



WATERWAY DAMAGE IN URBAN AREAS

Over 1.2 million people live in the Georges River catchment, mostly in urban locations in the middle and lower catchment. As water can wash away dirt and grime, it is used by people inside their houses for showers, dishwashing, washing clothes and toilets. This dirty water is then transported via sewer pipes to water treatment plants for cleansing before being released into the environment. However, any water falling outside of buildings typically receives very little cleansing treatment before being released to the environment. During storms, most of the water that falls on impermeable surfaces that dominate urban areas (such as roofs, roads and paths) flows into stormwater systems, rather than being filtered by passing through soils and

vegetation, as occurs in forests. So, any materials that water picks up along the way are transported directly into local waterways. Such materials may include damaging pollutants, such as spilled oils, pesticides and fertiliser applied to gardens, plus litter discarded into gutters. The large flow peaks that occur during storms have the capacity to transport large amounts of pollutants from urban areas and also have the power to erode exposed stream banks. Urban streams around the world are consistently degraded owing to large peaks in flow during storms, high amounts of nutrient and other pollutants, eroded channels, loss of habitat and reduced diversity of native plants and animals.



URBAN WATERWAY MANAGEMENT SOLUTIONS

Clean water is essential for all life on Earth and reducing degradation of urban waterways has environmental, social and economic benefits. Reducing the amounts of polluted water flowing directly into waterways from stormwater systems is beneficial for animals and plants that provide important functions for humans. Rehabilitation to enhance ecosystem condition also increases the potential for human recreation in and around waterways, such as fishing, boating or swimming. Solutions to urban waterway problems include: disposal of litter in bins; ensuring potential pollutants are kept out of gutters; reducing the volume of stormwater that enters waterways (e.g. by installing rainwater tanks or intercepting runoff in raingardens); slowing flow during storms and filtering pollutants by increasing green spaces or wetlands; rehabilitation of native vegetation adjacent to waterways and other natural habitat diversity; bank stabilisation to reduce erosion; and, weed removal.

GRCCC and its member councils are investing in educating the community and applying management actions to improve waterway condition across the Georges River catchment. In 2015 – 16, the GRCCC River Health Program continued working on waterway monitoring with the local community. Local residents and school pupils participated in the Program and contributed 200 hours and over 500 hours, respectively. The GRCCC Riverkeeper Program removed 108 tonnes of litter from waterways and restored 91 ha of native vegetation in the Georges River catchment. Each year, local councils in the catchment invest millions of dollars on stormwater management and waterway rehabilitation. See the back page of this Report Card for examples of how councils in the Georges River catchment are improving river health.

COUNCILS IN THE GEORGES RIVER CATCHMENT ARE IMPROVING RIVER HEALTH



CANTERBURY BANKSTOWN COUNCIL WATER SENSITIVE TOWN CENTRES

In the Canterbury Bankstown LGA, water management has been incorporated into town centre renewals to: reduce demands on drinking water supplies (via collection, treatment and use of stormwater); maintain or improve local water quality; maintain high quality community assets (e.g. street trees and urban gardens); manage stormwater volumes during storm events; cool the urban landscape; improve aesthetics; and enhance local biodiversity. Examples of water sensitive urban design include raingardens that filter stormwater runoff in Padstow, Panania, and Bankstown CBD, and many street trees across the local government area that are watered by stormwater, rather than requiring potable (drinking) water.



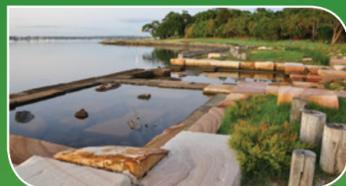
BAYSIDE COUNCIL ALLIGATOR WEED CONTROL

Alligator weed can restrict water flow, increase sedimentation, aggravate flooding by blocking channels, hinder recreational use of water, out-compete native aquatic species, restrict light penetration and deplete the amount of oxygen in water. Bayside Council's Alligator Weed Control Program includes staff and community education, as well as on-ground control. The Program has resulted in a noticeable decrease in the distribution of the weed across the LGA.



SUTHERLAND SHIRE COUNCIL GREEN STREETS TREE PLANTING PROGRAM

The Green Streets Program offset every tree approved for removal in the Sutherland Shire. The applicant for removal of each tree either replanted four replacement trees or paid \$100 to fund planting of replacement trees by Council. The money generated has been used to plant trees across the Sutherland Shire, such as those pictured at Washington Drive. The replanted trees have created green corridors, added habitat, reduced urban heat island effect, stabilised land, improved aesthetics and reduced runoff to waterways.



GEORGES RIVER COUNCIL CARSS PARK FORESHORE IMPROVEMENT

Georges River Council's Carss Bush Park foreshore improvement project involved enhancing the range of habitats available for colonisation by intertidal plants and animals in Kogarah Bay, to increase biodiversity and aesthetic appeal. The low diversity seawall was replaced with habitat features that emulate those occurring along natural rocky foreshores. Habitats include sandstone rockpools at varying tidal levels, longer foreshore slopes, crevices between rocks of varying sizes, and space with soft sediments to facilitate establishment of endangered saltmarsh community.



FAIRFIELD CITY COUNCIL CLEAR PADDOCK CREEK REHABILITATION

Fairfield City Council's Restoring the Waters Project at Clear Paddock Creek involved transforming a concrete stormwater channel into a naturalised stream reach. Within the rehabilitated reach there is enhanced habitat diversity that will foster the establishment of native plants and animals, improve water quality, enrich aesthetics, facilitate passive recreation and provide opportunities to engage locals in education about waterways.

WOLLONDILLY SHIRE COUNCIL CATARACT SCOUT PARK REHABILITATION WORKS

Wollondilly Shire Council has continued investing in improving the condition of headwater tributaries of the Georges River. Council activities at Cataract Scout Park have included pampas grass control, native bush regeneration, bank stabilisation and flow controls. Green Army teams have assisted with woody weed control and revegetation.

CAMPBELLTOWN CITY COUNCIL LET'S GET QUIRKY

Let's Get Quirky is a partnership between Campbelltown City Council, local residents and federal government Green Army teams to rehabilitate Quirk Reserve in Bradbury. To improve biodiversity, ecological condition and the recreational value of the reserve, weeds have been removed, native species replanted and rocks placed along drainage lines to reduce erosion and improve water flow.

LIVERPOOL CITY COUNCIL WATER MANAGEMENT POLICY

Liverpool Council adopted a new Water Management Policy in June 2016. A range of water quality initiatives have been identified in the Policy and the council will liaise with the Georges River Combined Councils' Committee whilst implementing the Water Management Policy.



2015 - 2016

RIVER HEALTH GEORGES RIVER REPORT CARD



GRCCC The GRCCC represents member councils in the Georges River catchment of NSW, including Campbelltown, Canterbury Bankstown, Fairfield, Georges River, Liverpool, Bayside, Sutherland and Wollondilly.

The River Health Monitoring Program is being undertaken in association with Georges River Environmental Education Centre and the NSW Office of Environment and Heritage. River Health is funded by the member councils of the GRCCC.

Acknowledgments: The River Health Monitoring Program was developed by C. Tippler, A. Hanlon and P. Birtles and is modeled on the following existing programs: 1. EHMP (2008). Ecosystem Health Monitoring Program 2006-07 Annual Technical Report. South East Queensland Healthy Waterways Partnership, Brisbane. Centre for Environmental Management, Central Queensland University. 2. IWC (2009). Cobaki and Terranora Ecosystem Health Monitoring Program. 2009 technical report. International Water Centre, Brisbane. 3. Story A.W, Anderson L.E, Lynas J & Melville F (2007). Port Curtis Ecosystem Health Report Card. Port Curtis Integrated Monitoring Project (PCIMP). Cover Photography by David Reid. © 2015 – 2016 River Health Georges River Report Card.

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GEORGES RIVER CATCHMENT GRADES

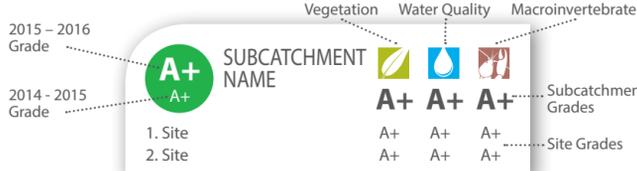
GRADING SYSTEM

River Health indicators are assessed against environmental guidelines allowing the award of a grade between A+ and F-.

GRADE	CONDITION
A+	EXCELLENT
A - B+	GOOD
B - C-	FAIR
D+ - F-	POOR

INTERPRETING GRADING ICONS

This diagram shows an example grading box.



MAP KEY

- Stippling indicates land is mainly urban, otherwise land is mainly bushland.
- Not monitored, owing to restricted access.
- Council boundary
- Subcatchment boundary

RIPARIAN VEGETATION

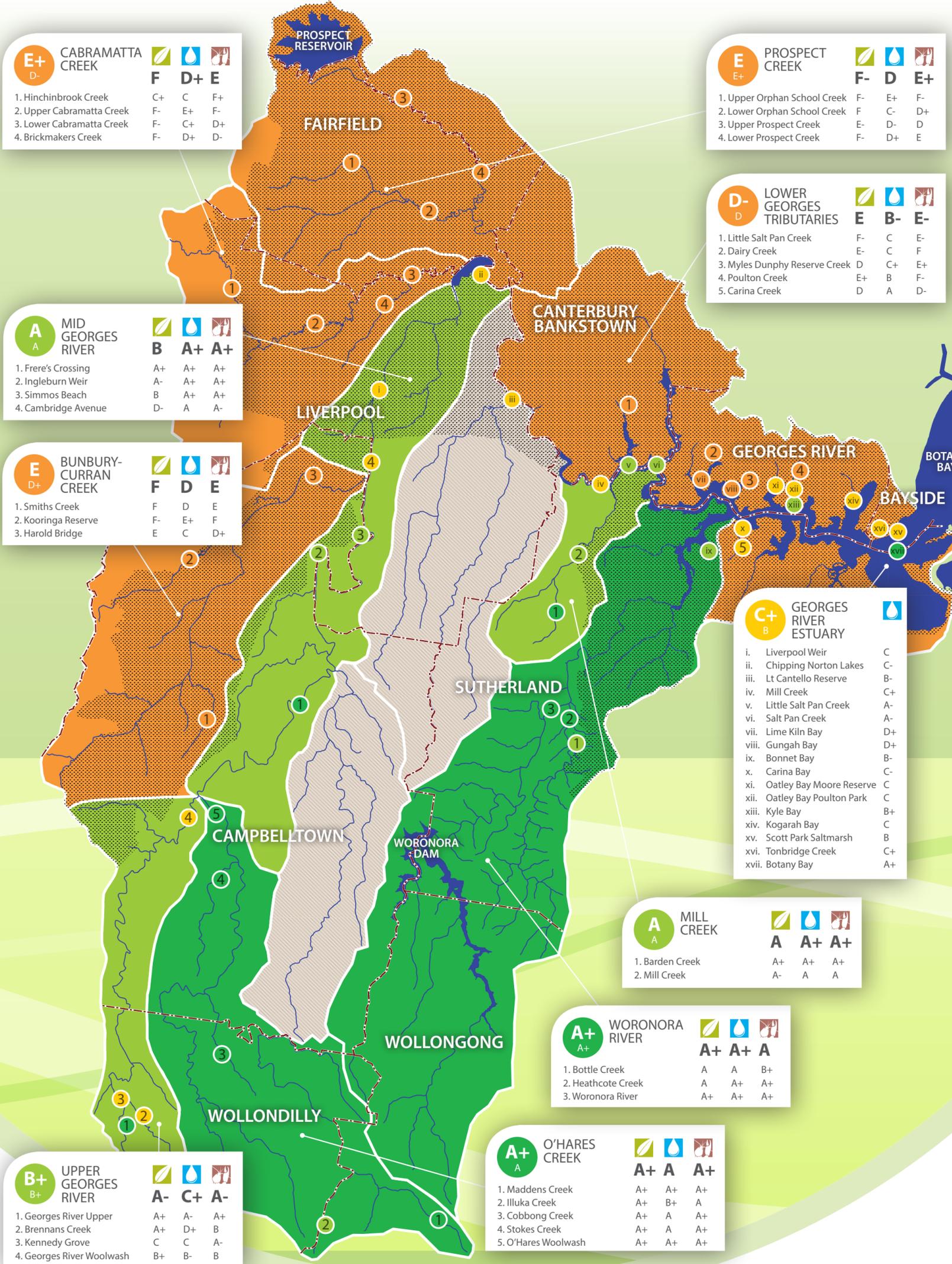
Riparian vegetation is those plants living along the edges of waterways. They contribute to maintaining the condition of waterways by stabilising banks with roots, dropping leaves and wood that act as important habitat for native animals, nutrient processing as they grow, regulation of temperature via canopy shade and filtration of pollutants that may otherwise enter waterways in overland flow. River Health assesses riparian vegetation every three years to gain a better understanding of its role in contributing to the ecological condition of waterways in the Georges River catchment.

WATER QUALITY

All aquatic plants and animals have specific water quality requirements. They will not survive in water where depleted amounts of desirable materials or elevated amounts of undesirable materials are outside of their tolerance limits. River Health monitors water quality indicators in the main channel, tributaries and estuary of the Georges River catchment throughout the year. Determining which water quality indicators are depleted and elevated at different locations provides valuable information about effects of urbanisation and other land uses on waterways across the Georges River catchment.

FRESHWATER MACROINVERTEBRATES

Macroinvertebrates are small animals without backbones, such as worms, snails and insects. They have diverse habits and life histories. Those that live in freshwater streams vary in their sensitivities to changes in water quality and habitat. River Health surveys macroinvertebrates in spring and autumn each year. Determining which macroinvertebrates can and can't live at particular locations provides valuable information about freshwater ecosystem condition across the Georges River catchment.



C+ B- OVERALL FRESHWATER GRADE

A SNAP-SHOT OF OVERALL CATCHMENT HEALTH

The Georges River catchment covers an area of approximately 960 km². The Georges River begins its journey 60 km south west of Sydney near the town of Appin and flows north towards Liverpool, before turning east at Chipping Norton Lakes to the mouth of the river at Botany Bay.

The River Health Program began in 2009 to compare the ecological condition of waterways across the Georges River catchment and to assess whether the ecological condition is changing over time. The waterways which are assessed are representative of those occurring across the nine major subcatchments contributing fresh water to the Georges River, plus the 46 km of estuary in the main channel of the river which is influenced by tides (from Liverpool Weir down to Botany Bay). Ecological condition is determined by measuring three important ecological indicators; riparian vegetation, water quality and macroinvertebrates.

The overall ecological condition of freshwater reaches across the Georges River catchment in 2015 - 16 was 'Fair'. The grade of C+ was indicative of a slight decline in ecological condition over the past few years. As for past years, the highest grades occurred in those subcatchments with much native forest, whilst urbanised waterways had lower grades.

The sites in those subcatchments that are surrounded by largely intact native forest (i.e. Upper Georges River, Mid Georges River, O'Hares Creek, Woronora River and Mill Creek) generally had 'Good' to 'Excellent' ecological condition. These waterways are not adversely impacted by polluted stormwater from upstream and the intact riparian vegetation provides some buffering which protects waterways from pollutants entering from surrounding land. In those subcatchments, the water quality usually complied with national guidelines and the macroinvertebrate communities were relatively diverse. Those communities included pollution-sensitive animals, such as mayflies and caddisflies.

The ecological condition is detrimentally affected in waterways located in subcatchments which are predominantly urbanised (i.e. Bunbury Curran Creek, Cabramatta Creek, Prospect Creek and Lower Georges River tributaries). Sites in those subcatchments generally had 'Poor' riparian vegetation, water quality and macroinvertebrate communities. In urban waterways, there were low diversities of macroinvertebrates, with predominantly pollution-tolerant animals, such as snails, fly larvae and worms.

C+ B OVERALL ESTUARY GRADE

The ecological condition of the Georges River estuary was 'Fair' (i.e. a River Health grade of C+, which equates to an OEH water quality grade of C when compared to similar estuaries across NSW*). Similar to the freshwater grade, this grade was indicative of a decline in ecological condition over the past few years. In the upper estuary, pollutants enter in freshwater flows from surrounding urbanised subcatchments and there is minimal tidal flushing, resulting in 'Fair' water quality. The downstream portion of the estuary is flushed by regular tidal water movement, contributing to generally 'Good' water quality in the main channel. 'Dead water areas' in the lower bays, which are not adequately flushed by tides to counter inputs of pollutants from urban areas, typically had 'Fair' water quality.

* River Health uses NSW Office of Environment and Heritage (OEH) Monitoring Evaluation and Reporting protocols to compare water quality in the Georges River estuary to similar estuaries across the state.

