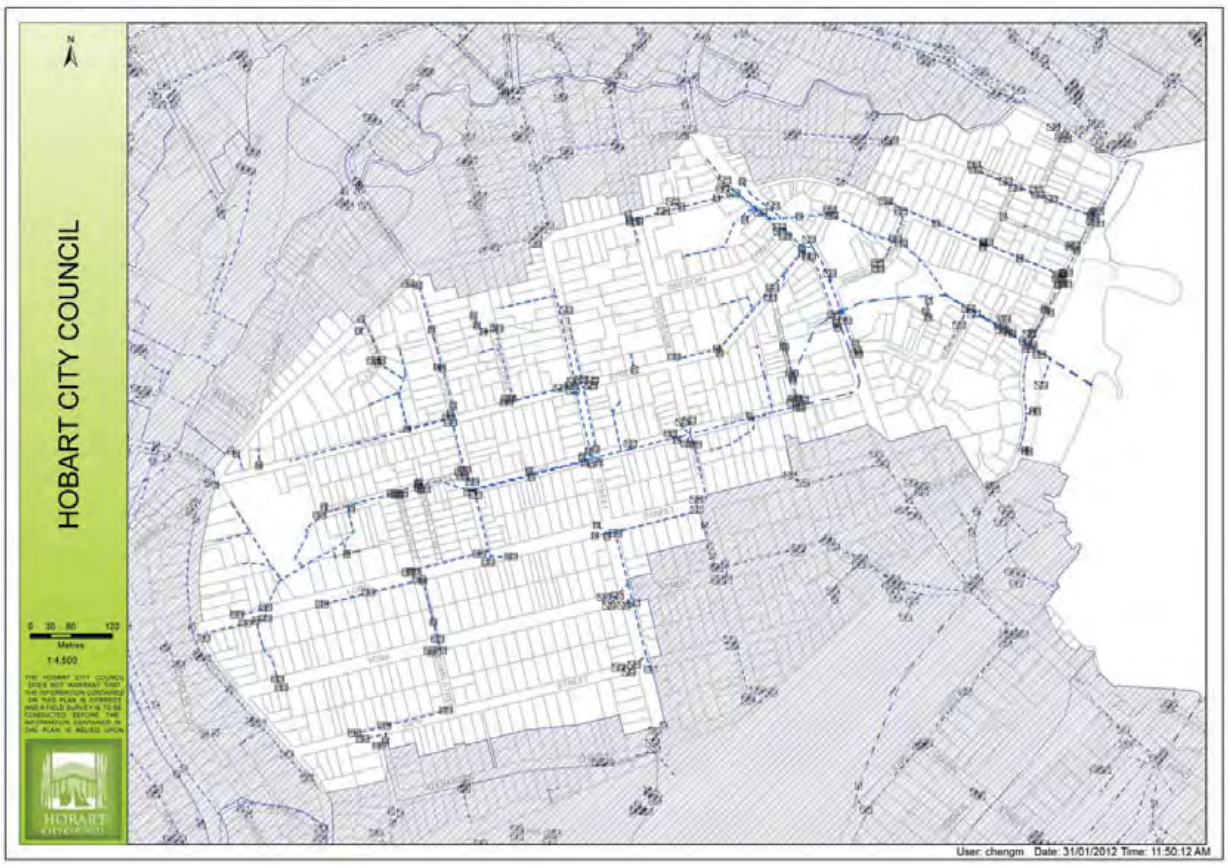
ACTION: Council officers participate in the legislation review of the Drains Act 1954.

Stormwater Reticulation Capacity

Stormwater reticulation refers to the stormwater infrastructure system (such as pits, pipes and lined rivulets) used to convey stormwater runoff from the top of the catchment through the Hobart municipal area to the River Derwent. Hobart City Council has initiated the development of a series of Stormwater Master Drainage Schemes (MDS) for priority catchments within the Hobart municipal area. The purpose of these studies is to assist in the management of stormwater by identifying deficiencies in the stormwater infrastructure system and recommend priority upgrades to ensure a consistent Level of Protection (LoP).

Key aspects of the studies are:

- establishment of hydrological and hydraulic models for each priority catchment;
- evaluation of existing drainage system performance;
- identification of deficiencies in the existing drainage systems;
- identification of areas not currently serviced by public stormwater reticulation;
- establishment of appropriate levels of protection based on factors including flood risk and cost; and
- prioritisation and incorporation of the recommended stormwater infrastructure upgrades into the capital works program and long term financial forecasts.



Level of Protection

The level of protection provided by a stormwater drainage system is defined by the frequency with which stormwater flows will exceed its capacity and at which point flood damage may be expected to occur. This is usually defined as its Annual Recurrence Interval (ARI), which is a statistic, based on historical rainfall records, indicating the average number of years between events of such a magnitude.

Determination of a suitable level of protection (LoP) is required to assess the capacity of a drainage system and its associated flood risk and as a design target for potential upgrades. Flood risk can be measured during a Defined Flood Event (DFE). The DFE in Australia has historically been set at the 100 Year ARI critical storm event.

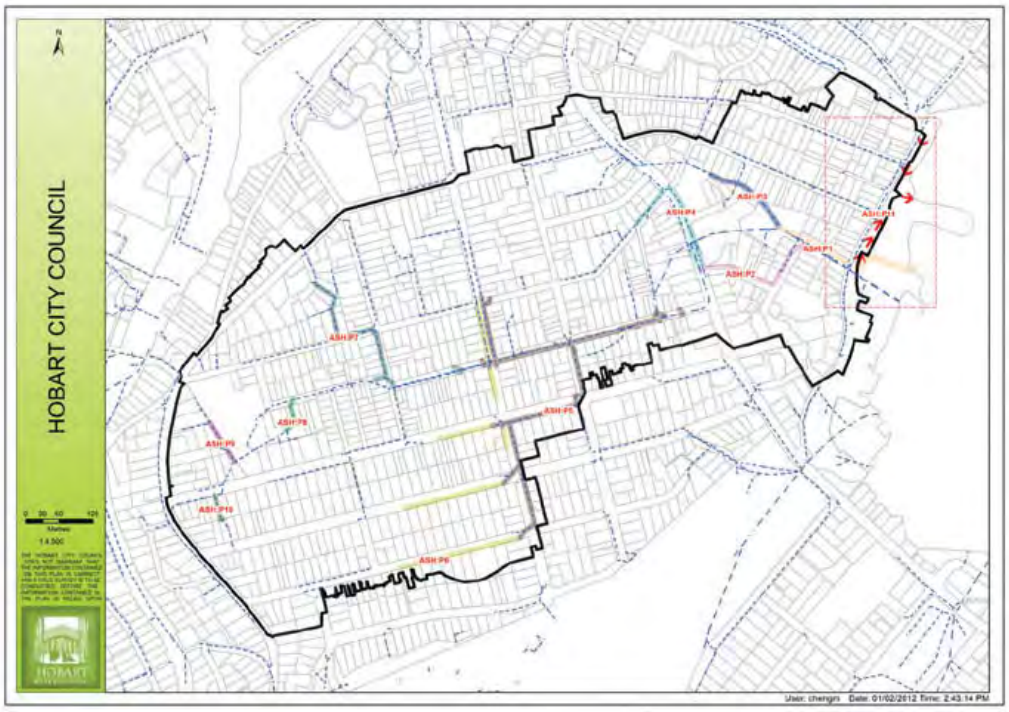
A preliminary set of target levels of protection have been adopted as follows:

- maximum flood depth in road to the top of kerb level;
- maximum flood level in flow across road to be 150mm from surface level in DFE (1 in 100 Year ARI storm); and
- no unsafe overland flow paths through private properties generated by external sources.

Drainage Upgrade Priorities

Stormwater drainage upgrades proposed in each MDS will be prioritised and incorporated into the capital works program with consideration of the following factors:

- the significance in reduction of flood damage;
- the relative cost benefit analysis of each individual project; • potential linkages with other council projects within the catchment (such as road upgrades and development of land divisions); and
- funding availability.



Current Status of Master Drainage Schemes

There are 23 major sub-catchments within the Hobart municipal area. Each major sub-catchment is delineated based on the outlet location as shown in Figure 1 below.

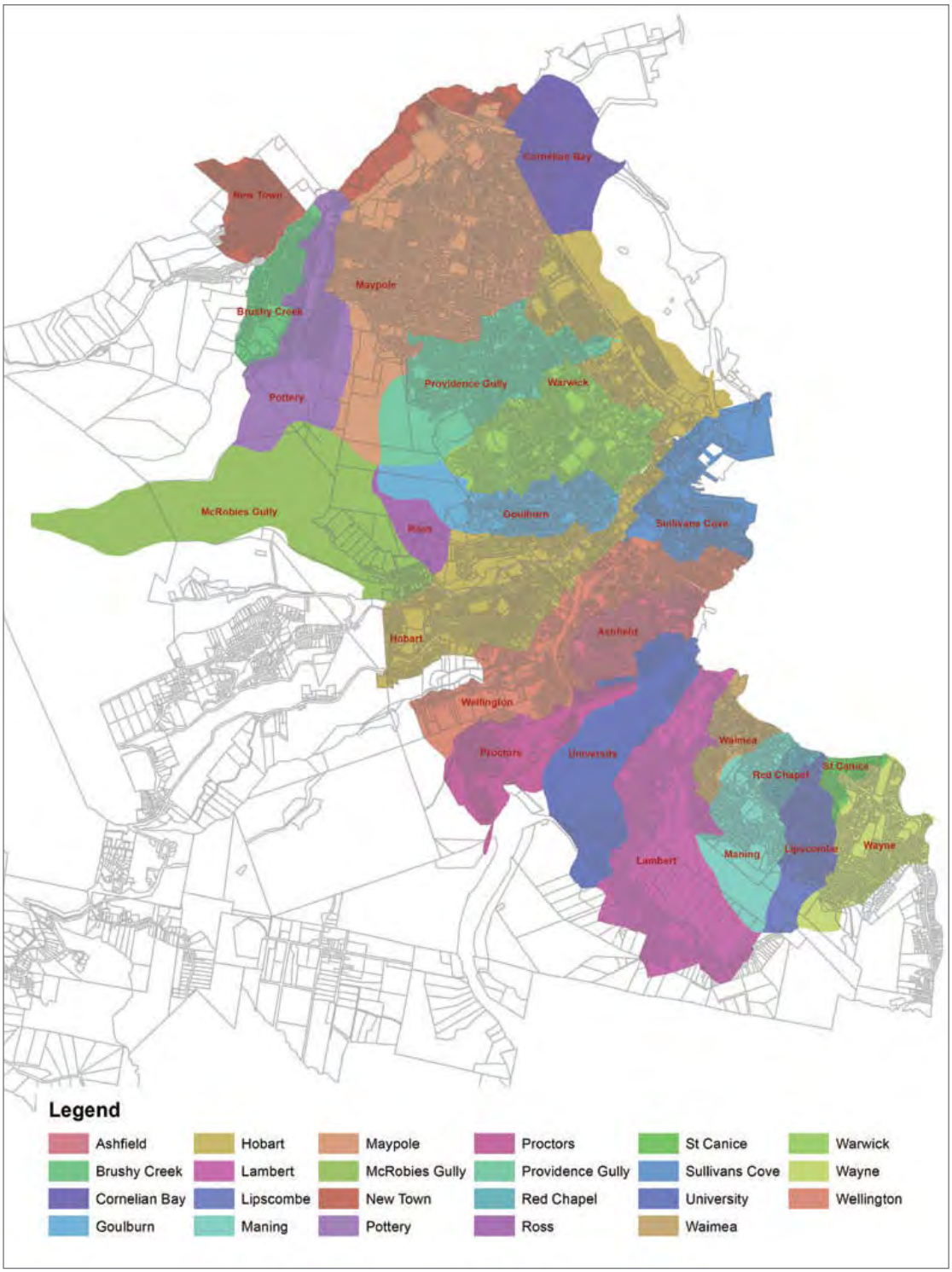
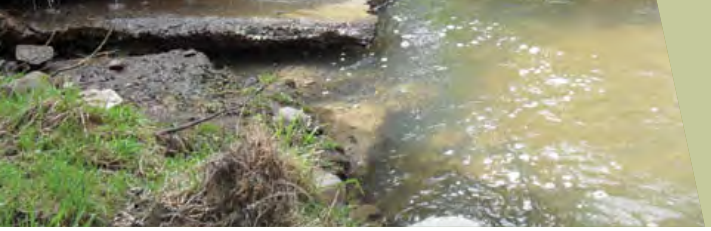


Figure 1: Hobart Municipal Area Major Drainage Sub-Catchments



Council has completed the Ashfield MDS encompassing the majority of Upper Sandy Bay and encompassing the Sandy Bay shopping precinct. Hydrologic and hydraulic models have been developed for the priority sub-catchments within the suburbs of Mt Nelson and Battery Point, with preliminary investigation into required upgrades well underway. In addition MDSs for several minor subcatchments within the New Town Rivulet catchment have recently been initiated.

Following Council endorsement the detailed results of each MDS study including existing system performance and proposed mitigation measures and upgrade/extension projects could be made available in a series of Reports.

ACTION: **The following Table lists the priority sub-catchments and the estimated completion date which constitutes the Action Plan for the Master Drainage Scheme project.**

Table 1: List of Major Sub-Catchments and Proposed MDS completion dates

MAJOR SUB-CATCHMENT	EXISTING SYSTEM MODEL	ULTIMATE SYSTEM MODEL	PRIORITISATION OF RECOMMENDED UPGRADES INTO AMP	DUE FOR COMPLETION
Ashfield	Yes	Yes	No	Complete
Wellington (Battery Point South)	Yes	Yes	No	October 2012
Sullivans Cove (Battery Point North)	Yes	No	No	November 2012
University (Mt Nelson)	Yes	No	No	December 2012
Providence Gully	Yes	No	No	2013
New Town	Commenced	No	No	2013
Hobart (CBD)	No	No	No	2013
Brushy Creek	No	No	No	2013
Cornelian Bay	No	No	No	2013
Goulburn	No	No	No	2013
Lambert	No	No	No	2013
Lipscombe	No	No	No	2013
Manning	No	No	No	2013
Maypole	No	No	No	2013
McRobies Gully	No	No	No	2014
Pottery	No	No	No	2014
Proctors	No	No	No	2014
Red Chapel	No	No	No	2014
St Canice	No	No	No	2014
Waimea	No	No	No	2014
Warwick	No	No	No	2014
Wayne	No	No	No	2014

Major Rivulets – Flood Management

Flooding can cause significant damage, both tangible and intangible. In order to protect private property and public infrastructure, Council has adopted a number of flood management actions including commissioning of Flood Risk Studies and development of Flood Action Plans for our major Rivulets.

An examination into the frequency of flood events in Hobart has indicated that significant floods have occurred on an average of every 7 to 10 years. Of these, four major floods which occurred in 1854, 1872, 1960 and 1970, caused widespread damage within the CBD.

Flood Studies

Council commissioned several flood studies on Hobart's major rivulets in the late 1990s. These reports provided flood maps for different rainfall events, and flood mitigation options and recommendations. The available flood studies are:

- Hobart Rivulet Flood Study, September 1997;
- New Town Rivulet Flood Study, January 1998;
- Sandy Bay Rivulet Flood Study, March 1999;
- New Town Flood Study: Extension to Include Maypole Creek and Brushy Creek, August 1999;
- Maypole Rivulet Flood Study, May 2008; and
- Hobart Rivulet: Extension of Flood Modelling Addendum to 1997 Hobart Rivulet Flood Study, June 2010.

Council has recently engaged a consultant to review and update of the original Sandy Bay Rivulet Flood Study. The consultancy includes the following:

- a review of the cross sections used to define the channel hydraulics to include any major changes since the model was first developed;
- a climate change scenario run that assesses the potential impact of the predicted increases in rainfall intensities (specific to the Hobart municipal area) and the predicted increase in sea level rise;
- a conversion of the 1D Mike 11 model to a 2D hydraulic model at major break out flow paths; and
- a re-calibration of the model to include flood level data that has been gathered in the ensuing years since the models were first developed.

As funding becomes available Council will undertake a review and update where necessary of the current flood studies for the other major Rivulets within the Hobart municipal area, ie Hobart Rivulet and New Town Rivulet.

Flood Action Plans

A key recommendation to come out of the Hydro Flood Studies was for the development of Flood Action Plans (FAPs) for the major rivulets. The purpose of a FAP is to detail the arrangements that are to be put in place when there is a risk of inundation of property and infrastructure from break out flows when a Rivulet is in flood. There are currently FAP's for Hobart Rivulet and Sandy Bay Rivulet.

A FAP for the New Town Rivulet is currently being developed and the Sandy Bay Rivulet FAP will be reviewed and updated, following completion of an updated flood study of this Rivulet.

The objectives of the Flood Action Plans can be summarised as follows:

- to minimise the impact on property and infrastructure arising from the inundation;
- to mobilise the necessary resources to facilitate the planned protection measures;
- to ensure the warning system provides the necessary lead time;
- to provide for regular exercising of the plan;
- to identify the key stakeholders in the affected area; and
- to develop the appropriate communication protocols with key stakeholders.

The scope of the FAPs are specific to each location.

The Hobart Rivulet Flood Action Plan is restricted to the open section of the Hobart Rivulet behind the Royal Hobart Hospital in Collins Street between Argyle Street and Campbell Street. The area of inundation associated with an overflow in this location is that identified in the Hobart Rivulet Flood Study (HEC 1997), which essentially consists of the City Hall/ Grand Chancellor precinct, including the adjacent parts of Wapping, from the Rivulet to the docks across Macquarie Street and Davey Street.

The rivulet emerges from beneath the hospital, travels in the open section parallel with Collins Street and re-enters two culverts as it passes under Campbell Street. The Rivulet has a limited capacity in this section and during extensive rain events water can backup and overtop the walls causing flooding in the nearby area.

Image 1: Hobart Rivulet in flood, June 1954 [Source: The Mercury]

The scope of the Sandy Bay Rivulet Flood Action Plan is restricted to those reaches of the Sandy Bay Rivulet between Waterworks Reserve and the River Derwent at Short Beach. The extent of inundation associated with fluvial flooding has been previously identified in the Sandy Bay Rivulet Flood Study (HEC 1999). The potentially flood prone areas adjacent to the Sandy Bay Rivulet include a number of private buildings and property as well as public roads and bridges.

ACTION: Update flood models to include impacts of potential climate change scenarios and updated survey information.

ACTION: Finalise the Sandy Bay Rivulet Flood Action Plan.

ACTION: Develop the New Town Rivulet Flood Action Plan.

ACTION: Continue to implement Flood Action Plans.

Areas Not Serviced by Public Infrastructure

Some ratepayers do not receive the benefit of a stormwater connection to Council's stormwater reticulation system. Prior to the Local Government Act in 1964, land developers who subdivided land were not required to provide a separate stormwater connection to each lot. This meant that in some areas only those blocks on the high side of the road which can drain to kerb and channel are fully serviced.

Consequently, in Hobart there are governance issues of shared private stormwater installations, discharge of stormwater to ground, and illegal connections of stormwater into the sewer system.

Shared Private Stormwater Systems

Shared private stormwater systems unlike Council owned stormwater mains are not subject to any asset management practices such as condition assessments or scheduled maintenance and consequently represent a risk to both the property owner and to Council. Council usually becomes involved when one of these systems breaks down and causes a nuisance to either the owner(s) and or other third parties when Council is required to investigate and facilitate the renewal. This can be a very complex and costly endeavour to both Council and the owners as it is often difficult to establish who discharges to the system given that no records of these systems are held by Council and the owners are often not aware of their drainage.

An important aspect of the Master Drainage Scheme for each catchment is to map areas that are not currently being serviced by Council mains which may indicate the presence of one or more of the governance issues listed above. In this way Council hopes to identify any potential requirement for extension of the Council owned and maintained system.However it is noted that this needs to be done on a case by case basis as the issues involved are often unique to each situation.

Illegal Connections of Stormwater into the Sewer System

It is likely that in the future Southern Water will require property owners, whose stormwater has been identified as connected to sewer, to disconnect. This type of problem is particularly evident in the older areas of Hobart such as Battery Point and Glebe. At this time Council may be required to assist property owners by providing a suitable stormwater connection point. This retrofit of stormwater infrastructure into densely urbanised areas is typically expensive. Additionally Council may be required to upgrade existing stormwater infrastructure to cope with added flows which previously were catered for by the sewerage system.

Funding

Capital funding has been secured for an ongoing project to extend Stormwater Reticulation into Unserviced Areas. The project has secured funding of an initial $75,000 per annum increasing up to $120,000 per annum over its 10 year implementation program for a total capital expenditure of $1.1 million. This represents a significant increase in funding for this project and is in accord with one of the key recommendations of the AMP which suggested that funding be substantially increased in order to have any 'meaningful' effect.

It is noted that a key outcome of the Master Drainage Schemes will be the definitive identification of both unserviced and inadequately serviced areas and estimation of their trunk stormwater requirements. This will provide Council with the base knowledge it needs to accurately forecast the future capital expenditure required to provide a consistent level of service across Hobart.

ACTION: **Identify and map locations where there are shared private drainage systems.**

ACTION: **Identify which private shared drainage systems are to be taken over as the responsibility of Council.**

ACTION: **Identify locations where there are properties without public stormwater systems.**

ACTION: **Identify and prioritise projects involving the installation of public stormwater systems in unserviced areas.**

Waterways and Rivulets

Operations and Maintenance

Current maintenance activities undertaken by Council's Stormwater and Waterways civil workforce include:

- Planned maintenance of sediment traps, stormwater quality improvement devices and grit removal from trunk stormwater mains;
- Responsive maintenance of rivulets (including clearing accumulations of silt, flood debris, tree branches, boulders from rivulets); and
- Planned maintenance of rivulets (including removal of silt accumulation and debris following storms, control of weed infestations, and maintenance of floodway capacity).

In addition to these activities, the Environmental Engineering Unit includes an officer to investigate and act on customer complaints about soakage, leakage or odour complaints in the stormwater networks.

It is noted here that there are many benefits across different service types by maintaining levels of infrastructure investigations. Investigations of foul odours in the stormwater system usually lead to the root cause of defective private or Southern Water sewerage installations. Recreational water quality can only be reliably assured as safe if all hydraulic systems upstream are in working order.

In order for the current maintenance culture to adapt to the changing performance and expectations of the stormwater system, it is vital that a maintenance planning function is created to determine and fund appropriate levels of planned and reactive maintenance on the system. This requires extensive performance and condition analysis.

In the near future, the Environmental Engineering Unit will be developing a formalised maintenance schedule which will be documented in the Stormwater and Waterways Operational Manual for all stormwater services to assist in the effectiveness of maintenance programs.

Erosion of Rivulet Banks

Increases in catchment impervious surfaces associated with urbanisation have dramatically increased peak flows in our waterways. This altered hydraulic regime has led to a significant increase in bank and bed erosion of our waterways as they attempt to find a new geo-morphological equilibrium ie the waterways are transitioning to a new shape to cater for increased peak flows.

Importantly, the hydraulic regime is also changing due to climate change, which has been predicted to result in increases in the frequency of extreme weather events further exacerbating the erosion of our waterways.

Erosion is a natural process and only becomes an issue when public or private infrastructure is potentially affected. Unfortunately, this is often the case when erosion occurs in the lower reaches of our rivulets due to the encroachment of development into the riparian zones.

Traditionally, In order to protect infrastructure from erosion, engineers have employed hard engineering solutions such as retaining walls or concrete lining of the rivulet. Hard engineering solutions are relatively expensive, can degrade the ecological and aesthetic values of the waterway and often result in the erosion potential simply being transferred further downstream.

In keeping with Council's Future Direction 2 where Hobart will be recognised for its natural beauty and quality of its environment the preference is to move towards a more proactive and preventative management strategy that favours the use of soft engineering solutions to mitigate against future erosion and to rehabilitate existing bank failures.

Soft engineering solutions involve using largely natural materials such as rock and vegetation and result in a soft landscaped feel. The intent is to create stable and attractive waterway systems upon which ecosystems flourish.

In order to facilitate this move to a more proactive, preventative management strategy the Environmental Engineering Unit will be undertaking an extensive condition assessment of our natural waterways. This assessment will enable us, via a geo-morphological survey, to identify high erosion potential sites and take steps to prevent rather than react to erosion in our waterways.

ACTION: Undertake riparian and geo-morphological condition assessments on appropriate waterways and rivulets.

Vegetation

A significant management issue associated with the Rivulets is the heavily overgrown state of a number of them. The prevalence of blackberry and other weed species in minor rivulets and the upper reaches of major rivulets affects Council's ability to carry out condition assessments and preventive maintenance on its infrastructure. The physical presence of this overgrowth also prevents the public from using many reaches of the Rivulets.

Formalised maintenance planning of activities is forecast in the short term as a significant improvement in this area however cross divisional cooperation with Council's Open Space Group (including the Bushland and Reserves Unit) and landowners is also necessary to achieve the most cost effective and sustainable outcome.

Currently Council's workforce carries out routine inspections of higher risk rivulets and removes weed species such as blackberries and willows where floodway capacity is challenged. A number of difficulties are currently experienced in delivering a balanced program in this area. Apart from some limited sections of the Hobart and Sandy Bay Rivulets, Council has responsibility for management of the rivulets as a 'common drain' under the Drains Act 1954, but does not own title. In essence this means that Council is required to maintain floodway capacity in Rivulets on private property.

There are currently no vegetation management plans for Hobart City Council's catchments. There is significant crossover of vegetation management within catchments between Council's Open Space Group (including the Bushland and Reserves Unit) and Council's Environmental Engineering Unit. As such, any planning in the development of vegetation plans will need to take place in consultation with both Units.

Weeds are invasive, non-local plants and have significant impacts on catchments and waterways in numerous ways including:

- impeding and altering stream flows;
- degrading water quality due to increased biochemical oxygen demand (BOD);
- accelerating erosion;
- reducing the effectiveness of stormwater infrastructure;
- impeding recreational access and enjoyment;
- displacing native vegetation;
- reducing native fauna habitat;
- increasing fire fuel loads; and
- harbouring pest animals and diseases.

Weeds occur throughout the majority of Hobart's catchments, generally with the densest infestations found in the lower, developed reaches, in areas with elevated nutrient levels and with a history of disturbance. In the natural and semi-natural upper reaches, weed populations are more scattered although significant localised infestations have established, usually in areas in close proximity to housing.

Significant work in some areas has been undertaken by Council, Bushcare and other community groups in the last two decades to clear weeds and reduce their impacts on the catchments. In some locations, weed clearing has been followed by plantings of local native species as a means of stabilising banks, improving streamside access, improving amenity values and restoring habitat. However, the extent of weed invasion in catchments remains high and will require considerable planning and resources to significantly reduce impacts in the longer term.

Important in maintaining a high standard of water quality in the upper catchments is the management of bushland. Hobart City Council's Bushland Management Strategy 2007–2017 (Hobart City Council, March 2008) identifies the aspects and influences bushland management practices may have on fluvial and riparian systems with actions identified as part of the Strategy. Ongoing management of upper catchments will be undertaken through action plans identified the Bushland Management Strategy 2007–2017, including a comprehensive analysis of the impacts management practices have on water quality and quantity.

ACTION: **Develop a vegetation (including weed survey) strategy for the catchment in collaboration with Council's Open Space Group (including the Bushland & Reserves Unit).**

ACTION: **Investigate funding options to target priority weeds through the catchment, including new and emerging species.**

ACTION: **Work with Council's Open Space Group in regard to incorporating environmental values into Open Space planning adjacent to rivulets and waterways.**

ACTION: **Complete a Stormwater and Waterways Operational Manual.**

Catchment Management Planning

Local governments in Tasmania are responsible for the management of drainage systems, including rivulets and the stormwater system.

The State Policy on Water Quality Management 1997 requires that local governments prepare and implement a Catchment Management Plan (CMP). Whilst this State Government policy has been in place for some time, there has been limited active follow up or assistance in its implementation.

The State Stormwater Strategy re-affirms recommendations of the Tasmanian State Policy of Water Quality Management 1997 which emphasises the need to manage stormwater at source and highlights the importance of managing stormwater in new developments at both the construction and operational stages.

Within Council, the responsibility for stormwater management often spans many departmental boundaries. Figure 2 below demonstrates the numerous departments within Council that may deal with stormwater and rivulet management.

Figure 2: Various departments within Hobart City Council that may deal with stormwater and rivulet management [Source: modified from DEP, 2005]

Different aspects of stormwater management are usually dealt with by a number of departments in Council. This may make it difficult to integrate stormwater management in the Hobart municipal area. However, the majority of rivulets and waterways are assets managed by Council's Environmental Engineering Unit.

In recent years, Council has undergone a Catchment Management Planning process for our major rivulets. From the CMPs several actions have been developed, with actions driven by the need to improve water quality in Hobart's waterways and to identify the catchment activities and processes that are contributing to significant stormwater pollution and to improve the environmental amenity and ecological integrity of the catchment.

CMPs for the following rivulets have been prepared and are publicly available:

- Hobart Rivulet;
- Sandy Bay Rivulet;
- Wayne Rivulet; and
- New Town Rivulet (Published by the Derwent Estuary Program).

A CMP for Council's minor rivulets is currently being prepared. This CMP will look to cover the following catchments:

- Cartwright Creek;
- Folder Creek (incorporating Hartam Rivulet, Kadina Rivulet and Riverview Rivulet);
- Lipscombe Rivulet;
- St Canice;
- Maning Rivulet;
- Red Chapel;
- Waimea;
- Lambert Creek;
- Rifle Range Creek/University;
- Earl Street Rivulet;
- Proctors;
- Ashfield; and
- Tributaries initiating in Hobart municipal area but ending up in Kingborough Council Municipality (Browns River, Dunns Creek, Vincents Creek, Tip).

Community Involvement

The long-term involvement of the community in aspects of Hobart City Council's rivulets and waterways is a key objective in managing a natural resource and fostering the development of a relationship between the catchment manager (Council) and the catchment users (community).

The community can be described as individuals whom reside within the catchment, volunteer interest groups and users of the catchment area. The community may utilise and value a rivulet and its surrounding catchment through a number of ways, including aesthetics, recreation, education, history, culture, flora and fauna.

To assist in developing and a maintaining strong community network within the Hobart municipal area, the Hobart City Council utilises its Adopt-A-Waterway program.

The Adopt-A-Waterway program is an initiative of the Hobart City Council, and is applicable to those rivulets and waterways within the Hobart City region that come under the Council's jurisdiction. The program aims to include the local community in the care and maintenance of rivulets and waterways around Hobart.

The purpose of the Adopt-A-Waterway program is threefold. The first is to increase awareness among the community as to the state of the local waterways. By being active in the Adopt-A-Waterway program, the Council hopes to encourage the local community to be willingly responsible for the state of their local environment.

The second is to create an active partnership between the Council and the local community. Through the program the Council and the community will together be involved in preserving Hobart's environmental assets in making improvements to the water quality and aesthetics.

The third is to keep the Council actively aware of any problems occurring along its rivulets and waterways, so the problem

can be fixed in the shortest time possible. Incidents can be reported immediately, making it easier for the Council to assess the severity of the problem and ensuring that the right solution is implemented.

Participating in the Adopt-A-Waterway program presents many benefits for the community and the Council. It gives the participants the enjoyment and relaxation that comes from working in an outdoor environment, as well as a sense of achievement for having performed a service to the community.

The benefits for the Council include the close ties created between the Council and the community, as well as a structured program to keep the rivulets and waterways of Hobart clean.

Any community group and organisation can participate in the Adopt-A-Waterway program. These include:

- schools;
- community groups;
- Landcare, Coastcare, Bushcare and Waterwatch Groups;
- businesses; and
- Local Government Organisations.

Where possible, the Council will encourage groups and organisations to adopt a waterway that is located in their area. In cases where local support is high, individual residents will be encouraged to join the program in their neighbourhood.

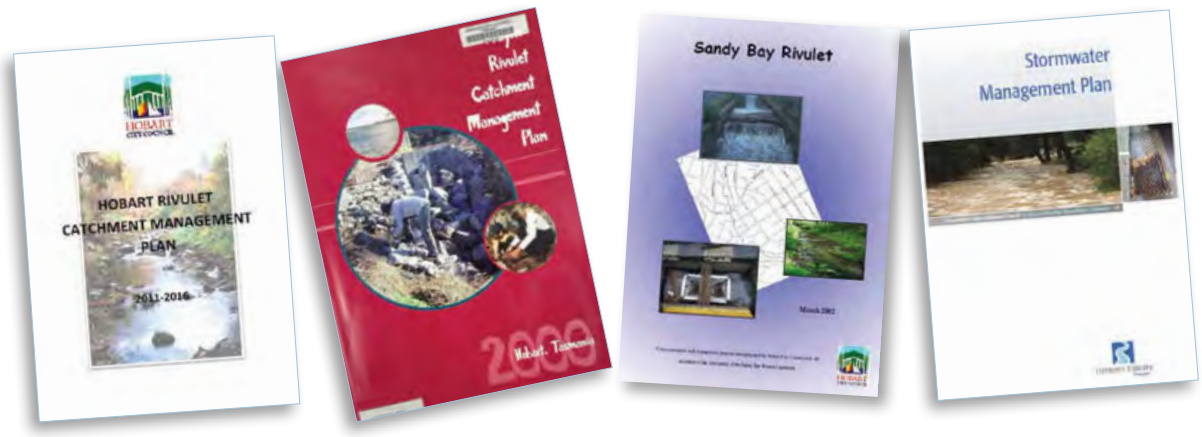
The Adopt-A-Waterway program is also utilised to provide suitable native plants to those residents residing adjacent to watercourses in the Hobart municipal area. This assists the catchment in providing suitable plant varieties for the area, providing bank stabilisation, erosion control, native wildlife corridor and aesthetic benefits in the area.

Overall the program is an initiative of Council to increase community awareness and appreciation of the waterways and foreshore areas.

ACTION: Complete minor rivulets Catchment Management Plan.

ACTION: Continue to promote the Adopt-A-Waterway program.

ACTION: Continue ongoing consultation with the community and community groups.



Stormwater Quality

Stormwater run-off is the major cause of poor water quality in waterways. It is the unique characteristics of a catchment area that may affect the quality of the stormwater and the way that the stormwater is managed within that catchment.

These characteristics may include the permeable/impermeable surface ratios, population of the catchment, operational industries within the catchment, and human behaviour to name a few.

As stormwater flows over the impermeable surfaces present in urban areas, it collects pollutants such as oils, pathogens, litter, nutrients, metals and sediments. These pollutants are transferred to our waterways via run-off into the stormwater system and have the potential to cause toxic, organic, nutrient, pathogenic and sediment pollution of our rivers and oceans.

Water Quality Modelling

Catchment Management Plans bring together the management of stormwater runoff quality and the protection of the values of the natural and built waterways that constitute a major component of a stormwater conveyance system.

Stormwater runoff quality and receiving waterway health will be addressed, within the context of the Master Drainage Schemes currently under development, leading to the integration of mitigation measures addressing both the quantity and quality aspects of stormwater runoff.

To evaluate stormwater quality within the catchment a water quality model of the catchment will be developed using MUSIC (the Model for Urban Stormwater Improvement Conceptualisation) developed by the eWater CRC. MUSIC provides the ability to simulate both quantity and quality of stormwater runoff from a single house block up to many square kilometres, and the effect of a wide range of treatment measures on the quantity and quality on runoff on the downstream environment.

The proposed treatment measures will include but not be limited to sediment traps, wetlands, ponds, bio retention systems, swales and street scale retrofitting of Water Sensitive Urban Design (WSUD). MUSIC will be used for conceptual sizing, costing and testing the effectiveness of the various water quality treatment options.

The treatment measures will be designed to minimise the impact of existing and proposed development within the rivulet catchment on receiving waters and will aim to achieve the water quality objectives outlined in the State Stormwater Strategy, DPIPWE, 2010.

Stormwater reuse is becoming an increasingly important option when considering the overall management of water resources. This is in keeping with the development of integrated water cycle management approaches, which recognise the value of water and aim to improve water quality and aquatic ecosystems. The potential for stormwater reuse within the Hobart Rivulet catchment will be investigated using the yield analysis and water balance tools available within the MUSIC model.

ACTION: Develop MUSIC models to assist in the conceptual location and sizing of stormwater quality improvement devices.

Stormwater Quality Monitoring

The Derwent Estuary Program (DEP) commenced the Greater Hobart's Stormwater and Rivulet Monitoring Program in July 2002. This program ran for three years (2002–2005) and was a joint effort between the Derwent Estuary Program, Waterwatch groups and Hobart's Regional Councils.

Samples were analysed for total suspended solids, nutrients, heavy metals and faecal bacteria. The results of the three year monitoring program demonstrated a clear relationship of decreasing stormwater quality with increasing catchment urbanisation.

Each Council analyses stormwater pollutants taken from various sites within their municipal area. The pollutants analysed are:

Sampled each month:

- Turbidity and Total Suspended Solids (TSS); and
- Faecal coliforms and enterococci.

Sampled each quarter:

- Nutrients (total nitrogen and total phosphorus);
- Oil and grease;
- Heavy metals;
- Turbidity and TSS; and
- Faecal coliforms and enterococci.

Sampled bi-annually:

- Turbidity and TSS;
- Faecal coliforms and enterococci; and
- Nutrients (total nitrogen and phosphorus).

Results from this program will be compared to that of the previous program to ascertain whether rivulet and stormwater quality has improved, remained similar or has declined. Overall the program will assist in identifying levels of stormwater pollutants that enter the Derwent Estuary, focusing on Rivulets. This will in turn allow Councils to identify and manage specific stormwater problems, improve water quality and protect the environmental values of waterways and receiving waters.

Image 2: Waterways sampling [Source: Hobart City Council, 2011]

As the results demonstrated in the 2002-2005 DEP Rivulet and Stormwater Monitoring Program, it is generally the upper 'pristine' areas of the Hobart Rivulet with good water quality, with the lower urban rivulet sites displaying high faecal contamination and nutrient levels which in the past has suggested that human sewage may be infiltrating to the rivulet and stormwater system. During normal flow conditions turbidity, suspended solids and oils were not a problem for Hobart Rivulet, however this is likely to differ significantly after a rainfall event.

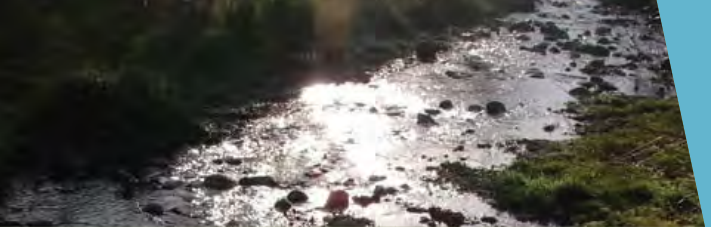
ACTION: Continue Council's involvement with the Derwent Estuary Program.

ACTION: Participate in and support the Derwent Estuary Program's Stormwater Taskforce.

ACTION: Identify sources of contamination identified through monitoring program.

ACTION: Review water quality monitoring program, including:

- **location of monitoring sites;**
- **number of monitoring sites; and**
- **event-based monitoring (ie during rainfall).**



Water Sensitive Urban Design

WSUD is increasingly being seen as the best solution to urban stormwater pollution and urban stormwater volume-related problems.

WSUD incorporates water management features into the urban landscape and has multiple environmental and aesthetic benefits, such as:

- reducing stormwater flows and pollutant loads – thereby protecting downstream waterways – by collection and treating stormwater in wetlands, ponds, bioretention swales or grass swales;
- conserving potable water by collecting roof runoff and stormwater in rainwater tanks or underground storage for reuse in gardens and toilet flushing;
- minimising impervious surfaces by use of porous pavements (eg for carparks, roads and driveways) and minimising housing footprints;
- providing public open spaces for stormwater treatment (eg wetlands), recreation and visual amenity (which also increases land values).

WSUD applies to both urban and rural developments and can either be retrofitted into existing urbanised catchments or incorporated at the design stage of new developments (DEP, 2006).

Hobart City Council encourages all new developments or redevelopments of any scale to investigate the potential for incorporating WSUD techniques during their design phase. Council refers developers to the Derwent Estuary Program's Water Sensitive Urban Design Engineering Procedures for Stormwater Management in Southern Tasmania document and Council's Water Sensitive Urban Design Site Development Guidelines and Practice Notes document. Both of these documents are used as guideline documents in an attempt to guide local developers and designers in how they may better manage urban water at a site scale.

ACTION: Assist in the development of guidelines for Council's Development and Environmental Services Division on appropriate stormwater treatment system requirements for private developments through the planning process.

ACTION: Continue to encourage developers and other Council units to utilise WSUD techniques where possible.

ACTION: Continue to promote the Derwent Estuary Program's Water Sensitive Urban Design Engineering Procedures for Stormwater Management in Southern Tasmania document and Council's Water Sensitive Urban Design Site Development Guidelines and Practice Notes document.

ACTION: Undertake a trial of rain gardens (WSUD) for street trees located within the CBD streetscape.

Stormwater Harvesting and Re-use

Each time it rains, water runs into roof gutters then enters the Council's stormwater system and ultimately, flows into the River Derwent.

A considerable amount of this water could be captured and stored, then used for other purposes. Stormwater harvesting would provide significant stormwater retention that:

- reduces runoff and downstream flooding;
- assists in reducing the quantity of stormwater through Council's infrastructure;
- value-adds stormwater as a resource supporting integrated water management;
- reduces the amount of treated water being used for purposes other than drinking;
- reduces the demand (and costs) for potable water supplies; and
- reduces the transfer of stormwater pollutants into the Derwent.

As such, stormwater collection, storage and re-use is of considerable benefit to the community. The re-use of stormwater can be undertaken on a number of different scales – infrastructure, residential and public open space.

Stormwater harvesting should be considered as an alternative strategy to upgrading stormwater infrastructure that has (or is approaching) its design capacity for storm drainage standards. Stormwater harvesting may be a more cost-effective and environmentally sensitive approach than large public works projects to upgrade the stormwater system (DPIPWE, 2010).

On a residential scale, there are many ways roof water could be re-used on residential properties, including: watering the garden; washing the car; in the laundry and toilet; and as additional fire protection.

Public open space and garden irrigation using drinking water supplies will be more closely scrutinised in the future.

Stormwater is increasingly being viewed as a source for irrigation. With the cost of water increasing, there is an increasing pressure on public open space managers to ensure that water used for irrigation is not wasted; that it is used in a sustainable and responsible manner; and to secure alternative water supplies such as stormwater.

ACTION: Review opportunities for stormwater harvesting within the Hobart Municipal area.

ACTION: Review Council's policy on rainwater tank plumbing application processes.

ACTION: Liaise with Council's Open Space Group to assist in the identification of appropriate Council open space areas for stormwater harvesting and re-use.

Asset Management

The Stormwater and Waterways Asset Management Plan (AMP) is part of a collection of AMPs that document the management of all assets of the HCC.

The purpose of the AMP is to:

- provide critical inputs for the annual budget process, 5 year works program and for the 20 year Financial Plan;
- document current asset management practice;
- plan and document asset management improvements;
- provide working and reference documentation for Asset Managers, asset management support staff, Unit and Group Managers and Directors;
- provide documented evidence for governance, good practice and audit purposes; and
- contribute to Council's knowledge management practices.

The Stormwater and Waterways AMP is continuously evolving through a process of using best available current information to analyse existing assets, predicting future demand, optimising management to meet identified demand and developing a financial plan to fund the rehabilitation, maintenance and operation of the stormwater asset groups.

The highest priority improvement tasks all focus on meeting that goal by:

- ensuring the right level of funding is allocated to maintain the asset service potential;
- confirming current levels of service and financial obligations associated with sustaining that level of service;
- continuing to improve predictive modelling techniques that will allow consideration of alternative long tem cost scenarios; and
- consulting with customers to ensure they have input into selecting the best scenario.

Asset Renewal

Prior to the development of annually revised asset management plans, stormwater infrastructure renewals were compiled from a number of different sources including:

- conquest customer complaints of soakage, flooding and other nuisances and the investigations carried out by the Unit arising from these;
- operator reports of sediment blockages or mains found in poor condition when investigated or repaired; and
- renewal opportunities with road infrastructure renewals/upgrades.

As the general asset condition of the stormwater network is good, there is usually only a small number of failure driven asset replacement projects up for evaluation at any particular time. As a more robust asset condition survey is implemented in later versions of the AMP, the Environmental Engineering Unit will be better positioned to raise its list of renewal candidates many years ahead of the program and to spend more value adding time in investigations of which projects are most worthwhile given the limited spend available.

New Assets

Capital funding has been secured for the projects. These are the Stormwater Reticulation into Unserviced Areas and Stormwater Strategy Implementation projects as listed below.

The Stormwater Reticulation into Unserviced Areas project has secured funding of an initial $75,000 per annum increasing up to $120,000 per annum over its 10 year implementation program for a total capital expenditure of $1.1 million. This represents a significant increase in funding for this project and is in accord with one of the key recommendations of the AMP which suggested that funding be substantially increased in order to have any 'meaningful' effect.

It is noted that a key outcome of the Master Drainage Schemes will be improved identification of unserviced and inadequately serviced areas and estimation of their trunk stormwater requirements. This will provide Council with the base knowledge it needs to accurately forecast the future capital expenditure required to provide a consistent level of service across Hobart.

A further $45,000, increasing $5,000 every 2 years over a period of 10 years for a total capital expenditure of $570,000 has been secured for stormwater treatment and erosion control measures in Hobart's waterways.

Condition Assessments

Council has Closed Circuit Television (CCTV) records of the condition defective stormwater mains collected over the last 10 years, however it has not to date carried out any statistically-based general assessments of stormwater asset condition.

Council has committed significant resources to the CCTV program and in data quality improvement. Council Officers will expedite the improvement of our stormwater infrastructure data with ongoing and strategic asset data improvement activities as detailed in the Stormwater Asset Data Plan. Some of the key activities include:

- inspect, review and report on condition of assets maintained by the EEU;
- oversee the asset management system as it relates to works being carried out on hydraulic assets and in particular ensure that information is registered in Council's asset management system; and
- undertake or instigate risk analysis of stormwater assets including matters relating to economic cost of failure, safety and public liability.

ACTION: Continue an asset condition inspection program by undertaking CCTV of selected stormwater reticulation assets due for renewal in the next 5 years.

ACTION: Undertake criticality analysis and preliminary risk assessment of stormwater reticulation and built rivulets reaches to inform risk register and forward works program.

ACTION: Establish realistic Level of Service (LOS) and corresponding KPI's with an indication of the funding required to achieve this LOS.

Developments and Subdivisions

Stormwater engineering forms an integral part of new developments. The Environmental Engineering Unit aims to enforce relevant legislation, codes, planning schemes and policies; minimise risk and prevent nuisance to third party properties or future owners; and minimise environmental harm.

When assessing development applications close interaction with various Units is required including Surveying, Roads, Environmental Planner, Environmental Health Officers, Parks and Bushland, as well as Planners, Development Engineers, Plumbing Officers and Compliance Officers.

Council officers are required to assess the following stormwater related developments and works:

- subdivisions;
- new Council infrastructure;
- new connections into Council infrastructure, including creeks;
- drainage of low-lying properties (private stormwater infrastructure which cannot drain by gravity);
- the use of existing private shared stormwater systems;
- onsite stormwater disposal;
- Water Sensitive Urban Design, including rainwater harvesting and re-use;
- stormwater quality management including pre-treatment and acceptable discharges to stormwater;
- stormwater quantity management (eg onsite detention in areas where existing infrastructure has insufficient receiving capacity);
- flood risk from Rivulets;
- building over or near Council infrastructure, or within overland flow paths;
- protection of riparian zones and functions;
- environmental pollution and harm with respect to stormwater and waterways;
- soil and water management; and
- flood risk from sea level rise.

Inadequate or High Risk Drainage Systems

Older houses which are not serviced by public infrastructure often drain to ground, or an undersized rubble pit. While this may have been adequate when the systems were first installed, they do not meet current standards and often cause a nuisance to neighbouring properties. Often these systems were installed when house sizes were smaller (less runoff generated), land size was larger (more opportunity for interception, and dispersion into overland flow which did not create a nuisance), and allotments were not as steep (more opportunity for interception and infiltration). Developments often now also involve deep cuts into the ground level, which both intercept additional water and increases the damage done by insufficient drainage, and are built closer to boundaries thereby concentrating overland flow.

Council has the power to request these substandard systems to be upgraded under the Drains Act 1954 and Hydraulic Services By-Law 2008. Often this occurs if:

- they are draining to sewerage;
- they are causing a nuisance or have the potential to do so;
- they are defective (eg blocked or broken) and require repair; or
- the property is developed further.

ACTION: Provide input to new Planning Schemes and Codes (State/Regional/Council).

ACTION: Provide input and feedback to new legislation (eg Drains Act).

ACTION: Provide input to new Standard Drawings and Design guidelines for public stormwater infrastructure, working collaboratively with other Tasmanian Councils and organisations (eg IPWEA).

ACTION: Create Hobart City Council specific guidelines and policies for new development, and update existing guidelines and policies.

ACTION: Incorporate climate change and sea level rise into flood risk analysis.

ACTION: Improve internal communications and procedures when dealing with development applications and compliance.

Climate Change

The future climate of Hobart is likely to be warmer and drier, with such trends also likely to increase evaporation. However in contrast to the predicted extended drier periods, there is also a potential for increase in extreme rainfall events with greater intensities.

Although average changes in temperature, rainfall intensities and evaporation will have long-term consequences of the catchment, the impacts of climate change are more likely to be felt through extreme weather events.

In summary, this equates to longer drier periods followed by more intense storms. These intense storms may lead to an increase in the velocity of the water, which in turn may lead to an increase in erosion and bank destabilisation and thus sediment pollutions within the waterways.

Lower flows and higher temperatures may also reduce water quality within the catchment. For example, low flows, higher temperatures and higher nutrient levels may create a more favourable environment for potentially harmful algal blooms. Decreases in runoff due to climate change may reduce the extent and function of tributaries flowing into catchments. These tributaries may provide habitat for birds and other wildlife. Changes to the climate will have significant effects on the catchment's plants and animals. Reductions in stream flows are likely to have a negative impact on aquatic biodiversity and wetland ecosystems.

Projected increases in the intensity and frequency of extreme events directly impact on council asset base with significant and unpredictable financial and service delivery implications. Council's stormwater system for example is designed for historical climate and with projected climate change, will likely become significantly under capacity. Council will therefore need to consider the additional cost of managing stormwater at the current acceptable level of service and either fund that cost or accept that a greater frequency of inundation events is likely. Acknowledging this, public inconvenience and safety issues have been identified as a recurring risk theme in relation to the impact of extreme events on council infrastructure (STCA, 2011).

Sea level rise and storm surge will also have a significant impact for the Hobart municipal area. There is a wide range of potential impacts where examples include environmental impacts such as inundation of estuarine and salt marsh communities, impacts on property and infrastructure and inappropriate land use planning decisions which do not account for potential impacts of sea level rise and/or storm surge (STCA, 2011).

In order to assist local government, the Southern Tasmanian Councils Authority (STCA) has created the Regional Councils Climate Adaptation Project (RCCAP). The aim of this project is to assist councils in developing climate change adaptation plans at the regional; land-use and corporate levels.

A risk based approach is to be undertaken through which council process and function is assessed with respect to the available climate change data for the region. This project provides opportunity for discussion around the issue of asset management within local government, in the context of climate change (STCA, 2011).

ACTION: **Consider climate change considerations when undertaking stormwater projects.**

ACTION: **Continue involvement with the STCA's Regional Councils Climate Adaptation Project.**

ACTION: **Provide advice and comment to the Hobart City Council's Climate Change Adaptation Plan developed from the RCCAP.**

ACTION: **Update flood models to include impacts based on potential climate change scenarios.**

ACTION: **Assess development applications taking into consideration climate change.**

Funding

The costs associated with developing and implementing the Stormwater Strategy will be substantially funded through Council's existing operating budget.

However funds associated with works that are needed to improve stormwater capacity and reduce the likelihood of flooding have not been allocated.

Funding for stormwater works have traditionally been sourced from either Asset Replacement funds or New Asset funding. Asset Replacement funds (in the order of $600,000 per annum) are typically used to carry out works on stormwater assets that require remedial attention.

New Asset funding has been used traditionally to install stormwater infrastructure into areas that historically do not have these assets present. Typically these works occur when soakage or flooding complaints are received from residents.

Funding in the order of $100,000 per year has been allocated in the 20 year Financial Plan for these works.

Any future works identified as a result of implementing the Stormwater Strategy will need to be identified and prioritised. This would be the subject of reports to Council in the future. However it is expected that prioritisation would be assisted by the use of Benefit/Cost Analysis for each site that may have deficient stormwater capacity.

Other sources of funding will also be investigated. Other possible funding sources include:

- development headwork charges;
- scheme of constructions (contributions by landowners towards works);
- Federal grants; and
- Roads to Recovery funding for suitable projects that benefit roadways.

ACTION: Undertake benefit/cost analysis of each potential project in order to assist with prioritisation of future works.

ACTION: Investigate external sources of funding for appropriate stormwater projects.

Summary of Actions

Ongoing Actions (2012–2017)

ACTION
Council officers participate in the legislation review of the Drains Act 1954.
Implement recommendations from flood studies.
Continue to implement Flood Action Plans.
Identify and map locations where there are shared private drainage systems.
Identify which private shared drainage systems are to be taken over as the responsibility of Council.
Identify locations where there are properties without public stormwater systems.
Identify and prioritise projects involving the installation of public stormwater systems in unserviced areas.
Investigate funding options to target priority weeds through the catchment, including new and emerging species.
Work with Council's Open Space Group in regard to incorporating environmental values into Open Space planning adjacent to rivulets and waterways.
Undertake riparian and geo-morphological condition assessments on appropriate waterways and rivulets.
Update Asset Management Plan
Continue to promote the Adopt-A-Waterway program.
Continue ongoing consultation with the community and community groups.
Develop MUSIC models to assist in the conceptual location and sizing of stormwater quality improvement devices.
Continue Council's involvement with the Derwent Estuary Program.
Participate in and support the Derwent Estuary Program's Stormwater Taskforce.
Identify sources of contamination identified through monitoring program.
Review water quality monitoring program, including: location of monitoring sites; number of monitoring sites; event-based monitoring (ie during rainfall).
Assist in the development of guidelines for Council's Development and Environmental Services Division on appropriate stormwater treatment system requirements for private developments through the planning process.
Continue to encourage developers and other Council units to utilise WSUD techniques where possible.
Continue to promote the Derwent Estuary Program's Water Sensitive Urban Design Engineering Procedures for Stormwater Management in Southern Tasmania document and Council's Water Sensitive Urban Design Site Development Guidelines and Practice Notes document.
Review opportunities for stormwater harvesting within the Hobart municipal area.
Liaise with Council's Open Space Group to assist in the identification of appropriate Council open space areas for stormwater harvesting and reuse.
Continue an asset condition inspection program by undertaking CCTV of selected stormwater reticulation assets due for renewal in the next 5 years.
Undertake criticality analysis and preliminary risk assessment of stormwater reticulation and built rivulets reaches to inform risk register and forward works program.
Establish realistic Level of Service (LOS) and corresponding KPI's with an indication of the funding required to achieve this LOS.
Provide input to new Planning Schemes and Codes (State/Regional/Council).
Provide input and feedback to new legislation (eg Drains Act).
Provide input to new Standard Drawings and Design guidelines for public stormwater infrastructure, working collaboratively with other Tasmanian Councils and organisations (eg IPWEA).
Incorporate climate change and sea level rise into flood risk analysis.
Improve internal communications and procedures when dealing with development applications and compliance.
Consider climate change considerations when undertaking stormwater projects.
Continue involvement with the STCA's Regional Councils Climate Adaptation Project.

Ongoing Actions (2012–2017) – Continued

ACTION
Provide advice and comment to the Hobart City Council's Climate Change Adaptation Plan developed from the RCCAP
Update flood models to include impacts based on potential climate change scenarios.
Assess development applications taking into consideration climate change.
Undertake benefit/cost analysis of each potential project in order to assist with prioritisation of future works.
Investigate external sources of funding for appropriate stormwater projects.

Actions 2012–2013

ACTION
Complete Master Drainage Schemes for those major sub-catchments listed for 2012–2013 completion in the Master Drainage Scheme project.
Finalise the Sandy Bay Rivulet Flood Action Plan.
Complete the New Town Rivulet Flood Action Plan.
Update flood models to include impacts of potential climate change scenarios and updated survey information.
Complete a Stormwater and Waterways Operational Manual.
Complete minor rivulets Catchment Management Plan.
Undertake a trial of rain gardens (WSUD) for street trees located within the CBD streetscape.
Review Council's policy on rainwater tank plumbing application processes.

Actions 2013–2014

ACTION
Complete Master Drainage Schemes for those major sub-catchments listed for 2013–2014 completion in the Master Drainage Scheme project.
Develop a vegetation (including weed survey) strategy for the catchment in collaboration with Council's Open Space Group (including the Bushland and Reserves Unit).
Create Hobart City Council specific guidelines and policies for new development, and update existing guidelines and policies.

Actions 2014–2015

ACTION
Complete Master Drainage Schemes for those major sub-catchments listed for 2014–2015 completion in the Master Drainage Scheme project.

The City of Hobart's Proposed Actions (addendum to HCC Stormwater Strategy 2012-2017)

2014

- Develop a prioritised schedule for the delivery and review of flood studies across Hobart's rivulet catchments, taking into account any guidance that may be provided by the State Government.
- Document the process for completing flood studies including how studies should be undertaken and involvement of elected representatives, the State Government and other relevant agencies.
- Review of City's major rivulets inundation mapping and flood action plans to ensure compliance with best practice principles.
- Review of Queensland Government draft flood planning control for incorporation into the Hobart Draft Interim Planning Scheme 2014.
- Review of the Hobart Draft Interim Planning Scheme 2014 to ensure that the planning scheme policy outlines the additional information required for assessment of flood prone land.

2015

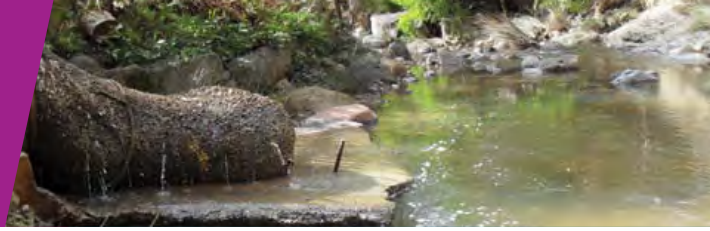
- Review the existing flood maps to identify where no assessment of flood risk has occurred and update the maps.

2014- 2019

- Complete all flood studies (all rivulets and assessment of overland flow path) for use in flood management of Hobart's catchments in accordance to Section 10 of the Urban Drainage Act 2013.
- Develop inundation maps and flood action plans for the minor rivulets.
- Develop and implement a program of flood risk mapping to support both planning and development and public awareness of flooding. The flood risk mapping program will consider zones of risk ('low', 'medium', and 'high' as per the guideline provided by Floodplain Management in Australia), likelihood and behaviour of flood (velocity, rate of rise and depth).

2014 and ongoing

- Continue to make flood and overland flow maps available to applicants for development approvals, and to consultants engaged by applicants.
- Review of Hobart Draft Interim Planning Scheme 2014 to ensure that specific guidance for the assessment of land use or storage of hazardous materials on the floodplain.
- Develop and implement a communication strategy to raise public awareness that stormwater connections to sewerage infrastructure is illegal.
- Implement communication strategy.
- Liaise with TasWater to understand their scheduled infrastructure maintenance programs.
- Develop and formalise processes for information sharing with TasWater to identify non-compliant properties.
- Continue implementing enforcement processes that rectify illegal stormwater to sewerage connections.
- Continue to conduct risk assessments of areas at risk of backflow flooding and incorporate this information in to the flood action plans.
- Liaise with TasNetworks and provide our inundation mapping.
- Liaise with Telstra, Optus and NBN and provide our inundation mapping.



2015 and ongoing

- Undertake review of feasibility of an online database to conduct search on development approvals relevant to the land.
- Make Development Application available on Council's website.
- Review of Council's current practice of informing property owners of flood risk at the property.
- Publish flood action plans and inundation maps on Council's website.

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