



Stormwater - the #1 source of ocean plastic that (almost) no-one is talking about

by Brad Dalrymple

Ocean Protect Webinar
29 September 2022



Independent survey
managed by Seven
Communications



Undertaken
February 2019



1004 respondents
from across
Australia



Litter and debris released at sea
(e.g. commercial fishing nets)



Sewage (e.g. microplastics from
laundry, bathroom and toilets)



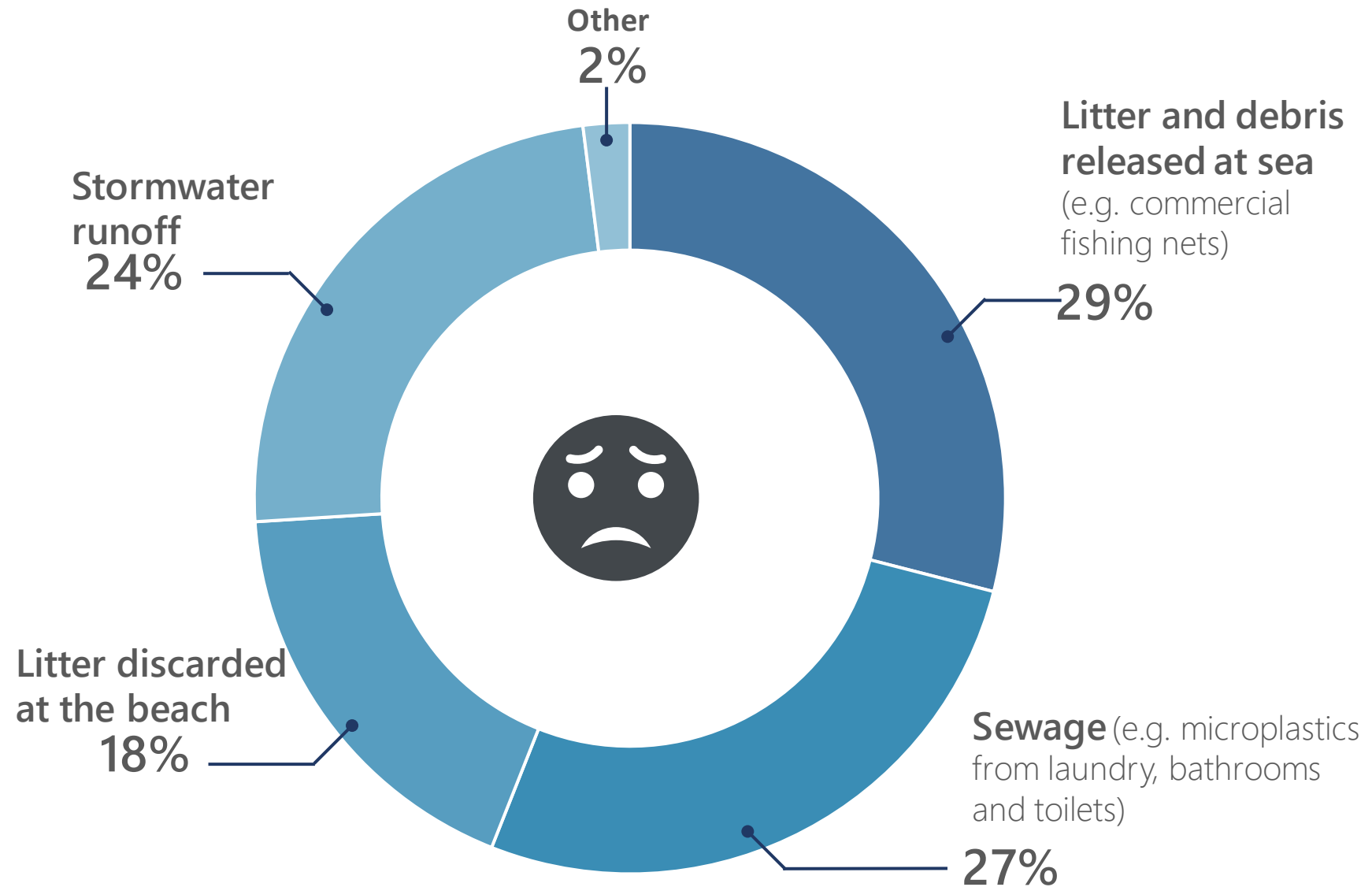
Stormwater runoff



Litter discarded at the beach

What is the biggest source of plastic pollution in the world's oceans?

What is the biggest source of plastic pollution in the world's oceans?



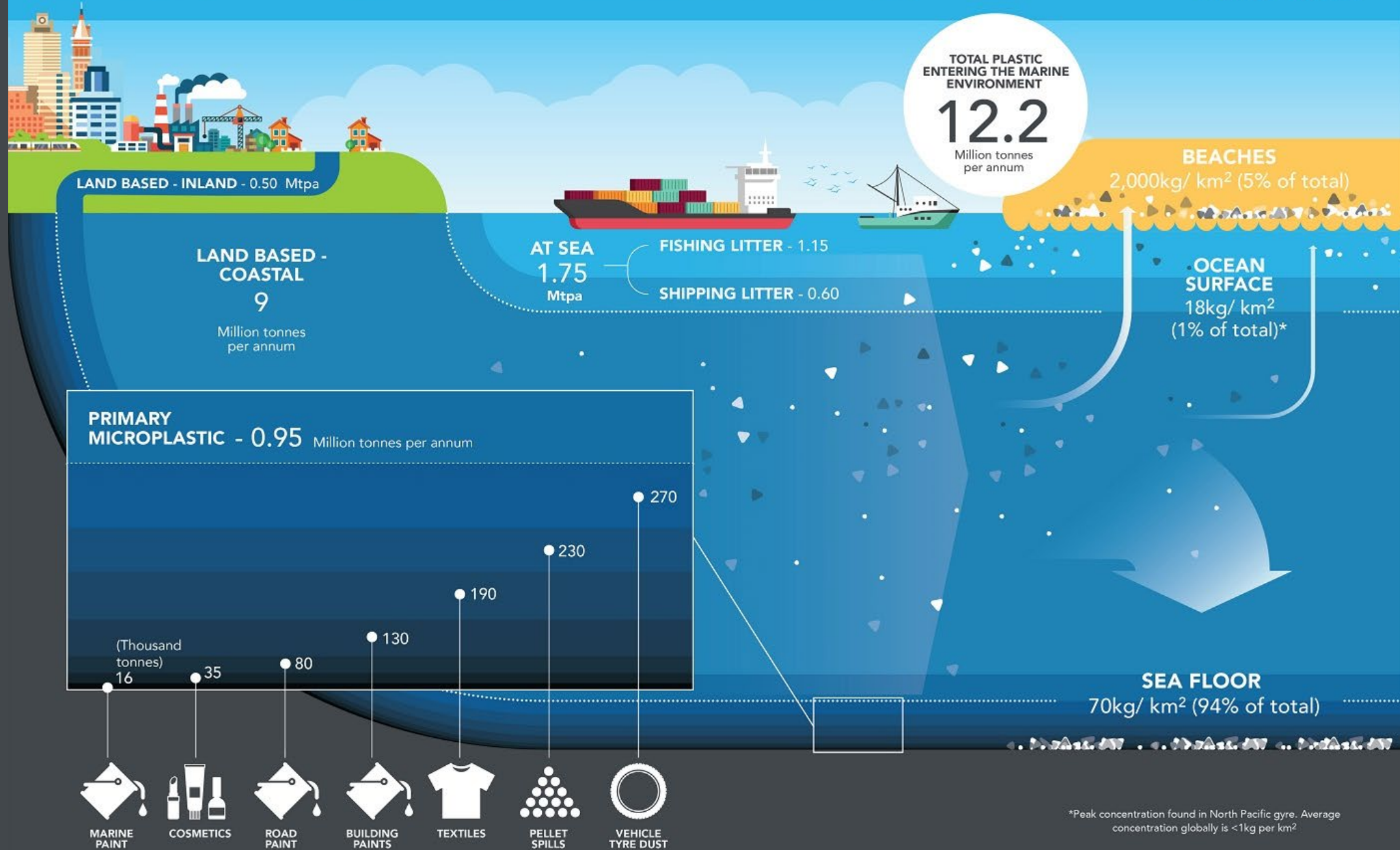
≡ **EcoWatch**[®]



80% of Ocean Plastic Comes From Land-Based Sources, New Report Finds

PLASTICS IN THE MARINE ENVIRONMENT: WHERE DO THEY COME FROM? WHERE DO THEY GO?

eunomia 









Gross Pollutant Trap



Gross
Pollutant
Trap



Gross
Pollutant
Trap



Gully basket









8 gully pit baskets
in Western Sydney

~2720m² urban
road catchment

5 months

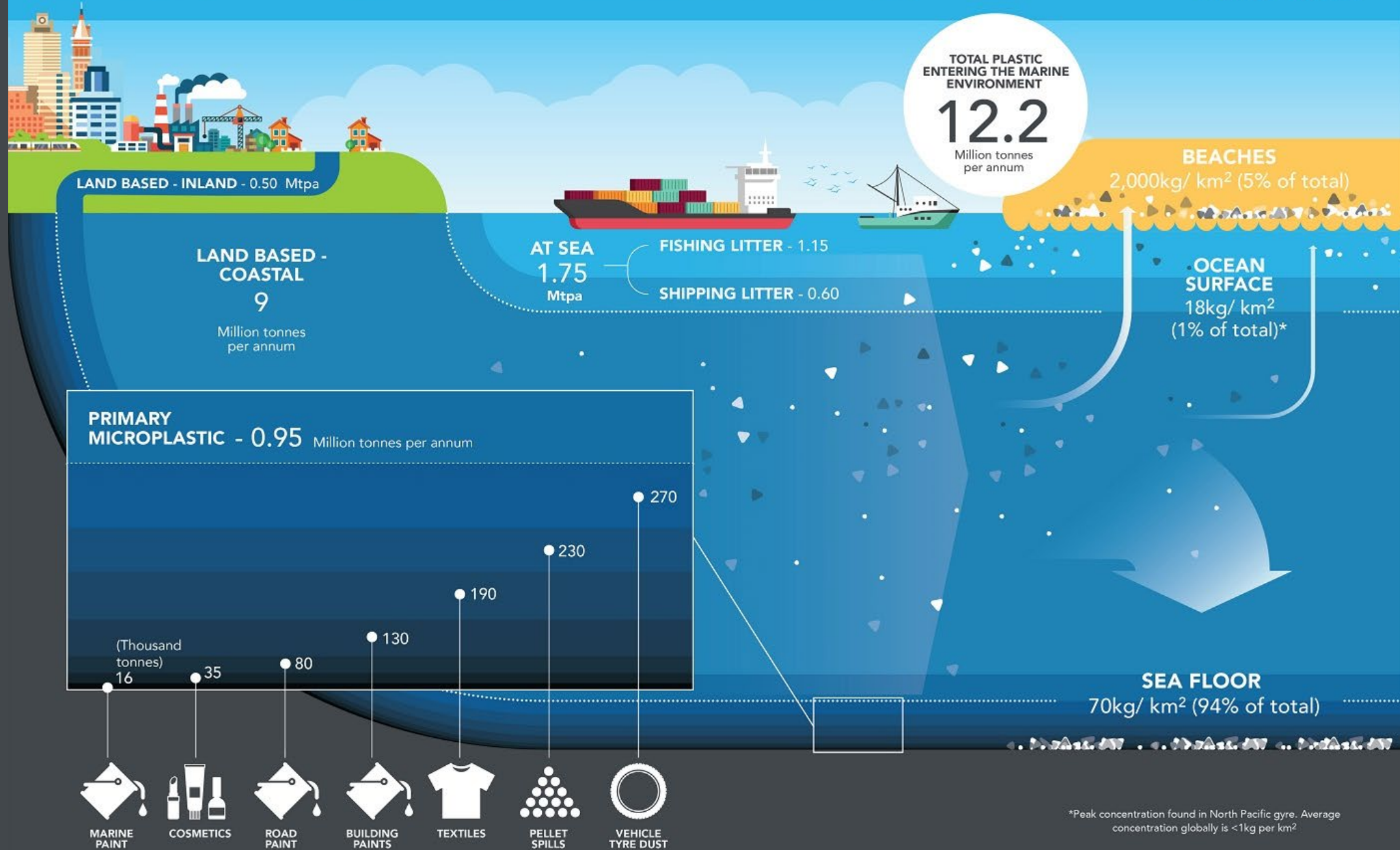
850 bits of plastic, including:

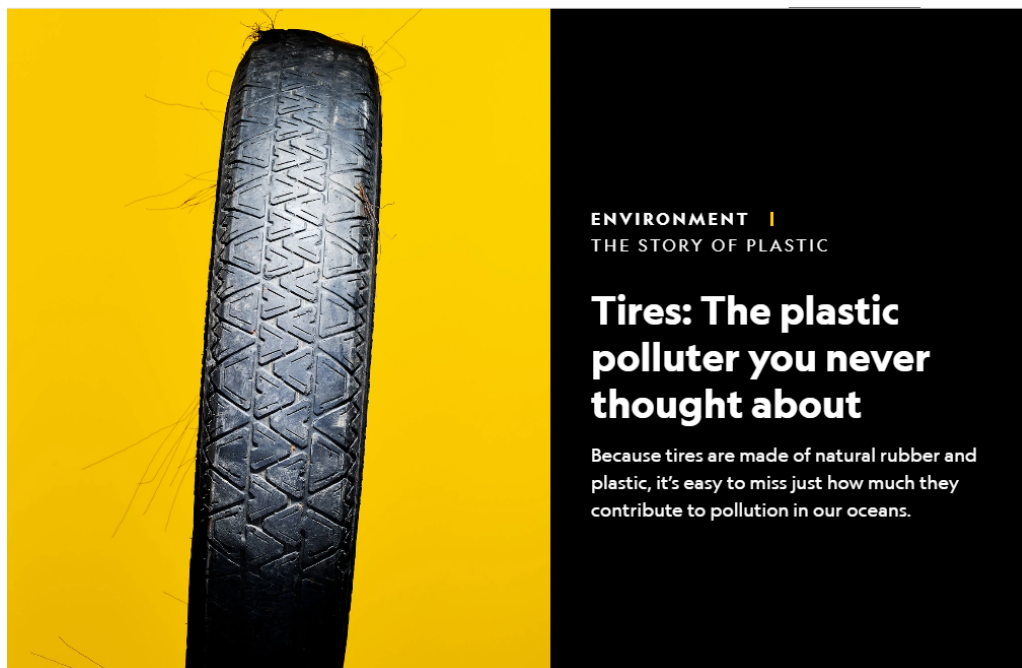
- 228 cigarette butts
- 88 plastic drink lids
- 44 cans
- 22 plastic cups
- 21 plastic straws

130kg of sediment

PLASTICS IN THE MARINE ENVIRONMENT: WHERE DO THEY COME FROM? WHERE DO THEY GO?

eunomia 





Primary Microplastics in the Oceans:

a Global Evaluation of Sources

Authors: Julien Boucher, Damien Friot

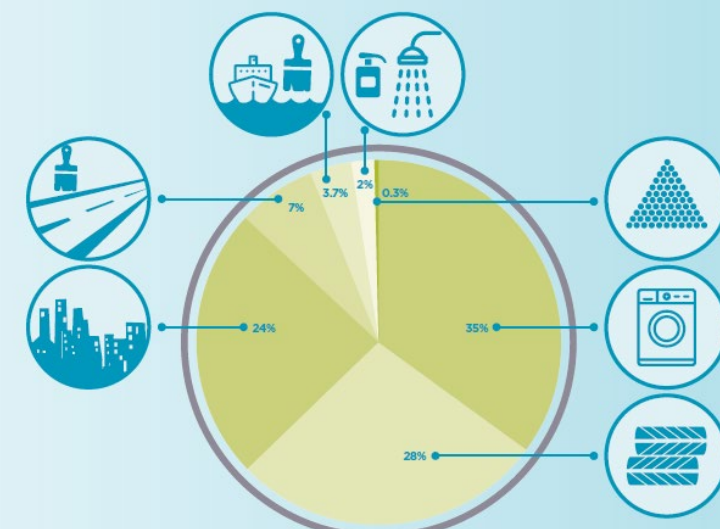


INTERNATIONAL UNION FOR CONSERVATION OF NATURE



GLOBAL RELEASES OF PRIMARY MICROPLASTICS TO THE WORLD OCEANS

BY SOURCE (IN %).



International Journal of
Environmental Research
and Public Health

Review

Wear and Tear of Tyres: A Stealthy Source of Microplastics in the Environment

Pieter Jan Kole¹, Ansje J. Lohr¹, Frank G. A. J. Van Belleghem^{1,2} and Ad M. J. Ragas^{1,3,*}

¹ Department of Science, Faculty of Management, Science & Technology, Open University of The Netherlands, 6419 AT Heerlen, The Netherlands; P.J.Kole@studie.ou.nl (P.J.K.); Ansje.Lohr@ou.nl (A.J.L.); Frank.vanBelleghem@ou.nl (F.G.A.J.V.B.)

² Zoology: Biodiversity and Toxicology, Centre for Environmental Sciences, Hasselt University, BE 3590 Diepenbeek, Belgium

³ Institute of Water and Wetland Research, Faculty of Science, Radboud University Nijmegen,



ENVIRONMENTAL
Science & Technology

pubs.acs.org/est

Concentrations of Tire Additive Chemicals and Tire Road Wear Particles in an Australian Urban Tributary

Cassandra Rauert^{*}, Nathan Charlton, Elvis D. Okoffo, Ryan S. Stanton, Alon R. Agua, Michael C. Pirrung, and Kevin V. Thomas

 Cite This: *Environ. Sci. Technol.* 2022, 56, 2421–2431

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ECOTOXICOLOGY

A ubiquitous tire rubber-derived chemical induces acute mortality in coho salmon

Zhenyu Tian^{1,2}, Haoqi Zhao³, Katherine T. Peter^{1,2}, Melissa Gonzalez^{1,2}, Jill Wetzel⁴, Christopher Wu^{1,2}, Ximin Hu³, Jasmine Prat⁴, Emma Mudrock⁴, Rachel Hettinger^{1,2}, Allan E. Cortina^{1,2}, Rajshree Ghosh Biswas⁵, Flávio Vinicius Crizóstomo Kock⁵, Ronald Soong⁵, Amy Jenne⁵, Bowen Du⁶, Fan Hou³, Huan He³, Rachel Lundeen^{1,2}, Alicia Gilbreath⁷, Rebecca Sutton⁷, Nathaniel L. Scholz⁸, Jay W. Davis⁹, Michael C. Dodd³, Andre Simpson⁵, Jenifer K. McIntyre⁴, Edward P. Kolodziej^{1,2,3,*}

In U.S. Pacific Northwest coho salmon (*Oncorhynchus kisutch*), stormwater exposure annually causes unexplained acute mortality when adult salmon migrate to urban creeks to reproduce. By investigating this phenomenon, we identified a highly toxic quinone transformation product of *N*-(1,3-dimethylbutyl)-*N*-phenyl-p-phenylenediamine (6PPD), a globally ubiquitous tire rubber antioxidant. Retrospective analysis of representative roadway runoff and stormwater-affected creeks of the U.S. West Coast indicated widespread occurrence of 6PPD-quinone (<0.3 to 19 micrograms

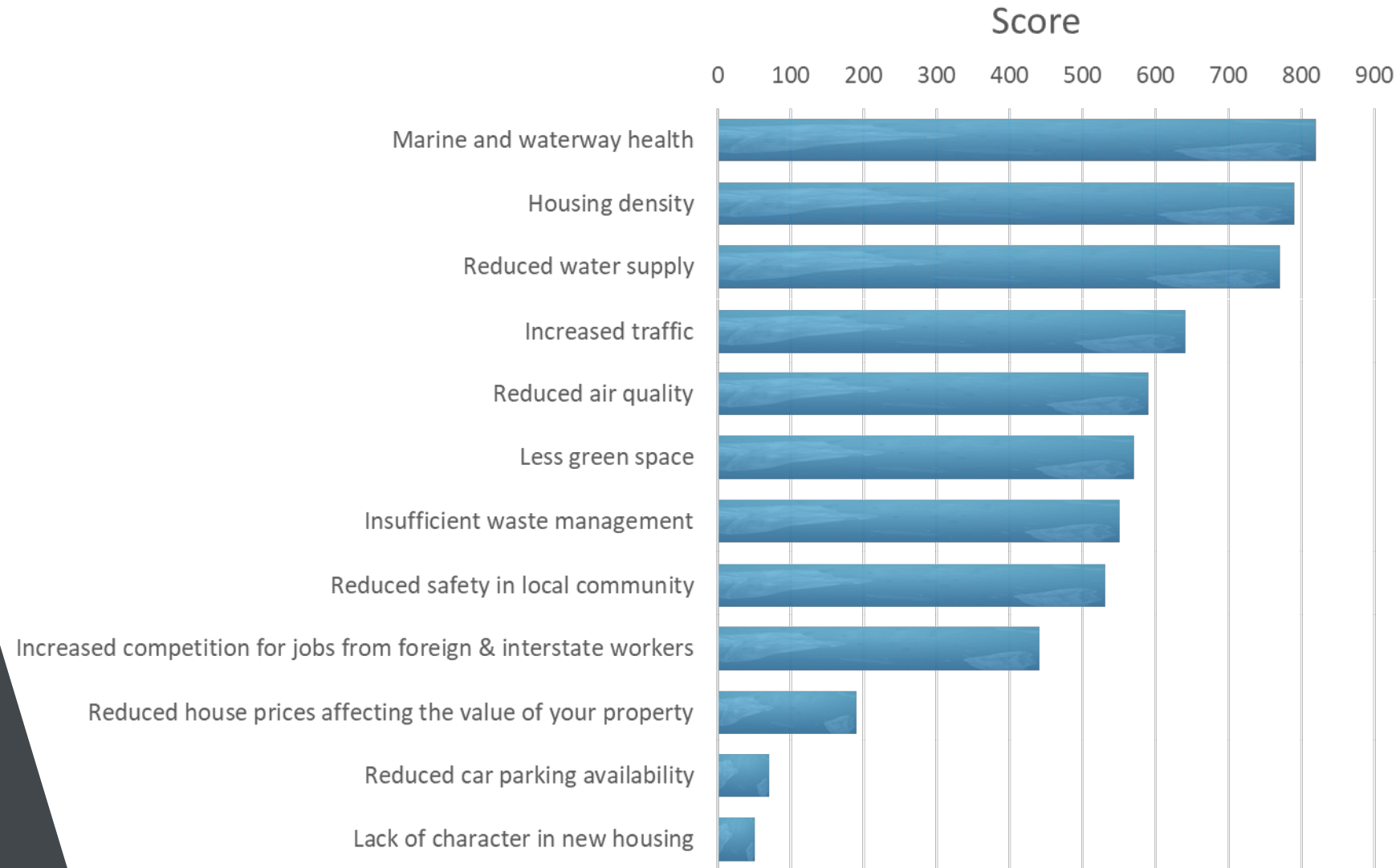


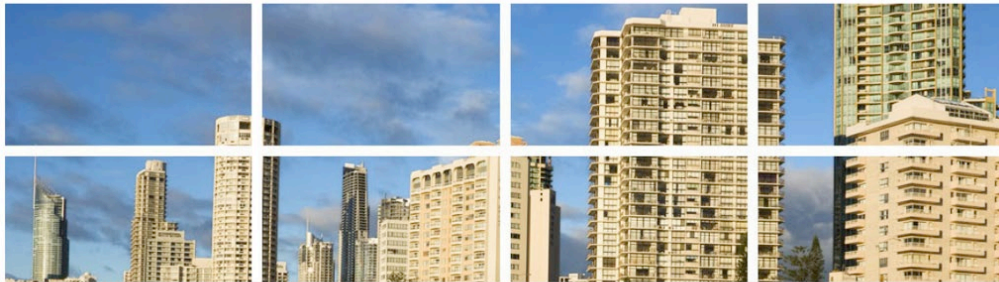


With increasing population growth in Australia, what impacts are you most concerned about?

- ② Housing density
- ② Increased competition for jobs from foreign & interstate workers
- ② Increased traffic
- ② Insufficient waste management
- ② Lack of character in new housing
- ② Less green space
- ② Marine and waterway health
- ② Reduced air quality
- ② Reduced car parking availability
- ② Reduced house prices affecting the value of your property
- ② Reduced safety in local community
- ② Reduced water supply

With increasing population growth in Australia, what impacts are you most concerned about?



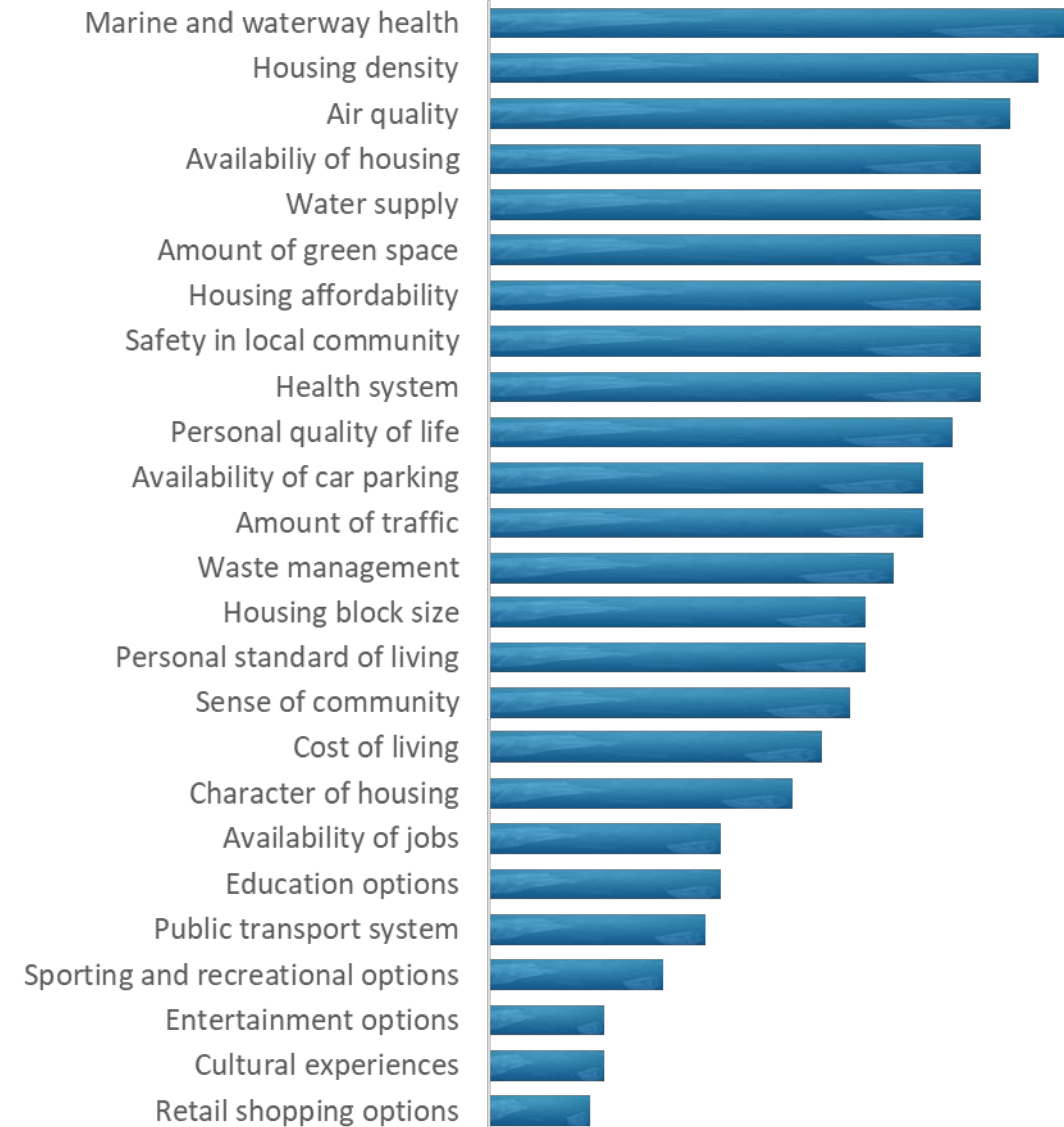


Queensland Growth Management Summit 2010

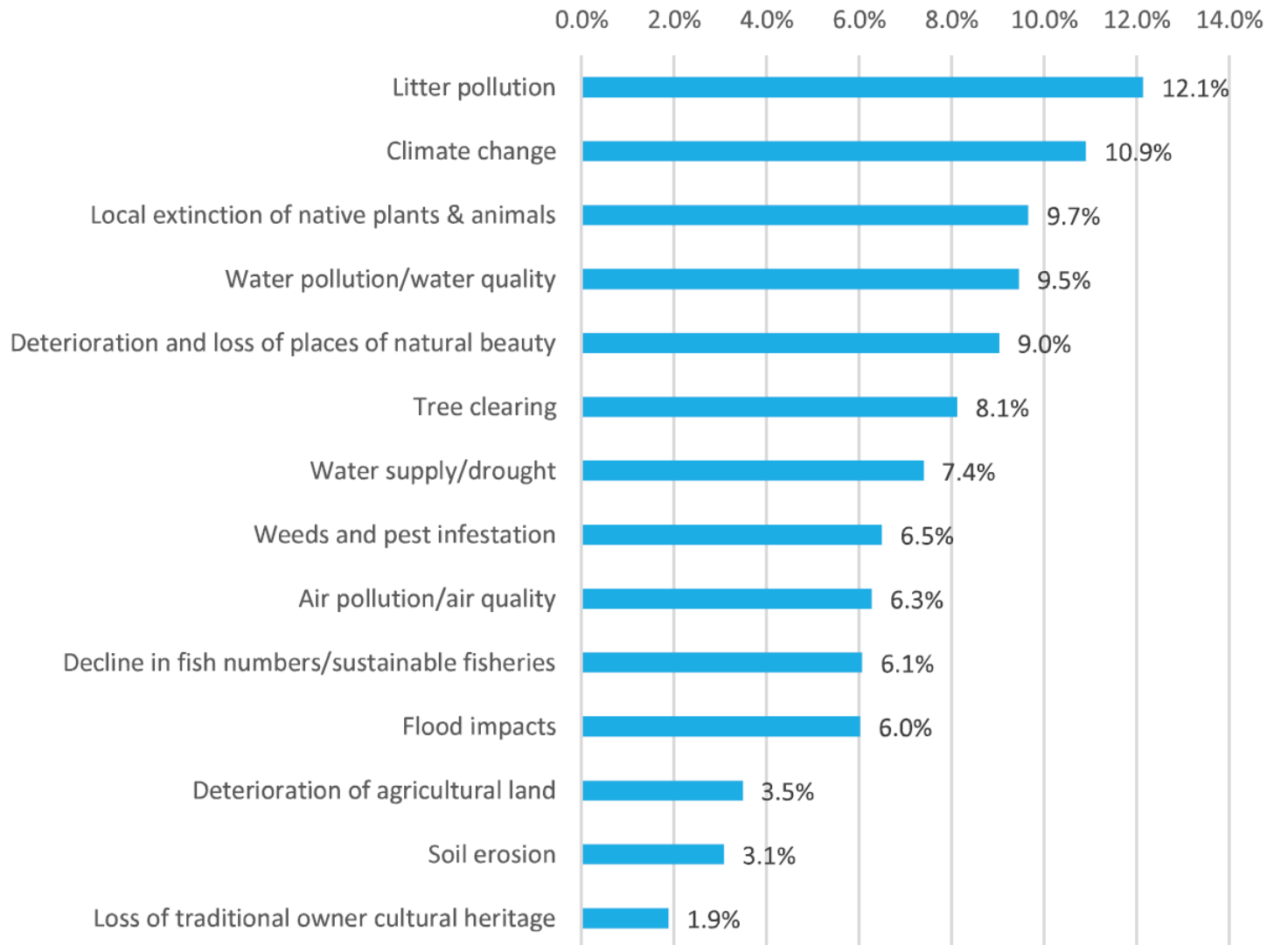
Social Research on Population Growth and Liveability in
South East Queensland

March 2010

- Prepared for: Department of the Premier and Cabinet
- Client contact: Julie Northage
- TNS consultants: Debra Haszard, Robyn Rutley
- 81195 : March 2010



Summary of results of community research (by Healthy Land and Water & QUT, 2018) asking respondents to rank their top three environmental concerns







THE STORY OF PLASTIC



DROWNING IN PLASTIC



S M O G OF THE S E A




BLUE PLANET II

Take a deep breath

BBC
earth



A PLASTIC TIDE



A PLASTIC OCEAN

WE NEED A WAVE OF CHANGE.



ALBATROSS

a love story for our time
from the heart of the Pacific

a film by chris jordan

PARLEY
SURFRIDER

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Dead whale found with 115 plastic cups and two thongs in its stomach

Updated 21 Nov 2018, 9:15am



NEWS LOCATION: Brisbane, Qld [Change](#)

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Whale starves to death after eating 40kg worth of plastic bags off the Philippines coast

Updated 19 Mar 2019, 6:16pm



PHOTO: The amount of plastic Darrell Blatchley found inside the whale shocked him. (Supplied: Darrell Blatchley)

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Beached sperm whale found with 100kg of rubbish inside its stomach

Posted Tue 3 Dec 2019 at 9:42am, updated Tue 3 Dec 2019 at 2:07pm



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Arctic birds, seals and reindeer killed by marine plastics; pollution expected to rise

By Anne Barker

Posted Fri 9 Feb 2018 at 6:36pm, updated Sat 10 Feb 2018 at 1:10pm



brisbane times

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It's believed turtles are attracted to plastic bags because of their likeness to jellyfish. AAP

USC animal ecology lecturer Dr Kathy Townsend has spent ten years studying sea turtles, and said 30 per cent of dead turtles she had studied in Moreton Bay recently were full of plastic.

“That’s staggering, that’s almost a third,” she said.

ENVIRONMENT | PLANET OR PLASTIC?

In a first, microplastics found in human poop

As microplastics permeate remote places and species around the globe, people are no exception.



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Randomized Controlled Trial > Lancet. 2020 Jul 18;396(10245):167-176.

doi: 10.1016/S0140-6736(20)30539-0.

Urgent endoscopic retrograde cholangiopancreatography with sphincterotomy versus conservative treatment in predicted severe acute gallstone pancreatitis (APEC): a multicentre randomised controlled trial

Nicolien J Schepers¹, Nora D L Hallensleben², Marc G Besselink³, Marie-Paule G F Anten⁴, Thomas L Bollen⁵, David W da Costa⁵, Foke van Delft⁶, Sven M van Dijk⁷, Hendrik M van Dullemen⁸, Marcel G W Dijkgraaf⁹, Casper H J van Eijck¹⁰, G Willemien Erkelens¹¹, Nicole S Erler¹², Paul Fockens⁶, Erwin J M van Geenen¹³, Janneke van Grinsven³, Robbert A Hollemans⁷, Jeanin E van Hooft⁶, Rene W M van der Hulst¹⁴, Jeroen M Jansen¹⁵, Frank J G M Kubben¹⁶, Sjoerd D Kuiken¹⁵, Robert J F Laheij¹⁷, Rutger Quispel¹⁸, Rogier J J de Ridder¹⁹, Marno C M Rijk²⁰, Tessa E H Römken²¹, Carola H M Ruigrok¹⁸, Erik J Schoon²², Matthijs P Schwartz²³, Xavier J N M Smeets¹³, B W Marcel Spanier²⁴, Adriaan C I T L Tan²⁵, Willem J Thijs²⁶, Robin Timmer²⁷, Niels G Venneman²⁸,

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Microplastics detected in placentas, infant feces, breastmilk, and infant formula

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By Dr. Liji Thomas, MD

Reviewed by Benedette Cuffari, M.Sc.

Sep 21 2022

Due to the exponential increase in the manufacturing, use, and disposal of plastics, the pollution of these products continues to overwhelm ecosystems throughout the world. Following their release into the environment, these places eventually degrade into microplastics (MPs) that can cause significant harm to organisms.

A new *Science of the Total Environment* journal paper reports the presence of this unknown and potentially life-threatening class of contaminants in uterine and infant tissues, breastmilk, and infant formula.



Science of The Total Environment

Volume 854, 1 January 2023, 158699



Detection of various microplastics in placentas, meconium, infant feces, breastmilk and infant formula: A pilot prospective study

Shaojie Liu^{a,1}, Jialin Guo^{c,1}, Xinyuan Liu^{a,1}, Ruoru Yang^a, Hangwei Wang^a, Yongyun Sun^a, Bo Chen^{a,b}, Ruihua Dong^{a,b}



MICROPLASTICS CAN INFILTRATE THE BLOOD-BRAIN BARRIER



Science of The Total Environment

Volume 807, Part 2, 10 February 2022, 150817



Microglial phagocytosis of polystyrene microplastics results in immune alteration and apoptosis *in vitro* and *in vivo*

Wookbong Kwon^{a,b,1}, Daehwan Kim^{a,b,1}, Hee-Yeon Kim^{b,c}, Sang Won Jeong^a, Se-Guen Lee^a, Hyun-Chul Kim^a, Young-Jae Lee^a, Mi Kyung Kwon^a, Jun-Seong Hwang^a, Jee Eun Han^c, Jin-Kyu Park^c, Sung-Jun Lee^{a,b}, Seong-Kyoon Choi^{a,b}



- ~1580 kg/hour of plastic entering Australian waters
- Vast majority of this is land-based & from Australia (via stormwater)
- Stormwater is the #1 source of pollution in urban waterways
- Vast majority of high litter generating areas have **zero** stormwater treatment assets
- Hundreds of thousands of stormwater treatment assets installed in Australia
- Vast majority of installed stormwater treatment assets **do not receive appropriate maintenance**



Recommended actions for Government

Ban on single
use plastics

Appropriate
stormwater
management
for all new
development

Appropriate
management
of stormwater
treatment
assets by 2025

'Zero litter to
ocean' by
2040

www.zerolittertooocean.com.au

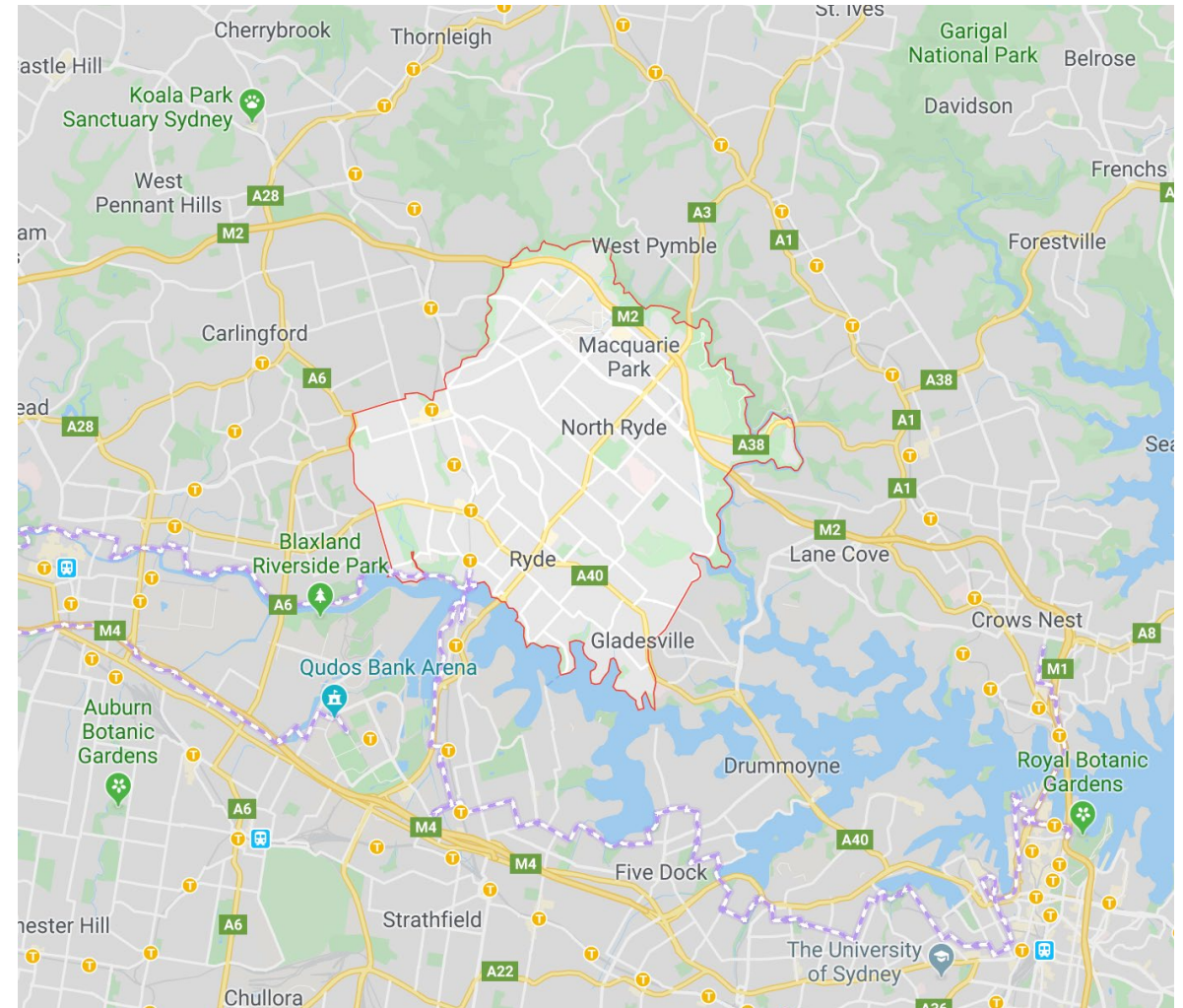
California

- Goal: Zero trash to waterways by 2030
- Population: 39 million people
- Area: 425,000km²



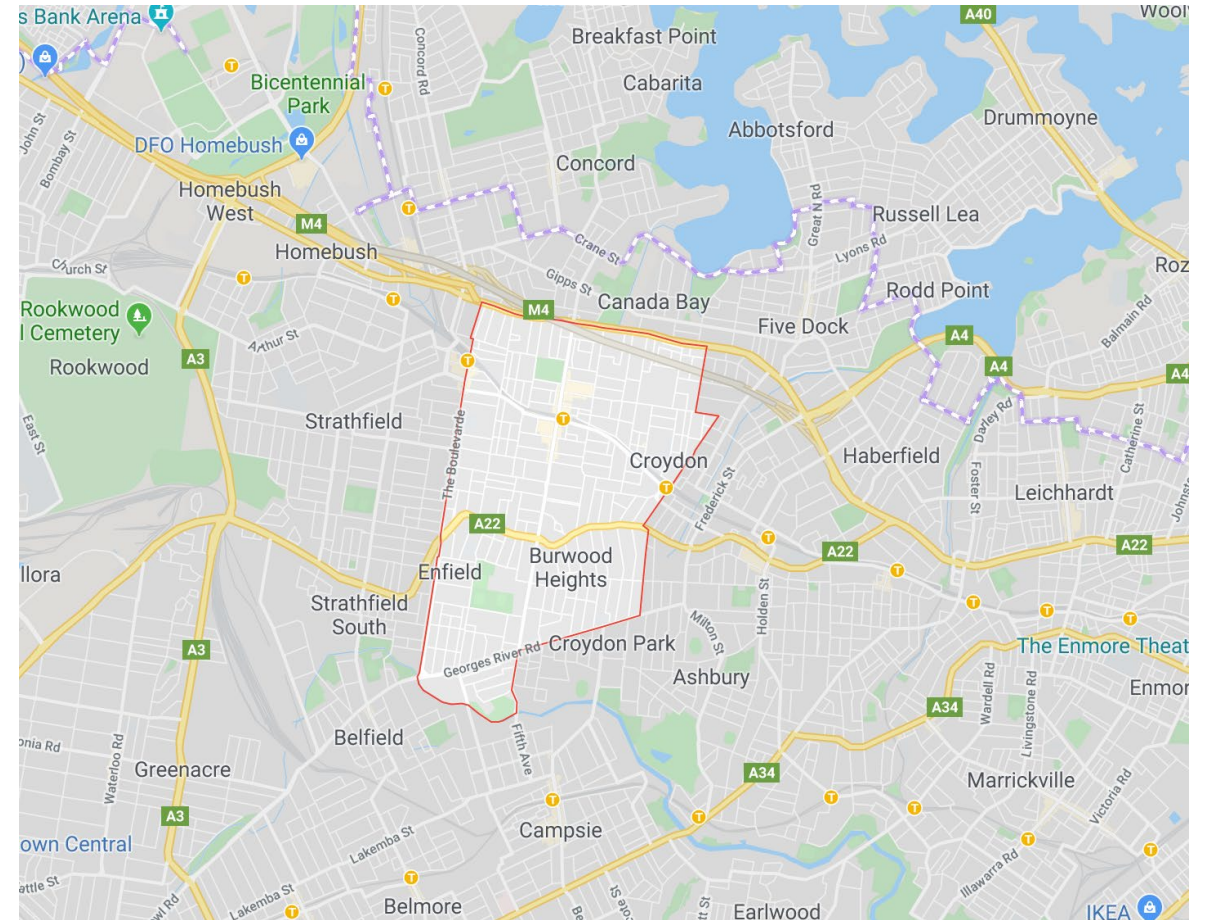
City of Ryde, NSW

- Goal: Zero litter to river by 2030
- Population: 116,300 people
- Area: 41 km²



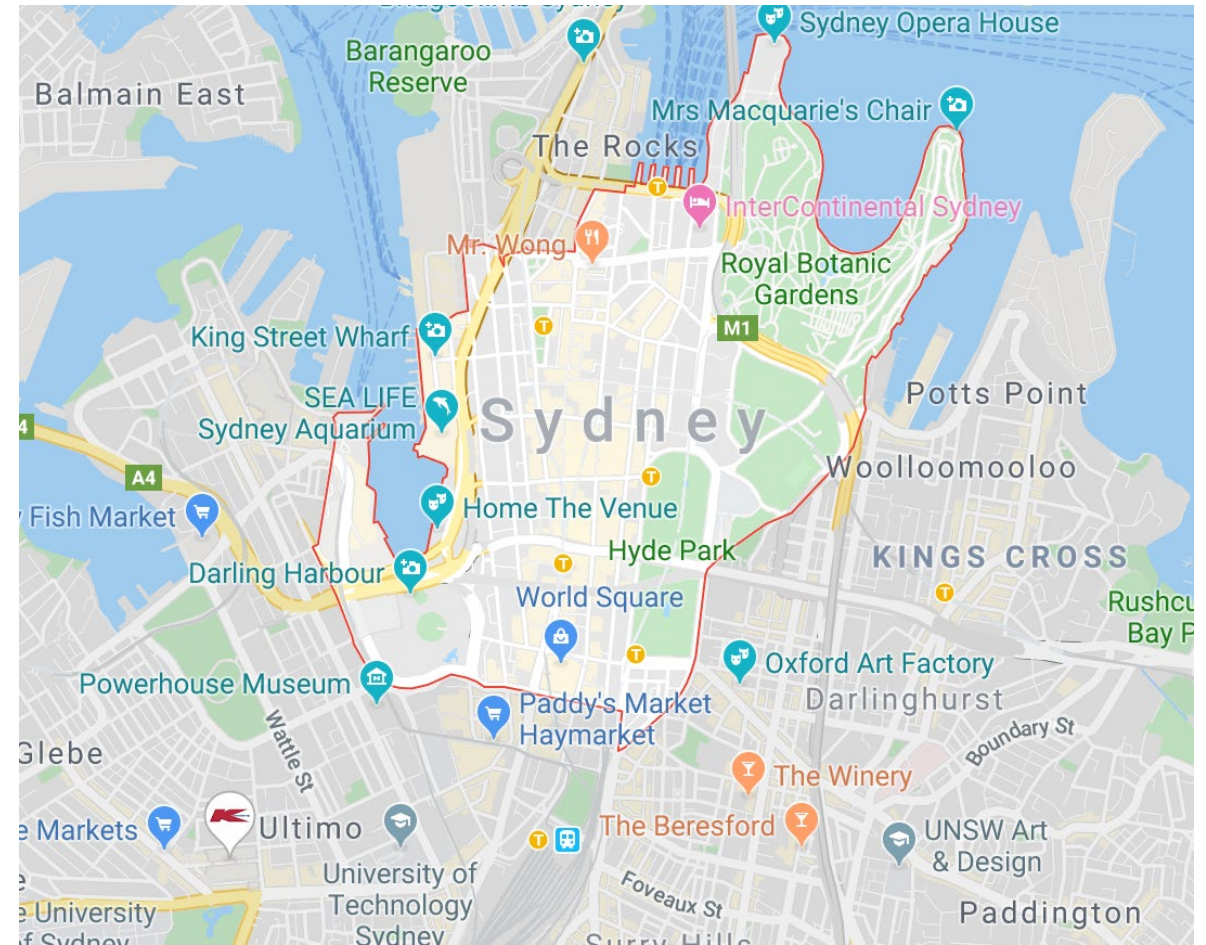
Burwood Council, NSW

- Goal: Zero litter to river by 2030
- Population: 37,000 people
- Area: 7 km²



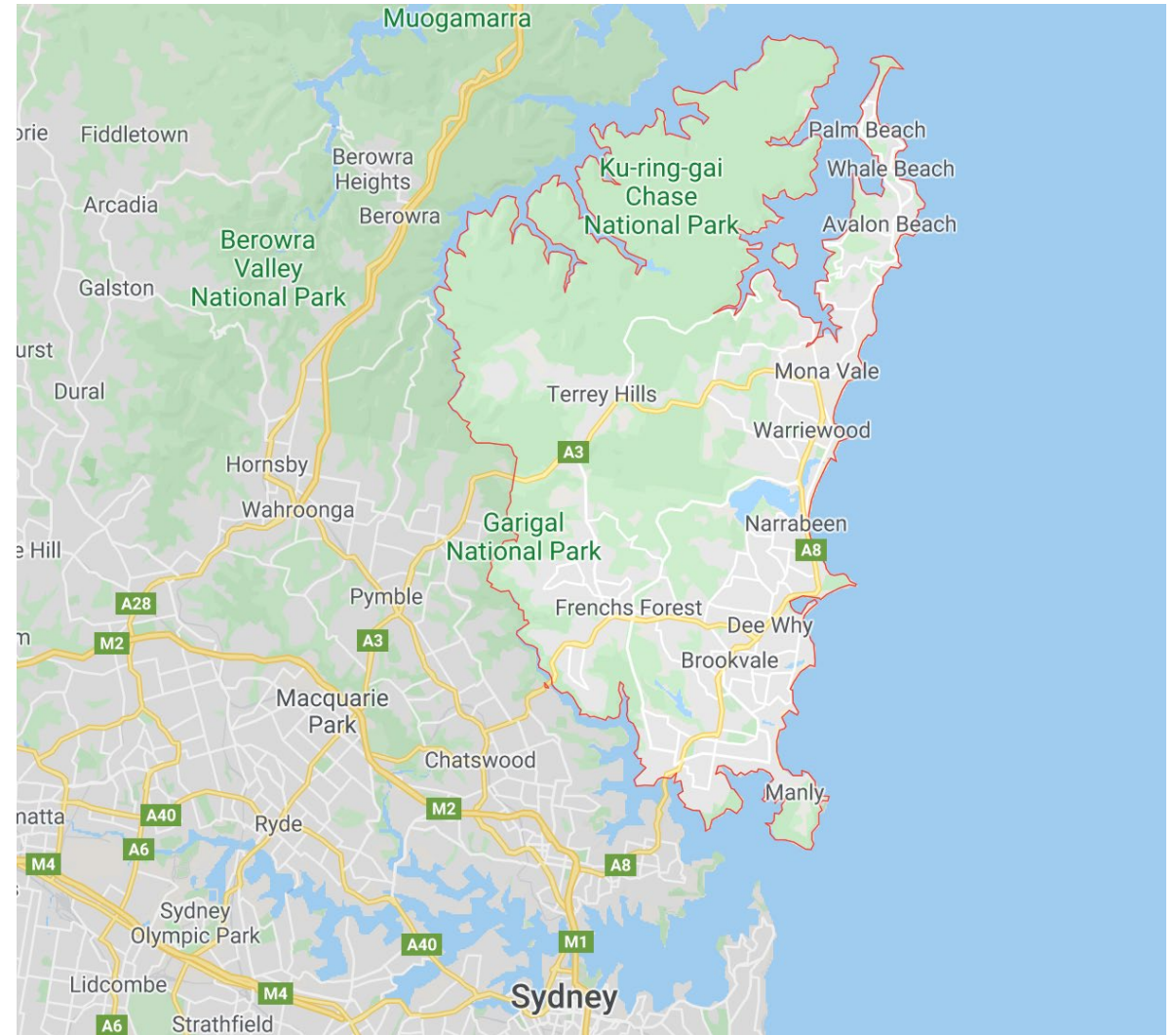
City of Sydney, NSW

- Goal: Zero litter to ocean by 2030
- Population: 208,000 people
- Area: 25km²



Northern Beaches Council, NSW

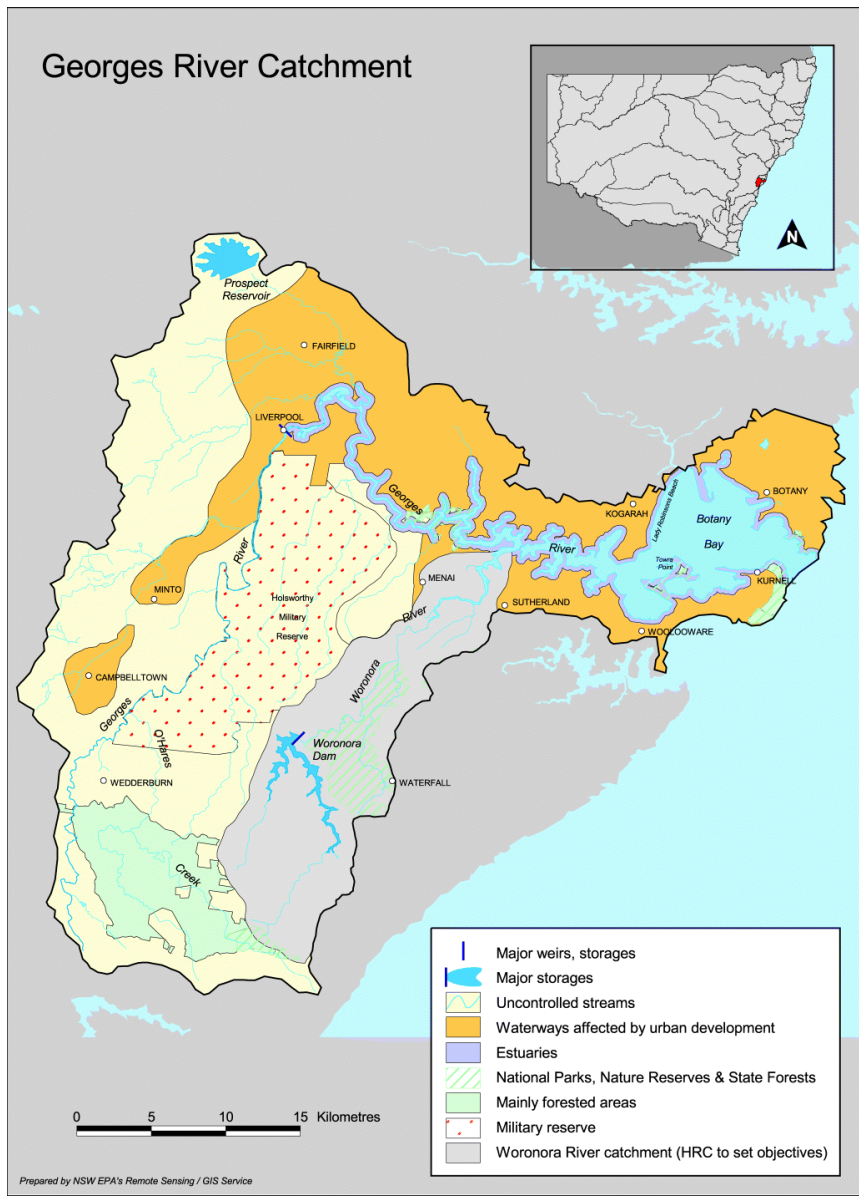
- Goal: Zero litter to ocean by 2030
- Population: 253,000 people
- Area: 254km²



Noosa River, QLD

- 🌀 Goal: Zero litter to river by 2030
- 🌀 Population: 52,000 people
- 🌀 Area: 869 km²







A gross problem

Local litter heroes

Be a litter quitter



Zero Litter in GEORGES RIVER



[Georges Riverkeeper](#) is committed to best practice environmental management for a liveable urban river. We want you to enjoy, learn about, and help the Georges River.



- ④ **Goal:** an 80 % reduction in plastic waste entering the Australian environment by 2030

THE CONVERSATION

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Local efforts have cut plastic waste on Australia's beaches by almost 30% in 6 years

Published: June 9, 2022 6.20am AEST

Kathryn Willis, Author provided



Blacktown City Council




Water Sensitive Urban Design (WSUD) Fact sheet

Requirements for managing your water sensitive urban design (WSUD) system- private landowners

This fact sheet outlines our general requirements for managing WSUD systems on private properties. It describes what you, as a property owner, need to do, what may happen if these requirements are not met, and who you can contact at Council for assistance. To understand your property's specific requirements, this fact sheet should be read with your property's Notice of Determination and associated WSUD related development conditions and covenants for your property.

Overview

WSUD systems typically comprise one or more assets that work together to reduce flood risk to your property, reduce demand on our drinking water supply, and protect local waterways from the damaging effects of urban stormwater runoff. WSUD assets can include on-site stormwater detention systems, rainwater tanks, biofilters, filter cartridges, and gross pollutant traps.

WSUD systems are installed on private property in line with Part J of the Blacktown Development Control Plan 2015 (Water Sensitive Urban Design and Integrated Water Cycle Management).

Their intent is to protect people, property and the environment by:

- providing stormwater detention to help protect your home and street from 'nuisance' (localised) flooding
- improving our drought resistance by providing your property with alternative water sources for activities such as garden watering, car washing and toilet flushing
- improving the quality of stormwater that flows into our local waterways
- reducing bank and channel erosion of our local waterways by slowing down the flow of urban stormwater into local creeks.



On-site stormwater detention (OSD) system




Rainwater tank

Your responsibilities for managing the WSUD system on your property are determined by:

- the Notice of determination of development consent for your property
- positive covenants and restrictions applicable to the WSUD system associated with your property
- the Maintenance schedule made in line with the above.




Blacktown
City Council



Australian Government

The Hon Sussan Ley MP
Minister for the Environment



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[Sussan Ley](#) / [Media releases](#) / Australia takes action on plastics to the world stage

Australia takes action on plastics to the world stage


11 September 2021

Australia has again taken its plastics mission to the world stage as Minister for the Environment Sussan Ley joined calls for a new global agreement on Marine Plastic Pollution while addressing two major international meetings.

DRAFT PACIFIC REGIONAL DECLARATION ON THE PREVENTION OF MARINE LITTER AND PLASTIC POLLUTION AND ITS IMPACTS

[PP0] We, representatives of the people of the Pacific region and stewards of the world's largest ocean, meeting at the **Environment Ministers' High-Level Talanoa**, 10th September 2021, are deeply concerned about the impacts of plastics and microplastics pollution on our region and that the current patchwork of international legal instruments is not sufficient to prevent the acceleration of these impacts.

[PP1] *Recalling* the international commitments made by the Parties to multilateral environmental agreements including – but not limited to - the UN Framework Convention on Climate Change 1992, the Paris Agreement 2015, the UN Convention on Biological Diversity 1992, Basel Convention, International Human Rights instruments, the Sustainable Development Goals 2030, the International Convention for the Prevention of Pollution from Ships, SAMOA Pathway and the environmental principles notably the polluter-pays principle, precautionary approach and the inter-generational equity principle.



Australian State / Territory Commitments

Ban on Single-Use Plastics

Last Updated: 1 September 2021	ACT	NSW	NT	QLD	SA	TAS	VIC	WA
Lightweight plastic bags	✓	2022	✓	✓	✓	✓	✓	✓
Straws	2022	2022		✓	✓		2023	2022
Drink stirrers	✓	2022		✓	✓		2023	2022
Cutlery	✓	2022		✓	✓		2023	2022
Polystyrene food + drink containers	✓	2022		✓	2022		2023	2022
Plates + bowls				✓			2023	2022
Cotton bud sticks		2022					2023	2023
Fruit + veggie bags	2022							2023
Heavyweight plastic bags								2022
Microbeads		2022						2023
Plastic cups + lids								2022
Coffee cups containing plastic								2023
Plastic takeaway containers								

KEY: ✓ = Banned 2022 = Ban starts within 2 years 2023 = Over 2 years away



Table 1 Breakdown of budget estimate to achieve 'Zero Litter to Bay' by 2032

Action Ref.	Action Description	Additional Initial Investment (\$Million)	Additional Ongoing Investment (\$Million per annum)	Total Additional Investment (\$Million)
3	Continue and enhance existing litter reduction strategies	-	0.1	1.0
4	Identify, assess and rectify existing Council-owned stormwater treatment assets	0.2	0.2	2.2
5	Support appropriate management of existing and new stormwater treatment assets	0.05	1.4	13.9
6	Installation of new stormwater treatment assets	15.0		15.0
	Total	15.3	1.7	32.1

It should be noted that the cost estimate does not consider the economic benefits associated with achieving the given target, such as benefits to tourism, property values, commercial and recreational fishing industries, and public health.







www.oceanprotect.com.au

1300 354 722

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bradd@oceanprotect.com.au

THANK YOU