Attachment A

Mid-Brisbane Catchment Action Plan 2015 - 2018

May 2016

Resilient Rivers Initiative


DRAFT

Contents

Executive Summary

The Resilient Rivers Initiative is: "By 2045, the catchments of South East Queensland will support a resilient, productive, liveable and growing region." This vision is documented in the Resilient Rivers Regional Strategy (2015-2025) which also has supporting goals and measures of success. The development of a Mid-Brisbane Catchment Action Plan has been identified as a priority area for this strategy.

The primary focus of the Catchment Action Plan is addressing the very high risk of sediment movement from Mid-Brisbane River channel (as identified in key state and local government and Seqwater investigations into the January (Australia Day) 2013 weather event).

With a catchment area of 563km² the Mid-Brisbane catchment accounts for a small but vital area of the Brisbane River catchment. The Mid-Brisbane River extends 61k, from Wivenhoe Dam to the Mount Crosby Water Treatment Plan with the Lockyer Creek flowing into it approximately 2km downstream of Wivenhoe. There are no impoundments on the River from Wivenhoe downstream to Moreton Bay. The Mid-Brisbane River acts as a conduit for water supply between Wivenhoe Dam and the Water Treatment Plant, supplying 40 percent of the region's drinking water. In addition to the regionally important water supply role, the Mid-Brisbane catchment supports a small amount of irrigated agriculture and limited grazing. River based recreation and rural residential values are key aspects. Much of the river's riparian areas are poorly vegetated making them susceptible to erosion with significant erosion observed during the flooding of 2011 and 2013. Stabilisation and strengthening of the channel is required so it can continue to provide its significant values.

Detailed geotechnical analysis of the Mid-Brisbane channel has been undertaken. For example the Mid-Brisbane Stabilisation Strategy Technical Assessment (2014) split the Mid-Brisbane into 61 reaches and these have been classified in terms of the type and magnitude of erosion process i.e. fluvial scour and wet flow failure. It has been recommended that stabilisation should both protect and enhance areas of better riparian vegetation and begin restoring areas or poorer (or failed) riparian condition. The critical riparian area for this purpose is the area between the 'toe' (bank adjacent to the low-flow water level) and the top of the high bank.

Recreational sites along the river are largely 'informal' with consequential erosion, impacts on riparian vegetation and the introduction of pathogens. A 2008 Master Plan for the key recreational sites has identified improvements which will enhance the protection of the water supply.

High water tables in Black Snake Creek sub catchment continue to contribute to poor water quality in the Mid-Brisbane River due to the release of saline water (Ipswich City Council (ICC), 2014).

The Mid-Brisbane Catchment Action Plan was development by a project team consisting of key investors and advisers as part of the Resilient Rivers Initiative. Community engagement for this Catchment Action Plan utilised existing channels such as Seqwater stakeholder reference groups and ICC's Black Snake Creek Catchment reference group. The Catchment Action Plan has been endorsed by the relevant councils.

The following table outlines the actions in the Mid-Brisbane Catchment Action Plan 2015-18 and the Measures of Success as identified in the Resilient Rivers Regional Strategy (2015 – 2025):

Mid-Brisbane Catchment On-Ground Actions	Regional-level Measures of Success
Bank stabilisation at high risk sites along the macrochannel and raising of beds (in-stream islands or benches) to slow sediment. Fencing of the bank and provision of off-stream watering points/irrigation infrastructure along macrochannel delivered as a supported package (voluntary, deliver works on behalf of landholder). Tree planting program to manage salinity in Black Snake Creek (recharge area) – link to Plan and Woolshed Creeks in the Lockyer catchment. On-site sewerage system education and compliance program (requires enhanced coordination between councils and Seqwater). Prioritise remediation of high use informal recreation areas along the macrochannel and develop best practice approaches to remediating recreation zones in a water supply catchment (as per the Sapling Pocket demonstration site). Strategic land purchase for multiple benefits (eg. riparian sites for recreation; riparian sites of good quality vegetation; to protect infrastructure; to stop sediment) based on a voluntary willing seller principle.	Four on ground works completed. Six industry best management practice projects implemented.
Mid-Brisbane Catchment Policy Actions	**Measures of Success**
Establish a working group to develop management options with relation to Mid-Brisbane sand and gravel extraction activities and impacts to water quality, catchment health and stakeholders, including solutions for operational sites and investigation of Key Resource Areas not DA approved or DA pending. Investigate groundwater pumping system for Black Snake Creek (a salinity management system would need the development of 'rules' as it is a collaborative approach to management). Clarification of rights and responsibilities of landholders adjacent to creek reserves/riparian zones.	Best option identified and agreed. Feasibility report prepared. Education activity completed.

About this action plan

Scope and purpose

The Mid-Brisbane Catchment Action Plan 2015-18 has been prepared as part of the Resilient Rivers Initiative which has the 30 year vision for the South East Queensland (SEQ) region:

"By 2045, the catchments of SEQ will support a resilient, productive, liveable and growing region."

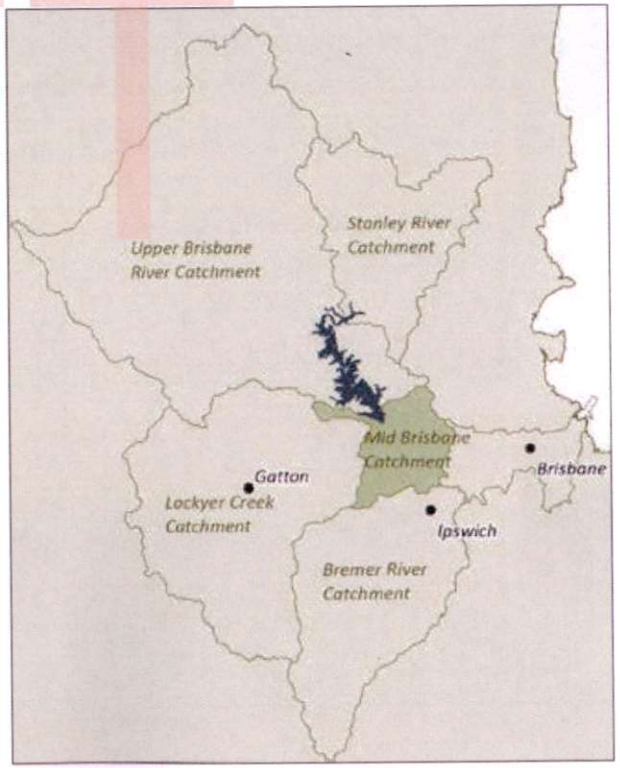
This vision is documented in the Regional Strategy (2015-2025) which also has the following supporting goals:

- Keep soil on our land and out of our waterways to support agricultural productivity and improve water quality.
- Help protect our region's water security so it can support the current and future population of SEQ.
- Improve the climate resilience of our region.
- Promote partnerships with strong leadership to deliver a coordinated approach to catchment management in SEQ.

The Resilient Rivers Taskforce determined that the Mid-Brisbane catchment is a regional priority area for works as identified in key state and local government and Seqwater investigations into the January (Australia Day) 2013 weather event which resulted in the Mt Crosby water treatment plants being severely impacted due to siltation.

This Catchment Action Plan:

1. Provides a commitment to enact change based on the 'best of our knowledge and understanding' which reflects the values of the local community
2. Identifies specific actions to mitigate risks in the catchment within the context of the Resilient Rivers Initiative
3. Identifies a package of coordinated and consolidated investments based on agreed prioritization actions.



Location of the Mid-Brisbane catchment

Rationale for regional investment in the Mid-Brisbane Catchment

With a catchment area of 563km² the Mid-Brisbane catchment accounts for a small but vital area of the Brisbane River catchment. The Mid-Brisbane Catchment contains the section of the River below Wivenhoe Dam and to the Mt Crosby Weir. It is dominated by the 61km 'macrochannel' which is an important conduit of the water supplied from Wivenhoe for treatment at Mt Crosby and the Lowood Water Treatment Plants. As such, the catchment is strategically important to SEQ, and indeed Queensland, being the main water supply intake catchment for the region, providing drinking water for three million people in SEQ.

Lockyer Creek enters the catchment below Wivenhoe and in high flow events it can impact on the catchment. Black Snake Creek is a tributary which contributes significant salinity due to underlying soils. The nearby Lockyer sub catchments of Woolshed and Plain Creeks have similar issues.

Protecting the macrochannel and the quality of the water within the macrochannel is the main issue for this catchment. Bank slumping and erosion risks have been studied. The banks are mainly stable by high risk areas exist. The re-suspension of sediment can occur in high flow rain events such as input from the Lockyer. A concerted effort to protect the entire macrochannel and riparian zone through a number of different actions is appropriate. As the River is continually in flow due to water supply releases, it is attractive to recreationalists.

As the 2013 Australia Day weather event showed, the risk of siltation on the functioning of the Water Treatment Plants, while of low frequency, is of potentially catastrophic consequences. As a general rule, any contaminants entering the 61km stretch that is the Mid-Brisbane River result in increased treatment costs for the region's community and businesses. There is also the benefit for downstream communities and users of Moreton Bay from the improved water quality within the Brisbane River.

Issues related to the catchment condition degradation have been documented and investigated by various agencies. Managing the issues 'at source' is demonstrably more cost efficient that managing the issues at the region's Water Treatment Plants. Any expenditure of public and private funds should aim to achieve the maximum outcome across a range of values and issues and be of benefit to the community at large. Expenditure in the Mid-Brisbane catchment fulfills this and represents a significant return on investment to the population of SEQ.

Brisbane River near Fernvale

Development of the Plan

The process for developing the Plan commenced in February 2015 and was overseen by a project team consisting of representatives from Queensland Departments of Natural Resources and Mines, and Environment and Heritage Protection, Somerset Regional Council (SRC), ICC, Brisbane City Council (BCC), Healthy Waterways Ltd, SEQ Catchments Ltd, Seqwater, Queensland Urban Utilities (QUU) and the Brisbane River Catchment Flood Study team.

The Resilient Rivers Taskforce reviewed aspects of the Plan as it proceeded. The Taskforce was supported by the executive level Catchment Action Plans Working Group which nominated the representatives for the project team. Council of Mayors (SEQ) provided the coordination and project management capacity on behalf of the project team.

A five step process was undertaken to develop the Mid-Brisbane Catchment Action Plan:

Step 1: Walking the Landscape – gather information on the geology and hydrology of the catchment in a workshop setting and prepare summaries to consolidate the current understanding of the catchment processes.

Step 2: Catchment description and issues – compile detailed data and prepare mapping products and a comprehensive analysis report; collate data gaps.

Step 3: Risks, targets and preliminary actions – identify key catchment issues and preferred management responses.

Step 4: Prioritisation of actions – investigate the initial feasibility of actions and likelihood of success, with political input.

Step 5: Publishing – finalise the action plan document and seek endorsement from collaborators.

The Queensland Government's Wetlands Program conducted Step 1 and provided invaluable data throughout. A number of supporting factual publications have been prepared and are available onthe Wetlands Program website.

Consultancies engaged were:

Alluvium Consulting: prepared a detailed Catchment Descriptions and Issues Report (Step 2) which included a stream type assessment for the major streams based of the River Styles® were undertaken using aerial imagery and available GIS spatial data, such as waterways, topography and infrastructure. Data from the site inspections was used to supplement and refine the desktop assessments.

ClimateRisk: assisted the project team with the development of the catchment risk register (Step 3) using methodology developed for the region's water entities.

Natural Decisions: assisted the project team to conduct a cost benefit analysis based on the Investment Framework for Environmental Resources (INFFER) methodology. This analysis assisted with determining the priority actions within this Action Plan.

Prioritisation (Step 4) also involved consideration of key actions from previous planning and studies, feedback from community based knowledge experts involved in this Plan's development, and input from the catchment's political leadership.

Community engagement for this Catchment Action Plan utilized existing channels such as Seqwater's stakeholder reference groups and ICC's Black Snake Creek Catchment reference group. The Catchment Action Plan has been endorsed by the relevant councils.

The following organisations provided funding towards the preparation of the Plan and assisted with the provision of venues for project team activities: Lockyer Valley Regional Council, SRC, BCC, QUU, Council of Mayors (SEQ), and the Australian Government Department of Environment (through SEQ Catchments Ltd).

A special thank you to the involvement of the community based knowledge experts at various points throughout the development of the Plan.

Catchment In Context

This section of the Action Plan is drawn mainly from the comprehensive Mid-Brisbane Catchment – Description and Issues Report prepared by Alluvium Consulting on behalf of the project team and is therefore the primary reference source. Additional sources of information are referenced.

The Mid-Brisbane Catchment

The Mid-Brisbane catchment is located approximately 26km west of Brisbane in SEQ within parts of the SRC Local Government Area (LGA), the ICC LGA and the BCC LGA. A small amount of the catchment is within Moreton Bay Regional Council (MBRC) LGA.

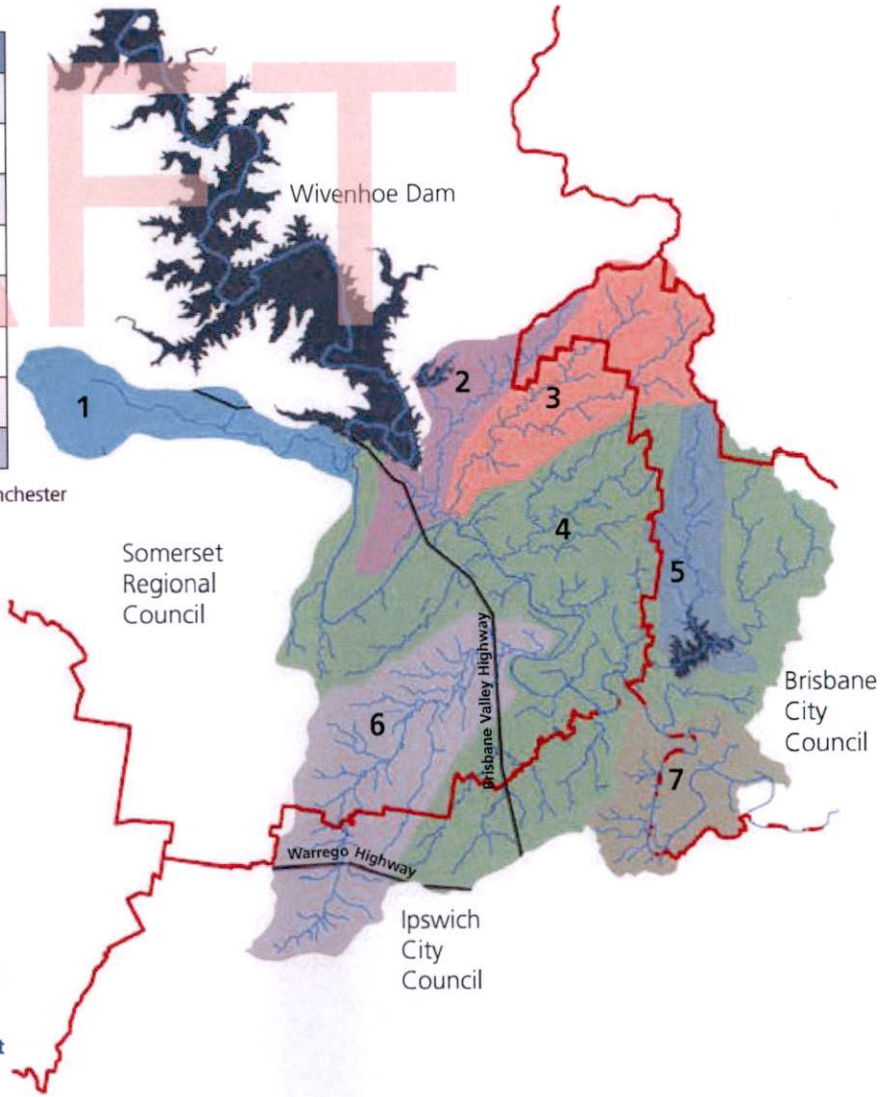
The Mid-Brisbane River is defined as being located between the Wivenhoe Dam outlet and the Mt Crosby Weir. This stretch of river and its catchment is strategically important to SEQ as it is located upstream of the Mt Crosby Water Treatment Plants, which are the region's largest suppliers of potable water. There are no barriers between the Mid-Brisbane reach and the receiving environment of Moreton Bay.

The Catchment area is approximately 560km² however it also receives inflows from the Lockyer catchment and discharges from Wivenhoe Dam. The catchment is bounded by the D'Aguilar Ranges in the north and east with the highest elevations of 700m AHD and the lower Liverpool Range to the south west. The Mid-Brisbane catchment has seven sub-catchments (Table 1).

Table 1. Sub-catchment information

Sub-catchment		Area (km²)
1	Spring Creek	40
2	Splityard Creek	35
3	England Creek	61
4	Mid-Brisbane River	248
5	Branch Creek	33
6	Black Snake Creek	97
7	Borallon/Mt Crosby	43
Total		**562***

*Including area of Splityard Creek Dam and Lake Manchester (total area of 3km²)



Council boundaries and sub-catchments of the Mid-Brisbane catchment

Geology and landscapes are variable across the catchment. To the east of the Brisbane River the geology consists of Neranleigh- Fernvale geology (hard rock), resulting in steep mountains and hills and steep v-shaped valleys. To the west of the Brisbane River the sub-catchment is dominated by low undulating hills to shallow, open valleys and flats underlain by Gatton Sandstone geology. The Mid-Brisbane River in this catchment is described as a macrochannel.

The sub-tropical climate of SEQ is capable of producing extreme flood events, and the Brisbane River has been demonstrated as having amongst the highest flood variability in Australia. These extreme events are likely to be a determining factor in the formation of the macrochannel morphology. The River base is armoured with large rocks and gravel. The presence of islands and in-stream sand benches is commonly seen.

Recent studies suggest SEQ macrochannel systems have an inherent resilience to changes in flow and sediment regimes, collapsing and reforming over time, and this is a consideration in restoration techniques.

The Gatton Sandstone in the west is a type of sandstone and has been recognised as a major contributor to groundwater salinity and that observed at the Mt Crosby Weir. In the Mid-Brisbane River catchment, this is mainly a concern within the southern tributaries, Black Snake Creek and Sandy Creek, where it outcrops and although these are natural processes in soil formation, human land use practices can exacerbate issues of erosion and salinity. This can lead to long-term land and water degradation as deep-rooted, perennial vegetation has been cleared from the plains and hillslopes and replaced by shallow rooted annual vegetation such as grasses and crops. The area impacted by dryland salinity increases during and after wet years as water tables rise and come close to the surface, bringing with it salts in the soil.

A salinity scour Black Snake Creek and the Hills Crossing section of the Brisbane River.

Land use and infrastructure

The relatively flat areas of the Mid-Brisbane catchment are predominantly used for rural residential purposes and livestock grazing and some irrigated areas, whilst the steeper area within the D'Aguilar Ranges is classified as 'Conservation and Natural Environments'. Rural residential properties are generally greater than 0.2ha and undertake some agricultural activity, however this is unlikely to be the major source of income for the property. The livestock grazing is predominantly of 'native vegetation', which is classified by ABRES as areas where there has been limited or no deliberate attempt at pasture modification and typically occurs in open woodland or grasslands where greater than 50 percent of the dominant species are native.

Land use in the catchment is governed by the relevant planning schemes of each local government and the SEQ Regional Plan 2009- 2031 under the Sustainable Planning Act. In the Mid-Brisbane catchment future growth will be focused on the urban centres of Fernvale and Lowood. These areas are designated for limited increases in urban residential land use. The vast majority of the catchment, however, is zoned as Regional Landscape and Rural Production Area, for which there are the limits on any sub-divisions below 100ha. The Regional Plan is to be formally reviewed in 2016-17.

The relevant sections of the SRC Planning Scheme 2016, the Ipswich Planning Scheme 2006 and the Brisbane City Plan 2014, indicate no significant future changes in land use. The latter includes the forested areas surrounding the Lake Manchester reservoir.

The majority of land use changes in the catchment occurred prior to the mid 20th century. During the late 1800s, laws and regulations encouraged wholesale clearing of land. Since 1990 land use change in the catchment has been relatively

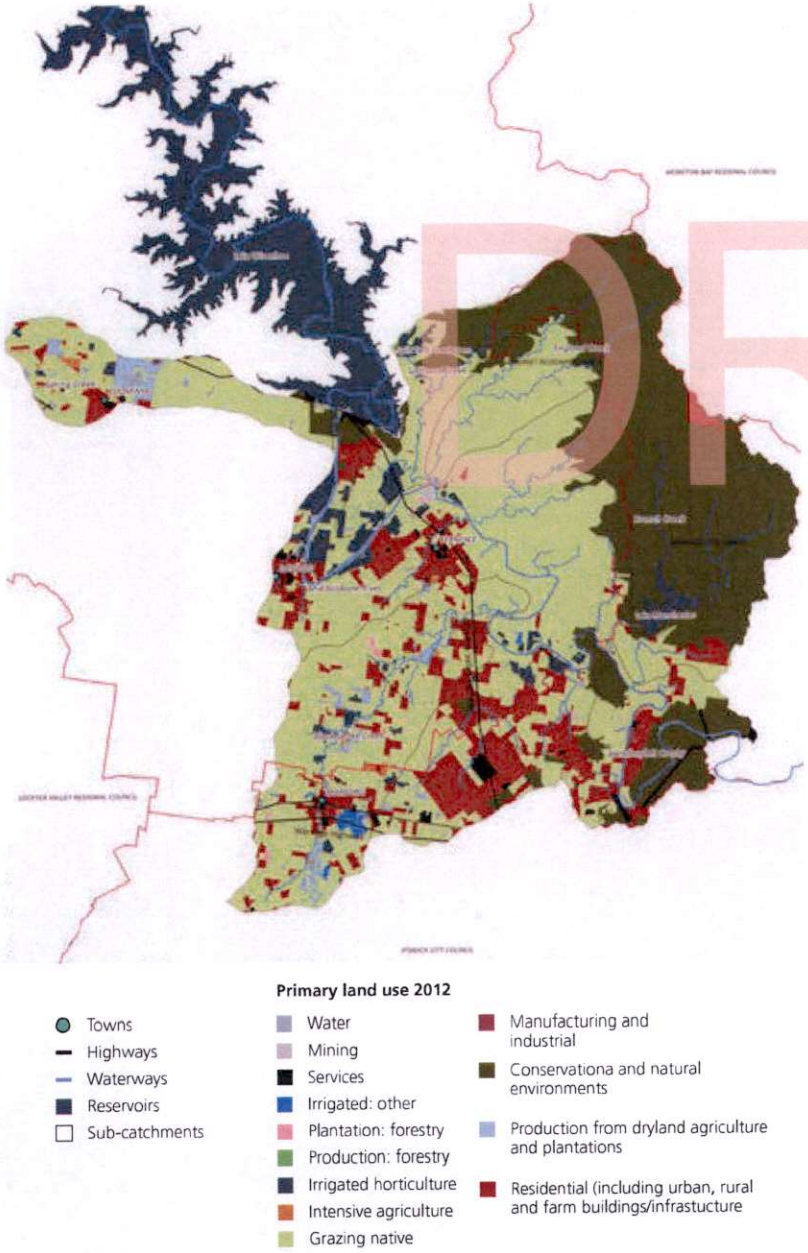
minimal. The cessation of production forestry in native vegetation in the late 1990s saw the subsequent increase in Conservation and Natural Environments from 7 percent of the catchment to 22 percent. There has also been a 1 percent increase in areas classified as residential. Whist there are no Identified Growth Areas within the catchment in the 2009-2031 SEQ Regional Plan and the council planning schemes limit development areas, the potential exists for future residential growth due to the proximity to Brisbane.

A number of sand a gravel extraction sites are located within the catchment – some are active, others pending approval or indicated in the State's planning data layers as Key Resource Areas. Sand and gravel extraction located near the Mid-Brisbane River can influence the hydrology of that system.

Recreational opportunities within the Mid-Brisbane catchment are numerous and varied. The natural environment and waterways are widely used for recreational activities in addition to council parks and recreation facilities. The areas identified include council, state and national parks as well as road and rail reserves and dams. The Mid-Brisbane River is an area for recreation due to the continuous flow of water from Wivenhoe Dam and activities include swimming, canoeing, fishing and four wheel driving on inset floodplains at information access points.

Sand and gravel extraction site near Kholo Bridge

Land uses within the Mid-Brisbane Catchment



The location of key infrastructure assets which are adjacent to or within the waterways of the Mid-Brisbane catchment is shown in Table 2. There is a high concentration of culverts, bridges, roads and weirs to the west of the catchment, in the flatter, more densely populated areas. The nationally significant Warrego Highway traverses the catchment in an east-west direction, through the town of Marburg. The Warrego Highway is the state's vital east-west freight artery that transports people and freight between western and southern Queensland, New South Wales and the Northern Territory. The Brisbane Valley Highway is an increasingly important transportation route to the Kingaroy region.

Table 2. Infrastrucure assets within the Mid-Brisbane catchment

Sub-catchment	Culverts	Bridge	Weirs	Dams	Sewage Treatment Plants	Water Treatment Plants	Roads (km)
Spring Creek	40	0	0	1	0	0	55
Splityard Creek	24	5	0	1	0	0	53
England Creek	0	0	0	0	0	0	63
Mid-Brisbane River	169	8	0	0	2	1	422
Branch Creek	0	0	0	0	0	0	38
Black Snake Creek	172	10	0	1	0	0	183
Borallon/Mt Crosby	24	0	1	0	0	1	95

Infrastructure within the catchment is vulnerable to damage from natural disasters, as shown during the January 2011 and January 2013 floods. After these floods, SRC, ICC and BCC were eligible for the Natural Disaster Relief and Recovery Arrangements for a large number of damaged assets in or adjacent to waterways. These arrangements are a joint funding initiative of the State and Commonwealth Governments to provide disaster relief and recovery payments and infrastructure restoration to help communities recover from the effects of natural disasters.

An estimated 10,500 people reside within the catchment; this is expected to increase by approximately 30,000 people by 2031. This will occur particularly in the already populated areas, such as around Lowood, Fernvale and Glamorgan Vale, at a rate of approximately 2 percent per annum over the next 15 years. As the population increases, infrastructure requirements, such as roads and drains also increase.

Within the catchment there are three Sewerage Treatment Plans (STPs). These STPs represent a point source for Total Nitrogen (TN) and Total Phosphorous (TP) as well as pathogens. Two of the STPs are owned and operated by QUU (Fernvale and Lowood) which discharge directly into the Brisbane River. The remaining STP services the Borallon Correctional Centre. These STPs elevate the protozoa and E. Coli risk for the Mt Crosby Water Treatment Plants. The licence for the Fernvale STP includes nutrient removal requirements and both STPs have treated effluent disinfection. The Lowood STP is at capacity, whilst the Fernvale STP is above design capacity, upgrades are due to be completed in the near future. As the population increases in these towns there will be additional load on the STPs.

Table 3 outlines the projected increase in the sewered population, which will require an increase in sewerage drainage and water treatment facility upgrades.

In addition to the STPs there are a significant number of on-site sewerage facilities such as septic tanks (which are being phased out) or Aerated Wastewater Treatment Systems within the catchment. Facilities need approval from the relevant councils and the onus is on the homeowner to adequately maintain the system. Discharge from the on-site facilities as well as the STPs discharging to land (both surface and sub-surface) present a potential source of contaminant to waterways, particularly during rainfall events through surface and sub-surface flows. The cumulative risk from on-site facilities has been assessed as the primary input of E. Coli risk within the upper reaches of the catchment.

Table 3. Queensland Urban Utilities sewered population growth forecasts

Region	Mid-Brisbane Catchment – Sewered Population Projections	
STP Name	**Fernvale**	**Lowood**
Current estimated population	1,095	1,795
Projected 2031 estimated population	5,322	5,595
Percentage increase	**486%**	**312%**

Policy and Management Context

The organisations with a primary policy and management interest in the Mid-Brisbane Catchment include the three councils, Queensland Government, QUU and Seqwater. The majority of land is in private ownership and so the interests of land managers are an important consideration within the management context. The Action Plan will build on existing activities underway in the catchment.

Councils

As previously outlined, the councils have a role in land use planning. They also invest in infrastructure asset management and recreational area management. Councils have some devolved responsibilities such as local laws relating to on- site sewerage facilities.

Queensland Government

The Department of Environment and Heritage Protection (EHP) has involvement in regulatory, policy and catchment management roles. EHP regulates Environmentally Relevant Activities, such as STPs and sand and gravel extraction under the *Environmental Protection Act 1994*. At a policy level, EHP sets Water Quality Objectives and Environmental Values (EVs) under the *Environmental Planning Policy 2009* to ensure the water is usable for the purposes defined in the EVs (e.g. drinking water, stock water, irrigation, recreation, aquatic ecosystems). It also establishes frameworks and processes in consultation with key stakeholders. EHP's catchment management interest focuses on reducing the source of pollutants entering waterways through data custodianship, research and industry-partnerships for improving land management. Queensland Parks and Wildlife manages the protected areas of the D'Aguliar Range. The Department of Natural Resources and Mine's role is to regulate instream work to maintain the physical integrity of the watercourses and manage the take of water for irrigation and other purposes. It works closely with Seqwater which holds a Resource Operations Licence for Wivenhoe Dam and Mt Crosby Weir.

QUU

QUU operates under the *South East Queensland Water (Distribution and Retail Restructuring) Act 2009, Water Supply (Safety and Reliability) Act 2008, Environmental Protection Act 1994,* and the *Water EPP 2009.* These prescribe standards for the operation of wastewater systems including licensed discharge criteria for protection of waterway environmental values. More recently, QUU has been investigating the State's 2014 'Flexible options for managing point source water emissions: A voluntary market-based mechanism for nutrient management' Policy. This Policy is a mechanism for protecting downstream water quality (for example, receiving water quality at a STP discharge) by mitigating upstream rural diffuse pollution sources. In a practical sense for QUU, this means targeting investments to mitigate significant sediment pollution sources (containing relatively low levels of nutrients).

Seqwater

Seqwater works collaboratively with customers, communities, governments and industry to deliver safe, secure and cost-effective water and catchment services to customers and communities. It sources, stores and supplies treated water from catchments and alternative sources. The Queensland Government has set the performance standard for Seqwater through a Statement of Obligations. Seqwater has recently prepared a water security plan for the region outlines how SEQ's drinking water supply is going to be managed into the future. Drinking water quality guidelines have been established nationally to which Seqwater adheres. The guidelines contain six principles which highlight the importance of understanding the source or raw water, the risks and hazards involved, and the management of these issues. Management of water levels within Wivenhoe Dam takes into account the competing uses of the dam, including water supply security, dam safety, flood inundation impacts downstream of the dam and economic impacts. The Manual of Operational Procedures for Flood Mitigation at Wivenhoe Dam and Somerset Dam ('Flood Manual') includes reference to Brisbane River flows during small flood events which may result in the inundation of low level rural crossings and irrigation equipment.

Private landowners

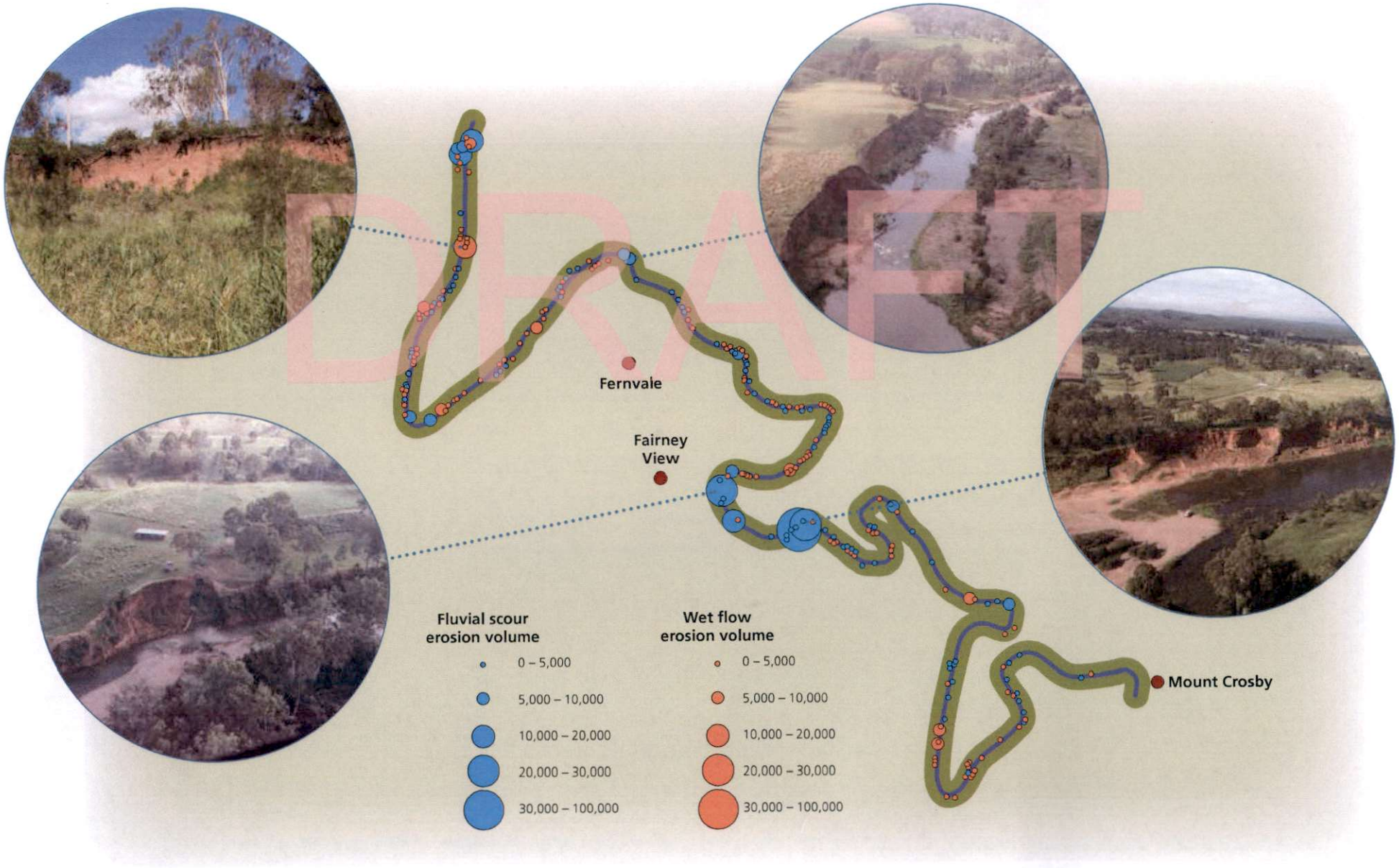
A landowner will have individual lifestyle and/or business goals as well as land and water use rights and responsibilities to consider. Goals and circumstances may change over time.

Seqwater installed fencing on the river bank rehabilitation site of this Mockers Road property in consultation with the owner

Ease of access to irrigation equipment in the event of river water rising can be considered as part of riparian works at each site

The Mid-Brisbane Catchment Action Plan builds on previous studies and planning activities. Key items described here have a level of detail that provides guidance for immediate investment planning:

Study/ Investigation	Mid-Brisbane Stabilisation Strategy Technical Assessment	Upper Black Snake Creek Improvement Plan	Mid-Brisbane River: Outdoor Recreation Master Plans
Prepared by	Seqwater, 2014	ICC, August 2014	SRC and Queensland Government, 2008
Description	The investigation split the Mid-Brisbane into 61 reaches and these have been classified in terms of the type and magnitude of erosion process i.e. fluvial scour and wet flow failure. It has been recommended that stabilisation should both protect and enhance areas of better riparian vegetation and begin restoring areas of poorer (or failed) riparian condition. The critical riparian area for this purpose is the area between the 'toe' (bank adjacent to the low-flow water level) and the top of the high bank.	This plan provides a total water cycle approach to planning and describes detailed prioritized actions to mitigate salinity, poor water quality and flooding risks in the sub catchment.	Five detailed outdoor recreation master plans for key sites along the Mid-Brisbane River. The report built on the 2004 Mid-Brisbane River Recreation Management Plan which involved BCC, SRC and the State Government. These studies found that the Mid-Brisbane River is a regionally significant outdoor recreation open space which needs to be coupled with the protection of the integrity of the water supply catchment.



2011 flood event mapped erosion sites identified in the 2014 Mid-Brisbane Stabilisation Strategy Technical Assessment (adapted from Alluvium, 2015)

Issues analysis

Based on the information gathered through the development of this action plan the following high level issues have been identified:

Asset	Threat	Impact
Integrity of the Mid-Brisbane River macrochannel Regional water quality for drinking water supply and ecosystem health	Disturbance of banks and inset floodplains and reduction in riparian vegetation of the Brisbane River macrochannel	• Reduction in the physical stability of waterways resulting in bank collapse and/or scouring • Loss of high value agriculture land through erosion • Reduction in the ability of the natural systems to perform their ecosystem functions including water purification • Reduced water quality resulting in increased water treatment costs due to mobilization and transport of sediment • Increased sediment loads entering Moreton Bay and Ramsar-listed wetlands, reducing seagrass habitat and increasing the need for the dredging of shipping channels. • Increased nutrient input resulting in blooms of potentially toxic algae species, aquatic weed growth and waterway eutrophication • Change in flood behaviour and distribution of flood flows
Regional water quality for drinking water supply and ecosystem health	Increased salinity seepage in Black Snake Creek catchment	• Loss of native vegetation and increased erosion due to saline seepage in the landscape • Loss or change in agricultural production due to salt effected land and the use of saline water for irrigation • Brackish surface waters resulting in ecosystem change • Waterway eutrophication due to decreased organic matter decomposition • Increased cost of water treatment
Regional water quality for drinking water supply	Increased pathogens in the Brisbane River macrochannel	• Human health impacted water quality • Increased cost of water treatment to remove pathogens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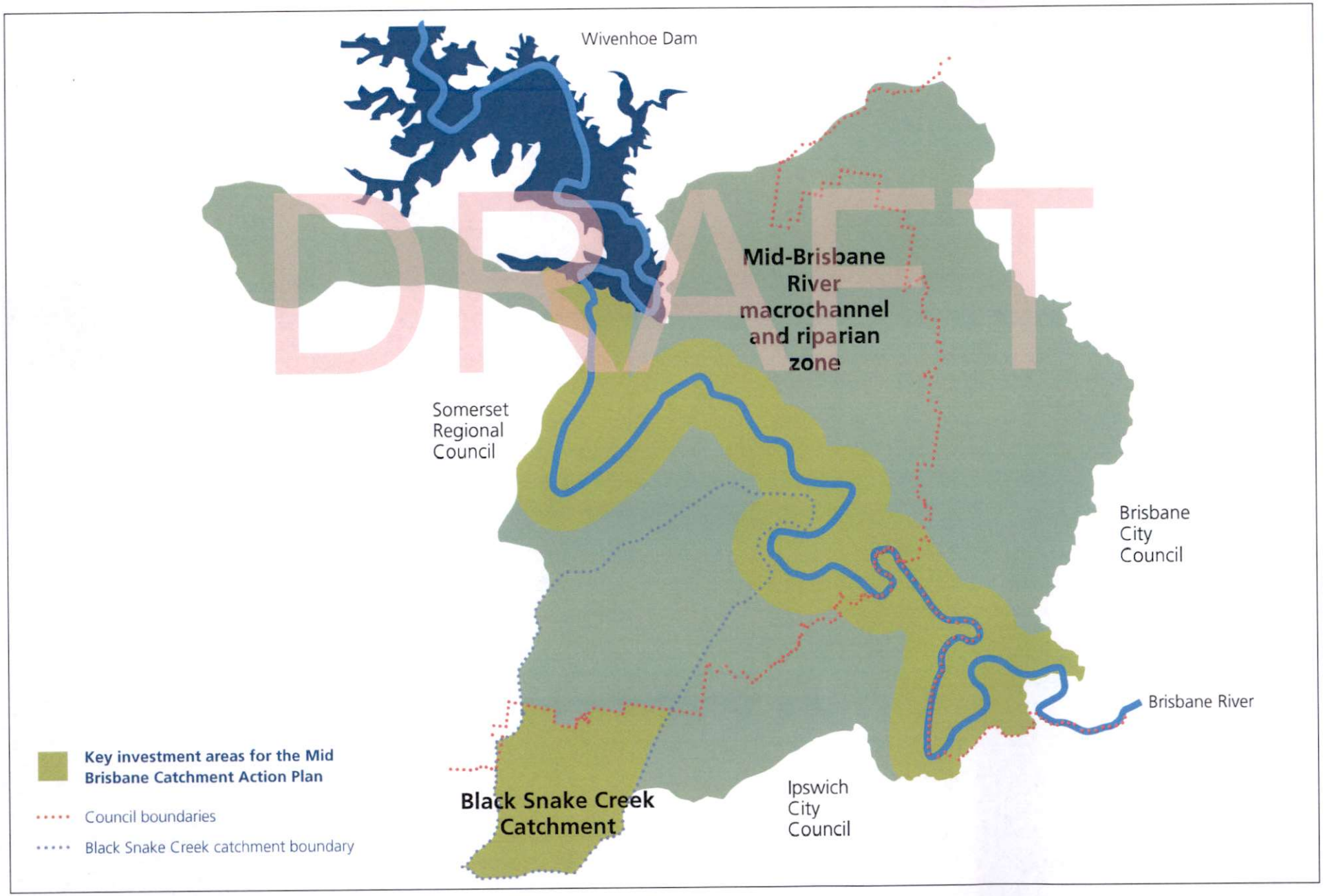
Action Plan

Overview

Regional investment drivers	• To protect the water supply of the region. • To keep soil on the land and out of our waterways for water quality purposes. • To improve the climate resilience of the region. • To promote partnerships with strong leadership to deliver a coordinated approach to catchment management in SEQ.
Assets at risk	• Integrity of the Mid-Brisbane River macrochannel; regional water quality for drinking water supply and ecosystem health.
Outcomes sought	• Maintaining the integrity of the macrochannel and associated riparian zone; reducing salinity and pathogens entering the Mid-Brisbane River; protecting infrastructure from erosion.
Actions summary	• Bank stabilisation at high risk sites along macrochannel and raising of bed (via in-stream islands or benches) to slow sediment. • Fencing of the bank and provision of off-stream watering points/irrigation infrastructure along macrochannel delivered as a supported package (that is, voluntary participation by landholder with works delivered on behalf of landholder). • Tree planting program to manage salinity in Black Snake Creek catchment recharge area. • On-site sewerage facilities education and compliance program (requires enhanced coordination between councils and Seqwater). • Establish a working group to develop management options with relation to Mid-Brisbane sand and gravel extraction activities and impacts to water quality, catchment health and stakeholders, including solutions for operational sites and investigation of Key Resource Areas not Development Assessment approved or pending. • Clarification of rights and responsibilities of landholders adjacent to River riparian zones • Strategic purchase of land for multiple benefits (e.g. riparian sites for recreation; riparian sites of good quality vegetation; to protect infrastructure; to stop sediment; flood storage; retire land from current use) based on a voluntary willing seller principle. • Prioritise remediation of high use informal recreation areas along the macrochannel and develop best practice approaches to remediating recreation zones in a water supply catchment (as per the Sapling Pocket demonstration site). • Investigate the development of possible 'rules' for a groundwater pumping system for Black Snake Creek (a salinity management system would need the development of 'rules' as it is a collaborative approach to management).


Wivenhoe Dam
Mid-Brisbane River macrochannel and riparian zone
Somerset Regional Council
Brisbane City Council
Brisbane River
Ipswich City Council
Black Snake Creek Catchment
Key investment areas for the Mid Brisbane Catchment Action Plan
Council boundaries
Black Snake Creek catchment boundary

Risk treatment plan

Based on a consolidated understanding of the key issues, a risk assessment (Appendix) and a high-level feasibility assessment of treatment options, the resulting risk treatment plan assists decision makers to prioritise investment decisions. The treatment and implementation pathways form the actions for this 2015-18 Action Plan.

Treatment	Risk Addressed	Implementation Pathway	Cost	Benefit	Approx. Timeframe	Priority
Bank stabilisation at high risk sites along macrochannel and raising bed via in-stream islands or benches	Channel integrity: Sediment entering water through bank slumping; Sediment re-suspension affecting water quality	Targeted investment at high risk sites identified by the Seqwater 2014 investigation	High	High	2016-2018	High
Fencing of the bank and provision of off-stream watering points/ irrigation infrastructure along macrochannel	Riparian zone degradation leading to loss of channel integrity; Pathogens entering water supply conduit causing acute illness	Deliver as a supported package: voluntary participation by landholder with works delivered on behalf of landholder	Medium to High	High	2016-2018	High
Restore deep rooted trees in recharge area of Black Snake Creek catchment	High saline groundwater table entering the water supply conduit	Tree planting program (investor – landholder – facilitator partnership including the prioritization of offset receiving sites)	Medium	Medium	Commence 2016	High
On-site sewerage facilities education and compliance program	Pathogens entering water supply conduit causing acute illness	Enhance coordination between councils and Seqwater to deliver an agreed program	Low	High	Commence 2016	High

Treatment	Risk Addressed	Implementation Pathway	Cost	Benefit	Approx. Timeframe	Priority
Limit Mid-Brisbane sand and gravel extraction impacts on water quality and catchment health	Inset floodplain/riparian zone degradation leading to loss of channel integrity	Establish a working group to development management options including solutions for Mid-Brisbane operational sites and investigation of Key Resource Areas not Development Assessment approved or pending	Low	High	Commence 2016	High
Improve landholder management of the riparian zone	Unintentional mismanagement of the riparian zone	Clarification of rights and responsibilities of landholders adjacent to River riparian zones	Low	High	Commence 2016	High
Strategic purchase of land to provide protection of the macrochannel	Riparian zone degradation leading to loss of channel integrity	Based on a voluntary, willing seller principle with a focus on multiple benefits (e.g. riparian sites for recreation; riparian sites of good quality vegetation; to protect infrastructure; to stop sediment; increase flood storage capacity; retire land from current use)	Medium to High	High	Commence 2018	Medium
Remediate high use informal recreation areas along macrochannel	Channel integrity: Sediment entering water through bank slumping; Pathogens entering water supply conduit causing acute illness	Prioritise high use informal areas identified in Master Plans 2008 report. Develop- a best practice approach to remediating recreation zones in a water supply catchment as per the Sapling Pocked demonstration site	High	High	Commence 2018	Medium
Artificial lowering of shallow groundwater table and re-use of brine in Black Snake Creek catchment	High saline groundwater table entering the water supply conduit	Investigate the development of possible 'rules' for a groundwater pumping system for Black Snake Creek (a salinity management system would need the development of 'rules' as it is a collaborative approach to management)	High	Medium	Commence 2016	Medium

Review of progress

Information gaps and emerging studies

This Action Plan and supporting documents will be updated by June 2018 with any relevant information arising as described below.

The Alluvium technical report collated flood extents based on largest floods. Following the development of hydraulic models as part of the BRCFS the flood extents will be updated and made consistent across the LGAs and the relevant information should be incorporated into this Action Plan and supporting documents. A "bed level sensitivity assessment" is also being prepared under the BRCFS which may provide information for catchment protection actions.

There was very limited catchment modeling information to be confident about the impact of individual and combined actions. Given this is a regionally significant drinking water catchment, increased modeling of actions to reduce the impact of pathogens, sediment, nutrients, and salinity is a very important research/ knowledge gap investment.

Detailed geomorphic assessments are required within the tributary sub-catchments to determine extent and level of erosion risk and within the main Brisbane River channel to determine the risk of removal/ damage to inset floodplain features. Additionally, minor tributaries and gully lines were not assessed for stability and may represent significant sources of sediment.

There is currently no data on sediment transport quantities or rates for the tributaries. This is key to understanding sediment loads moving through the catchment.

A high level qualitative assessment with the catchment identified potential assets at risk however this assessment was limited to the main tributaries and does not include the likelihood or consequence of asset damage.

The best available data was utilized for the geomorphic condition assessment. Digital Elevation Models (DEMs) from 2009 and 2014 (1m resolution) were used for the BCC LGA. ICC LGA had 2009 1m resolution DEM. No DEM data is available in the SRC LGA. Shuttle Radar Topography Mission (STRM) derived DEM (30m resolution) was used. Obtaining good quality up-to-date LiDAR for the region would be preferable.

The SEQ Regional Plan will be reviewed in 2016- 17 and may inform a future review of this action plan.

Monitoring and evaluation

Progress on action implementation will be monitored through the reporting framework established under the Resilient Rivers Initiative, including an evaluation to be conducted in 2018.

Before and after photos for a river bank rehabilitation site at Mockers Road, Fernvale

References

Alluvium, 2015, Reid, J, Ivezich, M and Daley J. *Mid-Brisbane Catchment Action Plan: Technical Report: Catchment descriptions and issues, Report* P415020_R03 by Alluvium Consulting Australia for the Council of Mayors (SEQ).

Ipswich City Council, 2014, *Upper Black Snake Creek Improvement Plan – A Total Water Cycle Management Approach to the Management of the Upper Black Snake Creek Catchment.*

Queensland Wetlands Program (2016) *Walking the Landscape – Mid-Brisbane Catchment Summary.* Department of Environment and Heritage Protection, Brisbane.

Seqwater, 2014, *Mid-Brisbane Stabilisation Strategy Technical Assessment*

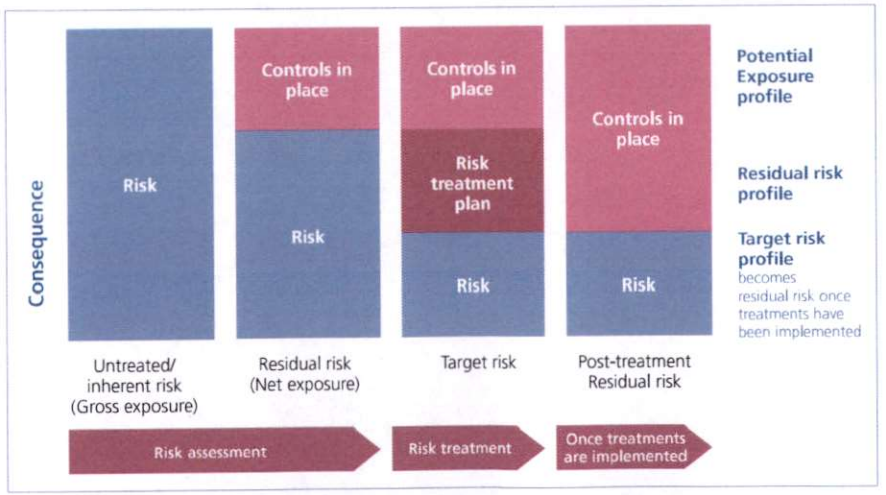
Somerset Regional Council and Queensland Government, 2008, *Mid-Brisbane River: Outdoor Recreation Master Plans*

Appendix

Risk assessment tool kit used in the preparation of the Mid-Brisbane Catchment Action Plan

Criteria	Expected Frequency	Probability (for use in quantitative assessments only)
Almost Certain	Occurs more than once a year	>95%
Likely	Occurs once between 1 to 3 years	>33–95%
Possible	Occurs once between 3 to 10 years	>10–33%
Unlikely	Occurs once between 10 to 50 years	>2–10%
Rare	Occures once between 50 to 100 years	1–2%

LIKELIHOOD	CONSEQUENCES				
	Insignificant	Minor	Moderate	Major	Catastrophic
Almost certain	Medium	High	High	Extreme	Extreme
Likely	Medium	Medium	High	High	Extreme
Possible	Low	Medium	Medium	High	High
Unlikely	Low	Low	Medium	Medium	High
Rare	Low	Low	Low	Medium	Medium



Residual Risk Rating	Action Required
Extreme	Risk treatment plan (RTP) must be in place immediately. The Taskforce to review and approve RTP.
High and increasing	Risk treatment plan must completed. Plan must also neutralise increasing risk over trend time frame. The Taskforce to review and approve RTP.
High	Risk treatment plan must be completed.
Medium and increasing	Risk treatment plan must be considered. Plan must also neutralise increasing risk over trend time frame.
Medium	Risk treatment plan must be considered.
Low and increasing	Risk treatment plan must be considered. Plan must also neutralise increasing risk over trend time frame.
Low	Risk treatment may not be required.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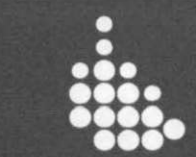

Images courtesy of Council of Mayors (SEQ), Seqwater, Ipswich City Council, Department of Environment and Heritage Protection, SEQ Catchments, Healthy Waterways