Annual Environmental Performance Report 2019 - 20

Incorporating our Special Objectives Statement

SW147 02/21.

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Sydney WATER

Executive Summary

Sydney Water has prepared this Annual Environmental Performance Report which incorporates our statement on the implementation of our special objectives as required by the *Sydney Water Act 1994* (the Act) and our Environmental Performance Indicators Report 2019-20. The report summarises how we addressed the Special Objectives identified in Section 22 (6) of the Act between 1 July 2019 and 30 June 2020. This report differs significantly from previous versions to address feedback from the Environment Protection Authority (EPA), including a request to provide a wholistic statement, focus on wastewater discharges and provide trending data. In addition to this document, we publish several comprehensive performance reports on our website that demonstrate our implementation of, and performance against, the special objectives.

Sydney Water integrates environmental and public health management into its business decision-making and operational activities. The special objectives are implemented within a total business context, rather than as separate considerations. This approach ensures that balancing social, economic, public health and environmental considerations is part of the usual way we provide services. We have established a number of management systems, plans and frameworks to support our business operations and ensure we continue to address the special objectives.

The below table highlights key points from the report which demonstrated positive, negative or stable trends/outcomes. Overall, most trends were positive, though we are committed to continually improve in our environmental performance through our management system framework. The report also provides details on key initiatives that we are implementing to improve our performance, most notably in our wastewater networks. Table E2 summarises some of the improvement initiatives that are underway to address adverse trends.

Table E1 – An overview of environmental trends

Sydney Water Act 1994 means	Environmental Topic	Key points from 2019-20 paper	Trend/ Outcome status
Reduce impact of discharges to the environment	Wastewater treatment discharges	Maintain waterway flow	➡
		Beachwatch ratings	↑
		Oil & Grease Exceedance	↓
		Total suspended solids	↑
		Non-compliant discharges at Picton WRP	↑
	Network discharges	Dry Weather Overflow volumes	↓
		Dry Weather Overflow events	↑
		Dry Weather Overflow volumes reaching waterways (SCAMPs)	↑
		Dry weather overflow volumes reaching waterways (Total)	↑
		Total number of chokes	↓

Sydney Water Act 1994 means	Environmental Topic	Key points from 2019-20 paper	Trend/ Outcome status
		Five-year average choke rate per 100km	
		Wet weather overflow incidents	
		Wet weather overflow volume	
	Stormwater network discharges	Silt and rubbish removal	
Efficient and sustainable resource use	Energy use	Grid electricity consumption	
		Renewable energy generation	
		Fuel usage	
		Gas consumption	
	Resource recovery	Biosolids – beneficial reuse	
		Solid waste generation	
		Construction and demolition waste recycling	
		Office waste diversion rate	
		Removal of waste from the environment (‘Beat the bottle’ campaign)	
Community involvement	Drought	water restrictions and water conservation	
	Community awareness programs	- Keep wipes out of pipes - School support education programs - Support delivery of community events	
	Residential monitor surveys	Q1, Q2, Q3, Q4	
	Decisions	Related to environmental matters.	

Table E2 – An overview of environmental trends – additional detail, including relevant improvement initiatives

Topic	Key points from 2019-20 report
Reduce impact of discharges to the environment	
Wastewater treatment discharges	Sydney Water is investing to increase the capacity and capability of several wastewater treatment plants in Western Sydney. We have also found that treated wastewater discharges to inland waterways can have benefits by maintaining waterway flow and habitat for wildlife such as the platypus in Cattai Creek and Seconds Ponds Creek
	Beachwatch ratings saw improved results for a number of sites that are influenced by our wastewater discharges when compared to last year.
	Oil and grease exceedances were experienced at Bondi, North Head and Malabar WWTPs.

Topic	Key points from 2019-20 report
	Relevant improvement initiatives – Oil and Grease Ongoing education campaigns to improve awareness on appropriate ways to dispose of fats, oils and greases with the aim to reduce incoming loads to our treatment plants and prevent blockages in our sewer networks. Assessment of further options bring oil and grease levels at Bondi WWTP into compliance. Optimise operations at North Head WWTP and Northside Storage Tunnel whilst NSOOS desilting works continue to occur.
	A significant decreasing trend in total suspended solids was observed at Bondi, North Head and Malabar WWTPs.
	Four non-compliant discharges occurred at Picton WRP due to a lack of effluent management capacity resulting in load exceedance.
	Relevant improvement initiatives – Picton licence exceedances Planning for expansion of reuse to nearby farms is underway to increase effluent management capacity and minimise discharges Trialing of treatment options including wetlands and macroalgae to polish the treated effluent prior to release to the environment. Licence variation application and a Review of Environmental Factors have been preparedin line with the Picton effluent management strategy.
Network discharges	Dry weather overflow volumes decreased in 2019-20 No of dry weather overflow events increased
	80 Sewer Catchment Area Management Plans (SCAMPs) exceeded their Environment Protection Licence (EPL) dry weather overflows reaching waterways target in 2019-20, compared to 60 in 2018-19.
	Total number of wastewater overflows reaching waterways was 473 in 2019-20 (2.7% of total blockages), (2.1 % in 2018-19)
	Total number of chokes experienced within our wastewater network has decreased
	Five-year average choke rate per 100km of wastewater networks slightly decreased from 2018-19
	Trends in wet weather overflow frequency or number of incidents decreased in 2019-20 compared to last year (2018-19)
	Trends in wet weather overflow volume increased in 2019-20 in both ocean and inland systems, partly due to above average rainfall in 2019-20.
	Continued work on our Wet Weather Overflow Program which reduces wet weather overflows and stormwater entering the network.

Topic	Key points from 2019-20 report
	Relevant Improvement Initiatives – Network discharges Various initiatives including: • Improved inspection programs and methods • Changed methods for preventive maintenance to deliver more inspections. • Continuation of maintenance and renewals programs • Increased resourcing for reactive and preventative maintenance • Expanding use of Internet of Things (IoT) sensors to identify blockages before they overflow. In 2019-20 we identified 45 blockages through IoT. • Trialling sniffer dogs to identify wastewater leaks in stormwater • Development of robotic tool for rising main condition assessments • Developing analytical tool to detect blockages upstream of pumping stations • Mobile laboratory to improve test result turnaround time
Stormwater network discharges	We removed silt and rubbish from over 60 stormwater quality improvement devices which prevented 2,279 m^3 of debris from entering Sydney's waterways in 2019-20.
	Relevant Improvement Initiatives – Stormwater Ongoing works to naturalise and improve stormwater networks, and better implement water sensitive urban design principles.
Efficient and sustainable resource use	
Energy use	Sydney Water's goal is to achieve grid electricity consumption equivalent to 1998 levels (366 GWh). In 2019-20, consumption exceeded that benchmark by 11 GWh.
	Relevant Improvement Initiatives – Electricity Consumption Ongoing implementation of our Energy Master Plan and energy efficiency projects
	Sydney Water's on-site renewable energy generation (67,953,137 kWh) was equivalent to 16% of total energy consumption in 2019-20. Renewable generation was 12% lower compared to 2018-19.
	Fuel usage has decreased due to the COVID situation. Fewer vehicles were on the road during the latter months of 2019-20.
	Gas consumption increased in the Cronulla catchment due to gas pressure booster pumps not working properly.
	Relevant Improvement Initiatives – Gas Consumption The gas pressure booster pumps issue was fixed in 2020.
Resource recovery	Sydney Water has been consistently achieving 100% beneficial use of biosolids.
	Sydney Water generated 199,547 tonnes of solid waste, an increase of 3% from 2018-19
	Implementation of a Resource Recovery Masterplan.

Topic	Key points from 2019-20 report
	The overall recycling rate for 2019-20 was 74%, an increase from 59% in the previous year due to increase in construction and demolition waste (recycling rates vary considerably during the life cycle of capital projects)
	Office waste diversion rate decreased to 32% which is the lowest since 2015-16. The rate is highly dependent on recycling from Sydney Water's facility management contracts.
	New facility management contract arrangements set up since July 2020.
	Removing over 3 tonnes of waste from the environment through our 'Beat the Bottle campaign' (2018-19 1.25 tonnes)
Community involvement	
	Communications strongly focused on the drought, water restrictions and water conservation.
	In 2019-20 we continued to roll out community awareness programs to increase understanding of roles in keeping our wastewater system healthy
	Our 'Keep wipes out of the pipes!' campaign has improved customer awareness and behaviour. The campaign also resulted in direct engagement with Kimberly-Clark (Kleenex) and product improvements.
	Continued to invest in and support school education programs and onsite tours.
	Supported delivery of 25 events by community partners across (11 in 2018-19), and also engaged over 1000 community volunteers (450 in 2018-19).
	Our Residential Monitor showed: Q1 - Strong focus on drought concerns due to dropping dam levels Q2 - A decline in perception that Sydney Water is protecting the environment (December 2019) Q3 - Environmental concerns peaked in January 2020 coinciding with the height of bushfires. Q4 - Both concerns sharply receded as Covid-19 impacts were felt. The survey also indicated that over 71% of people trust Sydney Water to always protect the environment.
	Relevant Improvement Initiatives – Community Involvement Our new Brand Tracker, customer research tool is ready and will be implemented to measure customer satisfaction, awareness and behavior.
	Continually promoted community involvement in decisions about environmental matters.

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1. Introduction

1.1 Background

Sydney Water prepared this Annual Environmental Performance Report which incorporates our statement on the implementation of our special objectives as required by the *Sydney Water Act 1994* (the Act), and our Environmental Performance Indicators Report 2019-20. The Act requires Sydney Water to publish its statement as part of its annual report on its environmental indicators.

Our business is underpinned by the three principal objectives outlined in the Act:

1. To be a successful business.
2. To protect the environment by conducting its operations in compliance with the principles of ecologically sustainable development (ESD).
3. To protect public health by supplying safe drinking water to its customers and other members of the public in compliance with the requirements of any operating licence.

These objectives enable us to achieve a sustainable future by balancing social, economic and environmental considerations.

In addition to this, Section 22 of the Act states that in implementing the principal objectives, we have the following special objectives:

1. To reduce risks to human health.
2. Prevent degradation of the environment.

These objectives are to be interpreted and implemented as specified in Section 22 of the Act and Section 6 of the *Protection of the Environment Administrations Act 1991*, so far as they are relevant to our business.

This report is intended to serve as a summary and demonstrate how we addressed the special objectives identified in the Act between 1 July 2019 and 30 June 2020.

1.2 Implementing the special objectives

Sydney Water integrates environmental and public health management into its business decision-making and operational activities. The special objectives are addressed within a total business context, rather than as separate considerations. This approach ensures that balancing social, economic, public health and environmental considerations is part of the usual way we provide services.

We have established management systems, plans and frameworks to support our business operations and ensure we continue to address the special objectives. These include our:

- ISO14001 certified Environmental Management system, which provides a systematic, planned approach to managing environmental risks.

- Drinking Water Management System, aligned to the *Australian Drinking Water Guidelines 2011*, which describes the methods we use to ensure the quality and quantity of drinking water we supply to our customers.
- Recycled Water Management System, aligned to the *Australian Guidelines for Water Recycling 2006*, which describes the methods we use to ensure we supply high quality recycled water to our customers and minimise risks to human health.
- Quality Management System, certified to the ISO9001 standard, enables us to continually monitor and measure how we are performing so we can improve and be more effective.
- Asset Management System, certified to the ISO55001 standard, provides a framework that supports our asset management activities to deliver customer service outcomes and continual improvement.

1.3 Reporting against our Special objectives

Table 1.1 below lists the special objectives means specified in Section 22 of the Act and Section 6 of the *Protection of the Environment Administrations Act 1991*. These have been aligned with the following four broad environmental objectives in our *Environment Strategy (2018 – 2030)*:

1. We'll contribute to healthy waterways and clean beaches in delivering our services to safeguard ecosystems that our communities can continue to enjoy.
2. We'll increase our resilience to a changing climate, connect with customers and use water in the landscape to shape liveable places.
3. We'll protect and restore valuable biodiversity and share the natural spaces, land and heritage in our care with the community.
4. We'll use our resources wisely, work with customers to save water and increase our recovery of energy towards net-zero emissions.

Table 1.1 acts as a guide to show where this report addressed the means.

In previous years, our Special Objectives statement was included within an Environment Compliance and Performance Report, with reference to multiple parts including our Environment Plan reporting, Environmental Indicator reporting and future Environment Plan actions, as well as reference to Sewage Treatment System Impact Monitoring Program (STSIMP) reporting. This report has been modified significantly to address previous feedback from the Environment Protection Authority (EPA), including a request to provide a wholistic statement, focus on wastewater discharges and provide trending data.

In addition to this report, we publish several comprehensive performance reports on our website that demonstrate our implementation of, and performance against, the special objectives. Please refer to the following documents available at sydneywater.com.au for more information:

- Sydney Water Annual Report – provides a summary of Sydney Water's overall performance.

- Water Conservation Report – outlines how we are meeting our water conservation requirements and contributing to water efficiency, leak management and water recycling initiatives.

Table 1.1 Reporting against Special Objectives requirements

***Sydney Water Act 1994* means**[1]	***POEA Act 1991* means**[1]	**Link to our Environment Strategy objectives**	**Where addressed in this report**
Reducing the environmental impact of its discharges into or onto the air, water or land of substances likely to cause harm to the environment.	Adopting the principle of reducing to harmless levels the discharge into air, water or land of substances likely to cause harm to the environment. Setting mandatory targets for environmental improvement. Promoting pollution prevention.	**1.** Healthy waterways and clean beaches Contribute to healthy waterways and clean beaches in delivering our services to safeguard ecosystems that our communities can continue to enjoy. **4.** Efficient and sustainable resource use Use our resources wisely, work with customers to save water and increase our recovery of energy towards net-zero emissions.	**Section 2 – Reduce impact of discharges to the environment** **Section 3 - Efficient and sustainable resource reuse**
Re-using and recovering energy, water and other materials and substances, used or discharged by Sydney Water, by the use of appropriate technology, practices and procedures. Reducing use of energy, water and other materials and substances.	Encouraging the reduction of the use of materials, encouraging the re-use and recycling of materials; and encouraging material recovery.	**4.** Efficient and sustainable resource use Use our resources wisely, work with customers to save water and increase our recovery of energy towards net-zero emissions.	**Section 3 - Efficient and sustainable resource reuse** • **Bioresources** • **Maintain our grid-sourced electricity demand**
Minimising Sydney Water's creation of waste by the use of appropriate technology, practices and procedures.	Minimising the creation of waste by the use of appropriate technology. Regulating the transportation, collection, treatment, storage, and disposal of waste.	**4.** Efficient and sustainable resource use Use our resources wisely, work with customers to save water and increase our recovery of energy towards net-zero emissions. **3.** Care for nature, land and heritage Protect and restore valuable biodiversity and share the natural spaces, land and heritage in our care with the community.	**Section 3 - Efficient and sustainable resource reuse** • **Develop and implement water conservation program** • **Waste**

[1] *Only the means relevant to Sydney Water's activities are listed*

Sydney Water Act 1994 means[1]	*POEA Act 1991* means[1]	Link to our Environment Strategy objectives	Where addressed in this report
	Promoting community involvement in decisions about environmental matters. Conducting public education and awareness programs about matters. Ensuring the community has access to relevant information about hazardous substances arising from, or stored, used or sold by, any industry or public authority.	**2.** Create resilient and liveable places Increase our resilience to a changing climate, connect with customers and use water in the landscape to shape liveable places.	**Section 4 - Community involvement** • **Customer satisfaction, awareness and behaviour**

One Strategy to deliver our vision

Our strategy for 2020-2030 has been developed to help us deliver on our vision of creating a better life with world-class water services. It sets out four strategic outcomes that will direct our activities over the next decade and respond to the key challenges facing our customers, our business and the environment.

Figure 1-1Our strategy to deliver our vision 2020 – 2030

This new strategy was applied from July 2020. This report was prepared against the Environmental Strategy 2018-30 for year 2019-20. Strategic success measures have been selected to assess our performance against our strategic goals for year 2020-21.

1.4 Sewage Treatment System Impact Monitoring Program (STSIMP) Report

The details in this report refer closely to the outcomes of our 2019-20 STSIMP Data Report. The STSIMP was developed in consultation with the NSW Department of Planning, Industry and Environment (DPIE) and implemented from July 2008, to monitor Sydney's waterways (Sydney Water 2008). The program was endorsed by the NSW EPA in 2008 with a slight amendment to one of its sub-programs in 2010 (Sydney Water 2010).

The STSIMP aims to monitor the environment within Sydney Water's area of operations to determine general trends in water quality over time, monitor Sydney Water's performance and to determine where Sydney Water's contribution to water quality may pose a risk to environmental ecosystems and human health. It contains a summary of wastewater discharge quality, quantity and loads data for key pollutants relating to regulatory limits. This report also contains inland and ocean receiving water quality, wastewater overflows and recycled water data. The 2019-20 STSIMP Data Report is provided to the EPA and subsequently uploaded to the Sydney Water website in early 2021.

2. Reduce impact of discharges to the environment

We deliver water, wastewater, recycled water and some stormwater services to over 5.3 million people in Sydney, the Illawarra and the Blue Mountains, covering an area of operations of approximately 12,870 square km. It's important we provide these services in an environmentally responsible manner.

Treating the community's wastewater plays a huge role in contributing to healthy waterways. Our wastewater system spans 16 wastewater treatment plants (WWTPs) and 14 water recycling plants (WRPs), licensed by the NSW EPA. Our plants receive wastewater from a range of sources and discharge treated wastewater to inland fresh waterways and the ocean. In 2019-20 Sydney Water collected 536,140 ML of wastewater, servicing an estimated population of 5,208,000 people.

Benefits of wastewater treatment

Clean water is critical to plants and animals that live there. Our rivers and oceans are full of life and maintaining these environmental flows are essential for their survival. Treating our wastewater not only protects public health; it protects habitat for terrestrial and aquatic life. Water also has scenic and recreational values and contributes to the quality of life that communities can enjoy, including through water activities such as swimming, fishing, boating and picnicking.

Case Study: Benefits of treated discharges to maintain creek flows for Platypus

Studies have found platypus are heading towards extinction. The Cattai Hills Environment Network (CHEN) is mapping and monitoring platypus populations. Their sampling included 18 sites across the catchment using environmental DNA. Out of these, three of the sites had detected platypus and another five sites had low DNA detection that required further analysis. Two of our wastewater treatment plants in the catchment (Castle Hill WRP and Rouse Hill WRP) release treated wastewater into the local waterways, Cattai Creek and Second Ponds Creek. Wastewater releases from these plants have maintained the flow in these creeks during times of drought which, as per CHEN, undoubtedly benefits the platypus that are now known to reside in Cattai Creek. CHEN would like to extend their project and work with Sydney Water's objective to protect valuable biodiversity and support Sydney Water to educate the broader community about water efficiency and the importance of environmental protection and sustainability.

Impacts on Swimmability

In 2019-20, BeachWatch program (DPIE) had 118 sites within the Sydney Water area of operations. Out of these 118 sites, 110 were graded as Very Good or Good. This indicates 93% of the sites were swimmable most or almost all of the time. Overall percentage of sites increased by 0.25% compared to previous year. The performance at four sites (Oatley Baths, Carss Point Baths, Foreshores Beach and Elvin Bay) was improved, but declined at two sites (Maroubra Beach and Hayes St Beach) compared to the previous year. Two percent of sites were graded as Fair (Gymea Bay Bath, Northbridge Baths and Gurney Cr Baths), and were generally good for swimming. The elevated results were due to rainfall events. Four percent of sites were graded as Poor (Foreshores Beach, Rose Bay Beach, Hayes St Beach, Davidson Reserve and South Maroubra Rockpool) indicating the presence of significant sources of faecal contamination and the sites being not always suitable for swimming.

Table 2.1 Summary of Beachwatch program changes in suitability grade for sites impacted by Sydney Water's operations (by exception)

Site	Beach suitability grade	Change from 2018-19	Comments
Oatley Baths	Good	↑	Higher proportion of samples collected during dry weather
Carss Point Baths	Good	↑	Higher proportion of samples collected during dry weather
Elvin Bay	Very good	↑	Upgraded from good to very good Higher proportion of samples collected during dry weather
Foreshores Beach	Poor	↑	Improved from very poor to poor
Hayes St Beach	Poor	↓	Downgraded from good to poor
Maroubra	Poor	↓	
Malabar beach	Poor	–	Continue to be graded as poor as it takes longer to recover from stormwater events

Seventy five out of the 114 Beachwatch sites recorded one or more exceedance in dry weather during the 2019-20 period (Sydney Water does not receive the Beachwatch data for Stanwell Park Beach, Coledale Beach, Seven mile Beach Gerroa and Camp Cove Beach). Wastewater overflows may have impacted *Enterococci* levels at twelve of the seventy five Beachwatch sites (Narrabeen Lagoon at Birdwood Park, Gymea Bay Baths, Brighton Le Sands Baths, Bronte Beach, Clifton Gardens, Coogee Beach, Davidson Reserve, Frenchmans Bay, Gunnamatta Bay Baths, Kyeemagh Baths, Rose Bay Beach

and Tamarama Beach). Out of these 12 beaches, two were graded as Poor (Davidson Reserve and Rose Bay Beach) and one (Gymea Bay Bath) as Fair by the DPIE. The remaining nine beaches were graded as Good or very Good during 2019-20. Malabar beach continued to be graded as Poor (similar to previous years). This beach takes longer to recover from stormwater events (State of the Beaches 2019-20, Statewide summary, DPIE).

2.1 Wastewater Treatment Discharges - Coastal Plants

About 90 per cent of wastewater collected by Sydney Water is treated at wastewater treatment plants before being released to the ocean. There are three major coastal plants at North Head, Bondi and Malabar and seven smaller coastal plants at Warriewood, Cronulla, Bombo, Wollongong and Shellharbour. The deep ocean outfalls play a key role in keeping our beaches and swimming areas clean (Manning et al, 2019). We treat about 80% of Sydney's wastewater at the three largest wastewater treatment plants (WWTPs) at North Head, Bondi and Malabar. These plants disperse primary treated wastewater through deep ocean outfalls (DOOF) about two to four kilometres offshore, where the water is 60 to 80 metres deep. Strong ocean currents further dilute the treated wastewater.

All other ocean wastewater treatment plants performed as expected (and are within the EPL limits) and thus are not discussed here. In this document we focus on DOOF plants.

Inflow

All weather inflow to North Head WWTP in 2019-20 and Malabar WWTP were similar to previous years, whereas for Bondi WWTP the inflow was less.

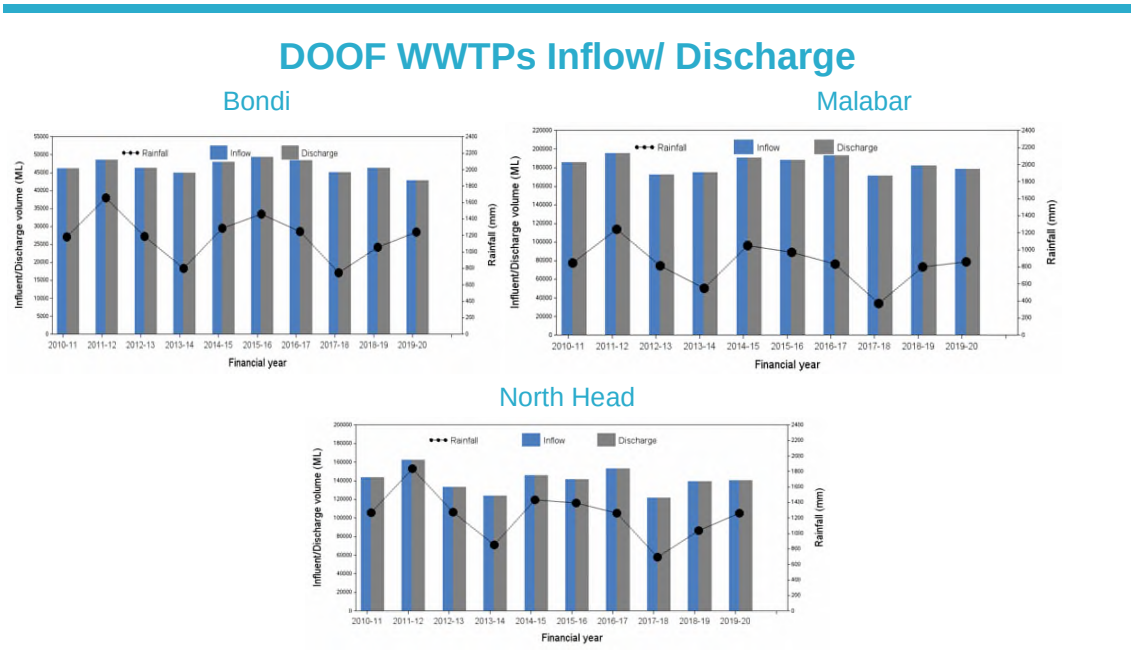

Figure 2-1 DOOF WWTPs Inflow/ Discharge

Oil and grease exceedance

The 50th and 90th percentile concentration limits of oil and grease exceeded the Environment Protection Licence (EPL) limit in the discharge from the Bondi WWTP during the 2019-20 period. The possible explanations include:

- an increase in emulsified oil and grease due to changing practices in the catchment, including increased use of vegetable oils, detergents and hot water washes.
- Increase in population and food outlets, yet reduced water consumption as a result of water efficiency programs.
- oil and grease loads possibly related with the densification of housing and restaurants.

A suspected cause of the oil and grease load exceedance at North Head WWTP is due to the impact on the treatment process from the prolonged period of diverting flow from the Northern Suburbs Ocean Outfall Sewer (NSOOS) to North Head WWTP via the Northside Storage Tunnel (NST). Work being carried out by Sydney Water to reduce oil and grease at North Head WWTP includes:

- Reduce surging and variation in Primary Sedimentation Tank (PST) wastewater level upon NST pump starting
- Review options to modify NST pump operation to reduce variation in level in the PST upon NST pump stop / start. NSOOS rehabilitation works requires diversion of NSOOS to NST for worker safety. This extra pumping is thought to emulsify the oil and grease making it harder to separate in the PSTs
- Undertake sampling of side streams to assess temporal variation.

Malabar WWTP showed a drop in oil and grease load levels during 2019-20 compared to earlier years. This was likely a sign of the COVID-19 impact on the demographic, with changes to patterns of detergent use, restaurant and business operation, in-home dining, and increased commercial cleaning within the catchment.

Sydney Water is working with the North Head, Bondi and Malabar WWTP catchments to educate the public and increase their awareness on proper ways to dispose of fats oils and greases to reduce incoming loads and prevent blockage in the sewer networks.

Oil and grease at ocean plants excluding Bondi WWTP, Malabar WWTP and North Head WWTP is well within the EPL limits.

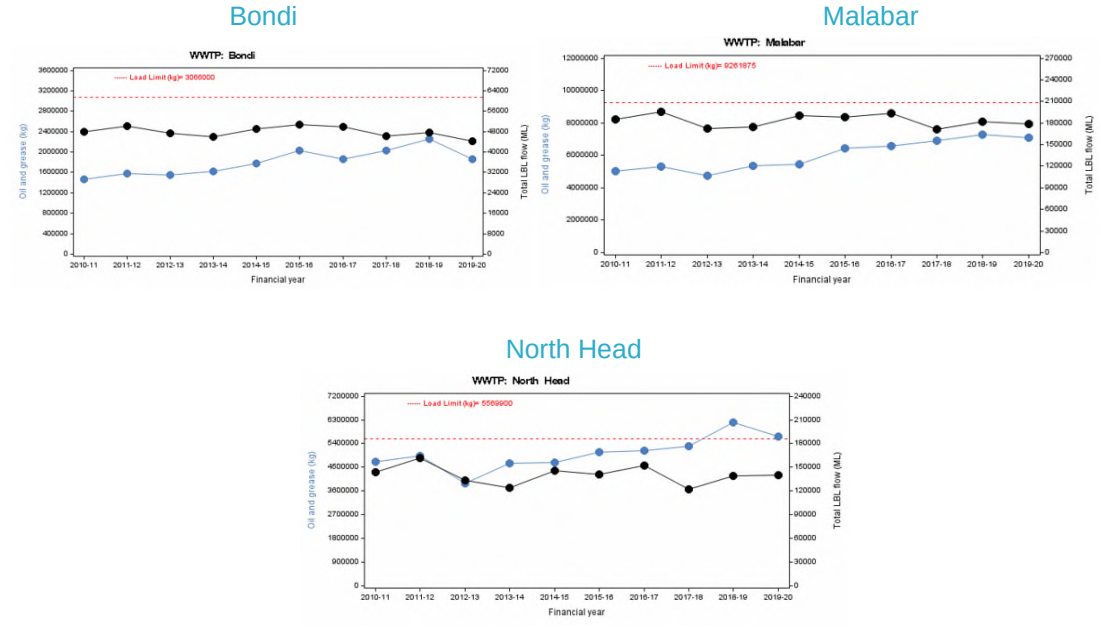

Figure 2-2 DOOF WWTPs Oil & grease concentration

Total Suspended Solids

Significant decreasing trends were observed in total suspended solids. The load plots for total suspended solids are displayed in Figure 2-3, illustrating a drop in load levels in 2019-20 compared to earlier years.

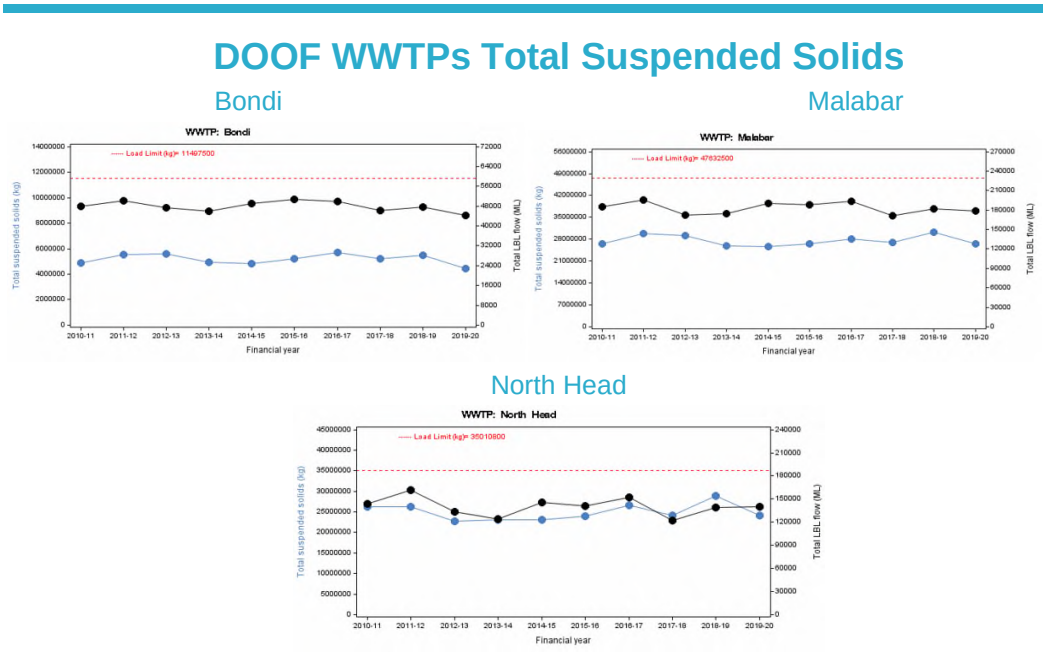

Figure 2-3 DOOF WWTPs TSS concentration

2.2 Wastewater Treatment Discharges - Inland Plants

Sydney Water's inland plants discharge into the Hawkesbury Nepean River system. Considerable urban growth is planned for the Hawkesbury Nepean catchment over the next 30 years to accommodate Sydney's growing population. This offers the opportunity to provide water services in new and better ways.

To understand the potential impacts to both water services and the environment, we use our water quality and hydrodynamic model of the Hawkesbury-Nepean catchment to test different catchment, environmental flow, wastewater and land-use options over time.

We are also supporting the NSW EPA in its review of the regulatory framework for nutrient discharges into the Hawkesbury-Nepean River system. With insights from our Hawkesbury Nepean water quality and hydrodynamic model, as well as community involvement, the new regulatory framework will enable smarter integrated water solutions that provide the best balance of social, economic and environmental outcomes for this iconic river catchment.

Total Nitrogen and Phosphorus

The annual total load discharged into the Yarramundi, Sackville and Berowra zone were significantly below the EPA limits except for the Subzone 2 of the Sackville zone, where the total phosphorus aggregate (bubble) load exceeded 2300 kg/year (2348.3 kg discharged in 2019-20 compared to 2074 kg discharged in year 2018-19) (Table 2.). This exceedance was related to the significant rain event in February 2020.

Table 2.2 Total load of Nitrogen and Phosphorus (kg) at inland wastewater treatment plants

Zones	Treatment Plants	Total Nitrogen (kg)		Total Phosphorus (kg)	
		Limits (kg)	Actual	Limits (kg)	Actual
Yarramundi Zone					
Subzone 1	West Camden	91,980	47,874.4	2,190	214.8
	Picton	1,460	2,285.6	73	39.3
Subzone 2	Winmalee	110,595	58250.2	6,687	1,995.0
	Penrith	176,660	23,467.9	8,030	474.5
	Wallacia	12,410	1,671.7	1,606	19.8
Sackville Zone					
Subzone 1	Richmond	43,800	3,777.4	10,877	15.4
	North Richmond	7,118	2,406.7	803	116.5
Subzone 2	(Bubble)	222,000	110,013.8	2,300	2348.3

	Riverstone	-	4,459.0	-	60.1
	St Marys	-	50,842.8	-	1,370.9
	Quakers Hill	-	54,712.0	-	917.3
Subzone 3	Castle Hill	72,270	34,693.69	2,300	673.8
	Rouse Hill	124,100	44,120.9	4,453	539.6
Berowra Zone					
	Hornsby Heights	72,270	16,598.7	2,300	355.8
	West Hornsby	80,300	25,954.5	4,643	1,490.7

Picton WRP load

The current load on Picton WRP exceeds its design capacity due to the addition of flow and loads from the Bargo and Buxton townships, together with loads from trade waste customers. In 2019-20, non-compliant discharges were triggered on four occasions (September 2019, October 2019, April-May 2020 and June 2020) ie Picton WRP was operating under an Emergency Operations Protocol as the Picton storage dams reached capacity.

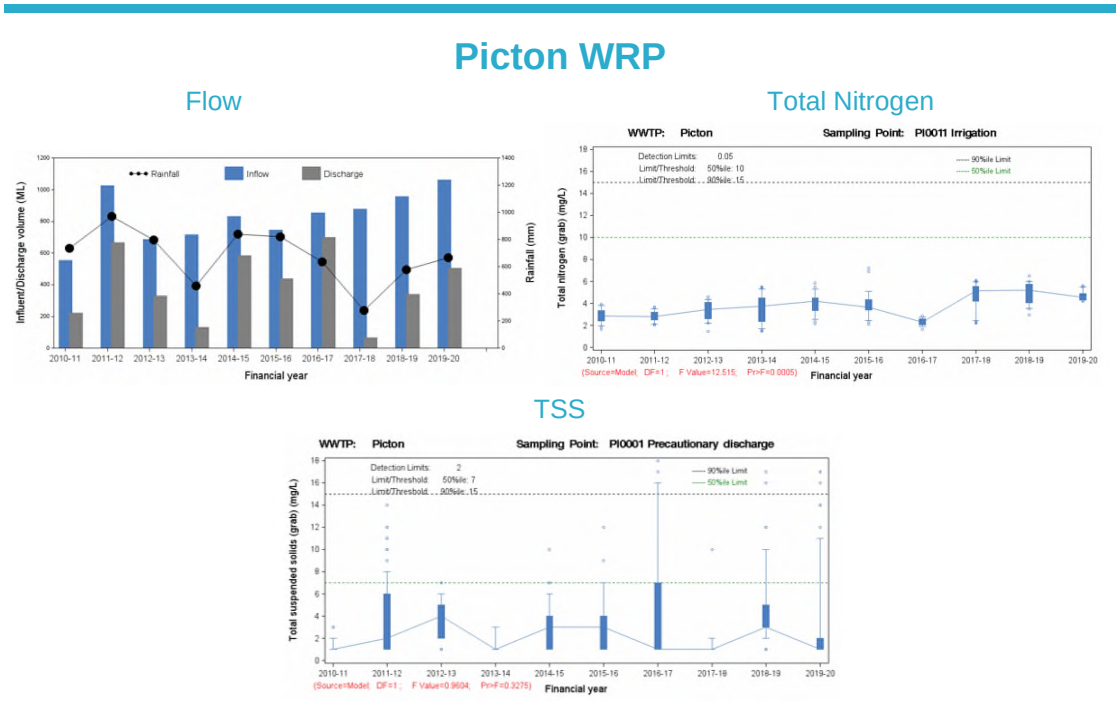

Figure.2-4 Picton WWTP Flow, TN and TSS discharge concentration

The EPA raised a Pollution Study for Picton WRP in 2016. Outcomes from that study are being used to review the Picton effluent management strategy with the EPA. Picton WRP

effluent management strategy is to be resolved and implemented to return Picton WRP to compliance. Planning for expansion of reuse to nearby farms is underway to increase effluent management capacity and minimise discharges. Treatment options that can deliver 'beyond best practice' nitrogen concentrations are being trialed (wetlands and macroalgae). This will minimise concentration impacts on receiving waterways. Periods of discharge outside licence conditions under an Emergency Operating Protocol will occur until a licence variation application (LVA) is approved. LVA3 (and a Review of Environmental Factors) will be prepared in 2020-21 in line with the effluent management strategy.

Hawkesbury-Nepean River water quality and algae

Sydney Water operates 15 WWTPs in the greater Hawkesbury-Nepean River catchment. In addition to discharges from Sydney Water WWTPs, there are numerous point and diffuse sources of pollution to the river such as wastewater discharges from council WWTPs and agricultural and urban runoff. Sydney Water's Hawkesbury-Nepean River water quality and algae monitoring program is designed to monitor the direct impacts of Sydney Water's activities and additional ambient environmental conditions.

Algal blooms in the Hawkesbury-Nepean River have been acknowledged as a river management issue in the past. The key drivers for these blooms are a combination of flow, temperature, light penetration, water clarity and nutrient levels.

The intent of the water quality and algae monitoring program for inland waters is to measure the dynamics of algal growth, standing crop and diversity of algal species.

Water quality and algal data from all sites were statistically analysed to understand how 2019-20 compared to recent years (last nine years, 2010-11 to 2018-19). The water quality of the Hawkesbury-Nepean River varied considerably between the upstream and downstream reaches and tributaries. Statistical analysis found that oxidised nitrogen and total nitrogen increased significantly in 2019-20 at all 12 main-stream river sites from the upstream control site of Nepean River at Maldon Weir (N92) to downstream Sackville Ferry, Hawkesbury River (N26). Of the five tributary sites, these nitrogen analytes also increased significantly at the lower Colo River site (N2202).

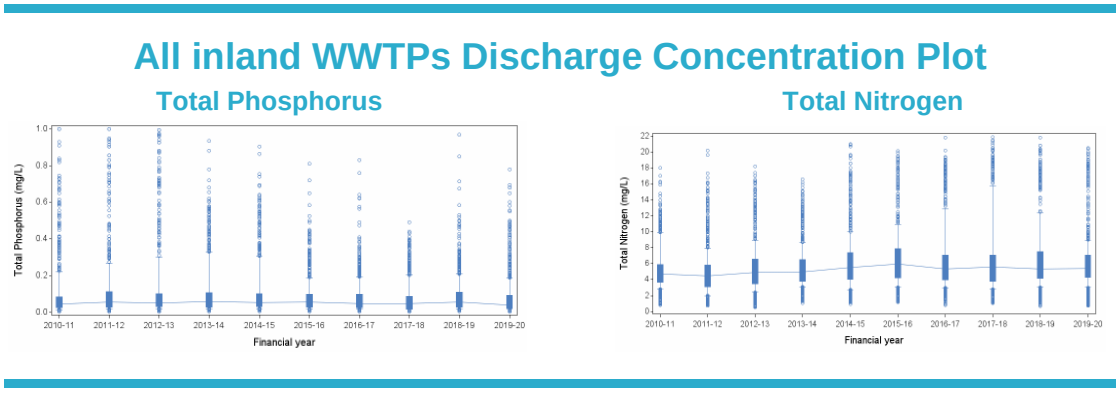

Figure 2-5 Total Phosphorus and Total Nitrogen at inland WWTPs

Total phosphorus concentrations increased significantly in 2019-20 compared to the previous nine years at Berowra Creek, off Square Bay (NB11). The trends in total phosphorus were steady at all other 17 sites. Filterable total phosphorus concentrations were stable at all 18 monitoring sites.

Chlorophyll-*a* trends were mostly steady, with improvements or decreasing concentrations at two Upper Nepean River sites: Sharpes Weir (N75) and Penrith Weir (N57). Conductivity increased significantly at 13 out of the 18 sites from upstream control site of the Nepean at Maldon Weir (N92) to downstream Colo River (N2202) in 2019-20. Dissolved oxygen saturation decreased or deteriorated at two sites, Nepean River at Penrith Weir (N57) and Hawkesbury River at North Richmond (N42). Both dissolved oxygen concentrations and percent saturation increased or improved at Lower Cattai Creek (NC11A). Dissolved oxygen concentrations also improved or increased at Berowra Creek, Off Square Bay (NB11). pH increased significantly at two sites, upstream control site at Maldon Weir (N92) and Sackville Ferry (N26). No significant trend in water temperature and turbidity results was found at any site.

The water clarity was good at most of monitoring sites as indicated by very low median turbidity that often dropped below the lower guideline limits (10 out of 18 sites).

Hawkesbury-Nepean River and Other Sydney urban rivers – Stream Health

Sydney Water monitors freshwater macroinvertebrate communities upstream and downstream of WWTP discharge to determine if stream health is altered by treated wastewater. A healthy stream is comprised of many different types of macroinvertebrate

Matahil Creek SG-Plot

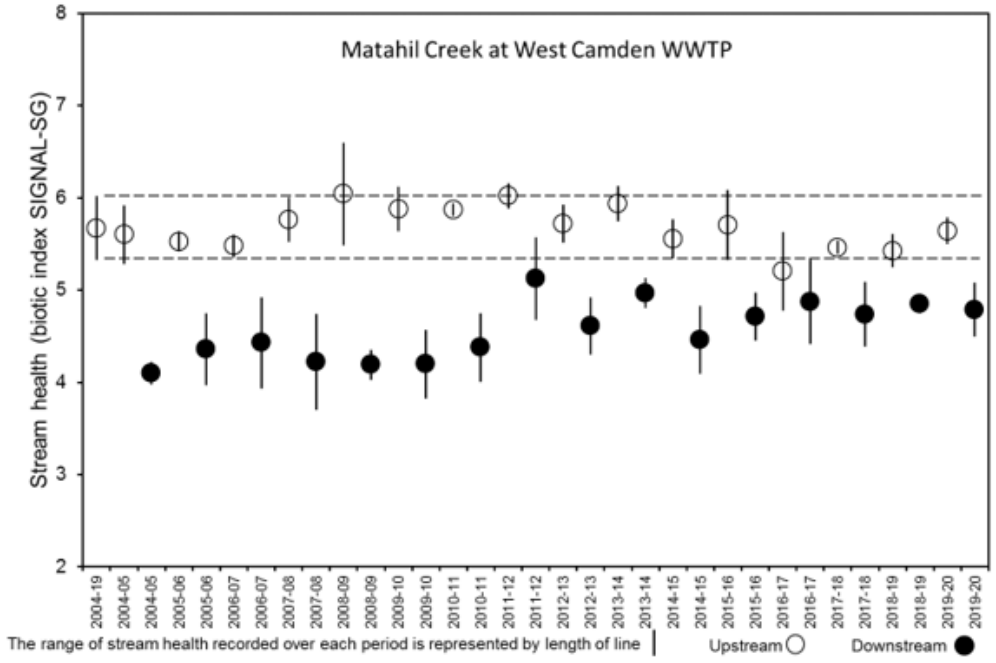

Figure 2-6 Stream Health of Matahil Creek

animals. The types present will vary according to natural factors such as stream type, altitude and geographic region. The types present will also vary according to human disturbance, particularly water pollution. Sydney Water has assessed 'stream health' with the Stream Invertebrate Grade Number Average Level (SIGNAL-SG) biotic index tool. 'S' indicates Sydney region version and 'G' indicates taxonomy is at the genus taxonomic level. This tool provides a sensitivity score for a macroinvertebrate sample and can range from 1 to 10.

The 2019-20 monitoring results show localised ecosystem impacts in creeks downstream of West Camden WWTP (**Error! Reference source not found.**), Winmalee WWTP, Hornsby Heights WWTP and West Hornsby WWTP. There was no evidence these impacts had any effect on the Hawkesbury-Nepean River system to which these creeks flow. No other stream health impacts were identified for other inland discharging WWTPs (STSIMP, Volume 2 Appendix N).

2.3 Water and wastewater network discharges

We supply water and recycled water through over 23,244 km of pipes, 163 pumping stations and 257 reservoirs. Our wastewater network consists of over 26,350 km of pipes and 693 wastewater pumping stations. We control over 456 km of stormwater channels. The weather presents challenges in managing this extensive network. During heavy rain, stormwater enters the wastewater network through illegal connections and cracked pipes. Our network is designed with additional capacity to cope with heavier flow during wet weather. However, if the combined wastewater and stormwater flow travelling through the network is more than the network can hold, it discharges to creeks or waterways at various planned overflow points. This is called a wet weather overflow. These overflow points prevent wastewater from backing up into our customer's homes and businesses.

Dry weather overflows

Wastewater overflows under dry weather are predominantly due to blockages caused by tree roots. Inappropriate disposal of solids into the network exacerbates these blockages as tree roots capture these solids. Inappropriate disposal includes items such as 'wet

Historical trends in all causes of network blockages/chokes

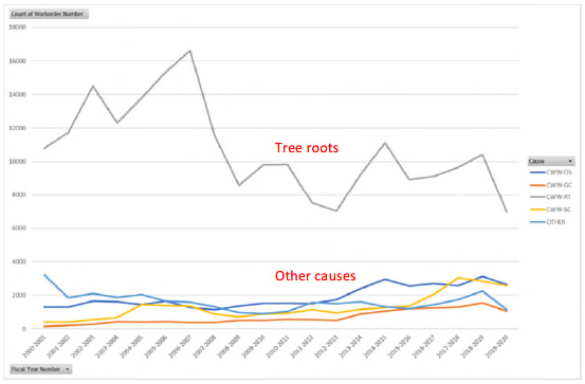

Figure 2-7 Historical trends in all causes of network blockages/chokes and a typical image

wipes', sanitary products, oil and grease and construction debris. Pipe and structural faults are less common compared to blockages/chokes. Dry weather overflow volumes are measured when an incident is reported to Sydney Water. The total number of overflows and the overflow volume are estimated by each Sewer Catchment Area Management Plan (SCAMP) and the proportion that reaches a receiving waterway is reported to the EPA via Annual Returns for each EPL.

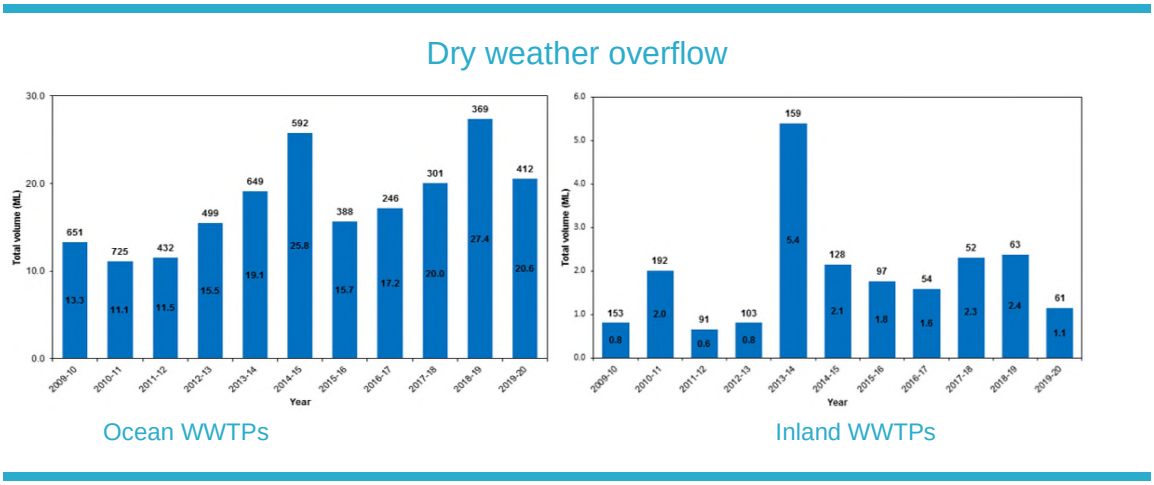

Figure 2-8 Previous 10 years of dry weather overflow volumes in ocean and inland WWTP catchments

Note: number of overflow events per year is shown at the top of each bar, volume (ML)

Eight wastewater treatment systems draining to the ocean WWTPs were responsible for a total dry weather overflow volume of 20.6 ML in 2019-20 (Figure 2-8). Twelve large inland wastewater system networks were responsible for a total dry weather overflow volume of 1.1 ML in 2019-20 (Figure 2-8).

Each SCAMP has EPL targets on number of dry weather overflows reaching waterways. In 2019-20, out of 215 SCAMPs, 135 were under or equal to their target and the remaining 80 areas (compared to 60 areas in 2018-19) exceeded their respective EPL targets.

In 2019-20, Sydney Water experienced 17,428 blockages/chokes (Figure 2-9) across all of its wastewater networks in relation to dry weather overflows. The total number of wastewater overflows reaching waterways that resulted from these blockages/chokes was 473 (about 2.7%) it is slightly higher compared to the previous year (2.1%)

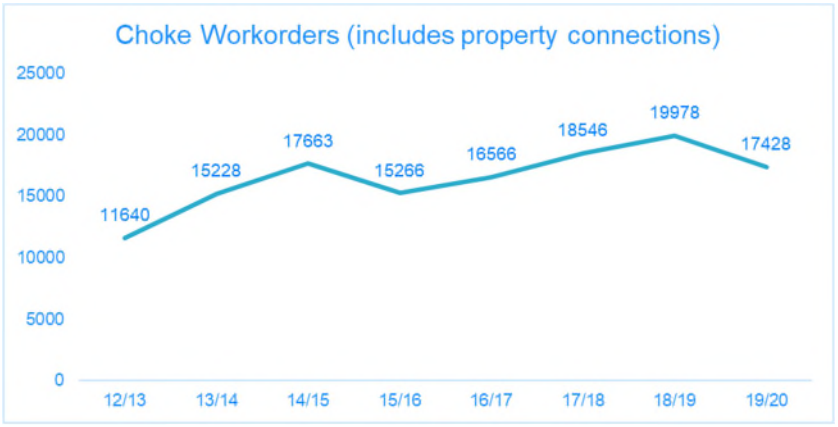

Figure 2-9 No of blockages/chokes experienced by Sydney Water

The overall trends in number of wastewater systems and SCAMPs that have exceeded their respective dry weather incident target limits in 2019-20 compared to last four reporting years (2015-16 to 2018-19).

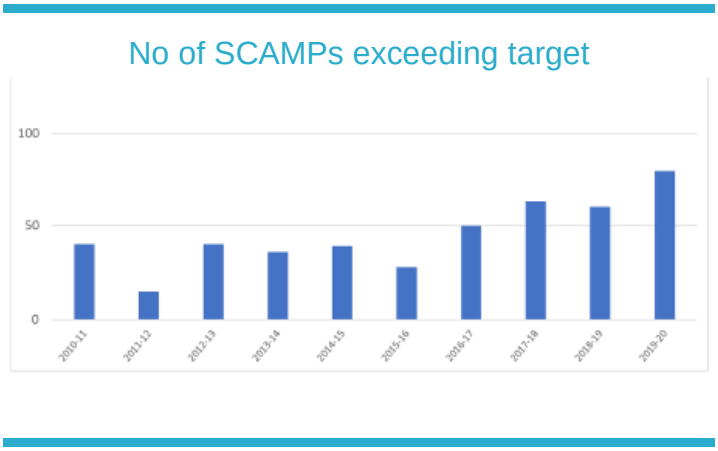

Figure 2-10 No of SCAMPs exceeding target

Through work done with Bureau of Meteorology, Sydney Water has identified that climatic factors are the single major influence on our sewer overflow performance. Specifically, there is a very strong correlation between measured deep soil moisture and the number of blockages causing overflow. Dry soil conditions result in increased blockages caused by tree roots. Each year the number of properties affected by sewer overflow is proportional to the total number of blockages. During 2018-19 extremely dry soil conditions resulted in an increase in properties affected by 846 compared to the year before (2017-18). This is further confirmed as wetter soil conditions in the second half of 2019-20 led to a decrease in overflows and properties affected by 1795 (Figure 2-9).

The use of wet wipes has been identified as a significant contributor to chokes in recent years. Over the past two years, we've been using our quarterly Sentiment Monitor to better understand wet wipes usage and create a profile of the customers who are flushing them. Our customer research shows there has been a significant drop in the usage of wipes, influenced by our engagement and activities as part of the 'Keep wipes out of the pipes!' campaign. Ongoing marketing campaigns to reduce customer use of wet wipes seem to be having a sustained impact.

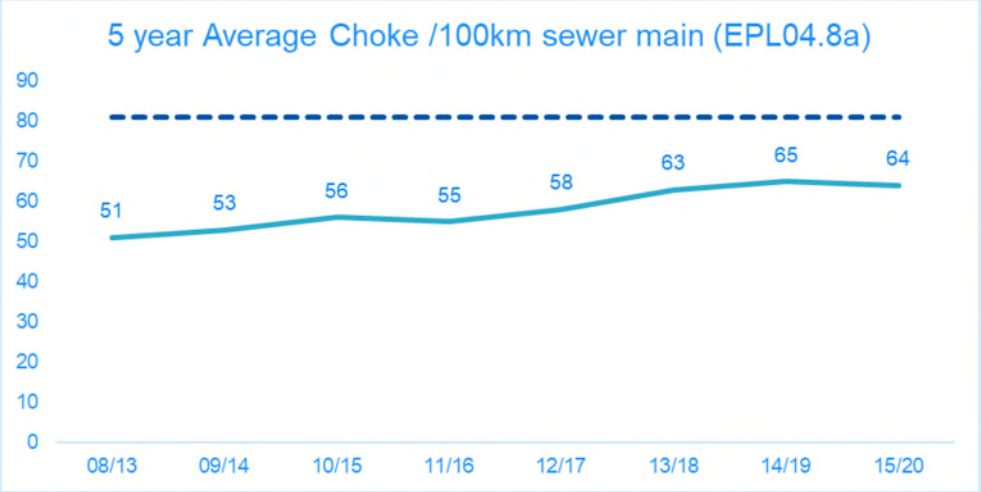

Figure 2-11 5-year average No.number of chokes per 100 km of sewer main

In 2019-20, most of the blockages occurred in small diameter pipes because of tree root entry. Altogether, 48.3% (improved compared to 52% in the previous year) of the total blockages were caused by tree roots entering through cracks, joints and private sewers. Other causes of blockages were debris (18.1%, 15.5% in 2018-19), soft chokes due to residual solids/ wet wipes/sanitary products (17.7%, 14.0% in 2018-19) and consolidations of fats from households pouring down the sink (7.4%, 7.7% in 2018-19). A more detailed performance of dry weather overflow volume and frequency by each of the SCAMPs and wastewater systems in relation to compliance limits are presented in our Sydney Water, 2020a report.

Key initiatives or improvement strategies for dry weather overflows

The STSIMP report (Sydney Water 2020a) also included detailed strategies or action lists by Sydney Water to reduce the increased volume and frequencies of dry weather overflows. The key initiatives or improvement strategies that were undertaken in 2019-20 as scheduled investigations, works and activities are:

- Improved CCTV cameras/surveillance: Inspection of pipes after overflows reaching waterways to minimise repeat occurrence
- Preventive waterway program Level 1 (Maintenance hole inspection and CCTV): Condition assessment of pipes and maintenance structures followed cleaning by exception to address significant blockages. A new approach to inspecting wastewater assets was trialled from November 2019. This has been further expanded and implemented whereby about 14,000 sewer Maintenance Holes were inspected along with the adjacent sewer main (about 600 kms) to identify partial blockages which would lead to dry weather overflow in the coming and subsequent years. The program identified about 1,200 partial blockages that were likely to cause an overflow at some time. In some instances, overflow was imminent. This new approach aims to inspect far greater lengths of networks per annum. The focus will be to target poor performing wastewater systems and SCAMPS not meeting EPL targets in 2019-20.
- In 2019–20 we continued our programs to condition assess, maintain and renew our network, including the:

- Avoid Fail Sewer Program (renewing sewers near high risk sites like swimming areas, hospitals and schools)
- Dry Weather Overflow Reduction Program (reducing blockages in small diameter sewers)
- Trunk and Reticulation Water Main Renewals Programs (replaces water mains that are not performing to the required standard) and Active Leak Detection Program (proactively searching for hidden leaks on our water mains).

- Since early 2018 the higher level of reactive workload (including sewer chokes) resulted in resources being redirected from preventative maintenance programs, such as root-cutting, to reactive maintenance, such as clearing chokes. Increased resourcing from mid 2019 has allowed us to more effectively manage its reactive workload and progress more preventative maintenance
- The trial use of Internet of Things (IoT) sensors in the wastewater network to identify blockages before they result in overflows is continuing with additional sites being rolled out. This technology has successfully averted several overflows from occurring through early detection. In 2019-20 we detected 45 blockages.

IoT sensors

Figure 2-12 IoT sensor installed

- We are continuing to progress our commitment to detecting, predicting, and improving prevention and response to dry weather overflows;
  - Continue the trial of sniffer dogs to investigate suspected wastewater leaks into stormwater systems. This trial will help speed up the process of locating defects in the system, by allowing the dog handlers to locate the faults in real time. The sniffer dogs are also being used to detect underground leaks on sewer pressure mains.
  - Continue training the water leak detection dog, to investigate if it's a viable option for rapid detection of faults along water mains.
  - We have partnered with UTS to develop a sewer rising mains robotic tool. A project was initiated in early 2020 to design, manufacture and operationalise a robotic tool for pressure sewer pipelines. This tool will inform pipe condition based on the remaining pipe wall thickness. This work is planned to provide a tool available for testing in 2020-21.
  - Continue development of analytic tool to detect sewer chokes upstream of Sewer Pumping Stations (SPS) by identifying abnormally low wet-well inflow rates. To date this process has identified 33 faults causing issues at SPS's, including blockages and issues with maintenance holes. Next steps will be to

determine clearer data criteria to determine flow outliers, analysis of variances that may be causing data discrepancies (such as climate events) and undertake further model testing across seven SPS's.

Environment Improvement Program (EIP/EPIP Update)

Dry weather sewer overflow (DWSO) response currently does not meet compliance with our EPL conditions. Sydney Water has received an unacceptable level of Penalty Infringement notices (PINs) and prosecutions due to DWSO performance and our response to these incidents. Special Condition E1 in EPL Licences required an independent review of our incident notification and management processes. This Independent review identified 37 recommendations. The EIP Incident Response Program's key outcomes are the delivery of these 37 recommendations. The program will introduce a:

- risk based Material Harm System
- risk based field response types
- dawn to dusk rapid response capability
- risk based EPA notifications
- risk based Customer notifications
- management of the DWSO using the Pollution Incident Response Plan (PIRMP) as the basis

The EIP Incident Response Program's key outcomes are the delivery of the 37 recommendations contained in the Dry Weather Overflow Response Report Independent Review, March 2019. The recommendations will be delivered and tracked by this program and will improve the way we respond to and manage environmental incidents when they occur.

The project has a planned completion date of December 2022 to deliver 37 recommendations. These recommendations have been grouped in seven streams:

- Notifications
- Pollution Incident Response Management Plan (PIRMP)
- Incident Management
- Rectification and containment
- Management of Environment and Health impacts
- Risk and communication
- Training

The field-based dawn to dusk rapid response capability uplift will also provide a significant contribution to our preventative work capability which will decrease the time taken to return our 7 non-conforming wastewater systems to compliance.

This program provides Sydney Water with the capability and processes needed to ensure compliance with EPL conditions including meeting the 37 recommendations as detailed in the EPA Implementation Plan.

An emerging risk is the impact of COVID-19 on the project schedule. This has been addressed by the addition of limited contingency time in the project plan.

The Workflow Management initiative will increase the job planning capabilities across our Customer Delivery group. The ability to ensure the right crew are in the right place with the right tools is an enabler for this project. Reducing travel time with better planning and tools will improve our ability to respond to incidents.

When the reactive workloads allow, the dawn to dusk field capability will be deployed to planned or preventative work. With the increased single person jetter capability it is envisaged that additional crews will supplement the preventative root cutting efforts to decrease the time required to get Sydney Waters seven non-conforming wastewater systems back into compliance.

Currently, the work is progressing on delivering the recommendations and the EPA is finalising it's acceptance of the implementation plan.

Wet weather overflows

Wet weather overflows occur when the capacity of the network is overloaded. The trends in wet weather overflow frequency or number of incidents decreased in 2019-20 compared to last year (2018-19). However, after three successive years of low volume overflows, the total wet weather overflow volume increased sharply in 2019-20 in both the ocean and inland systems (Figure 2-13).

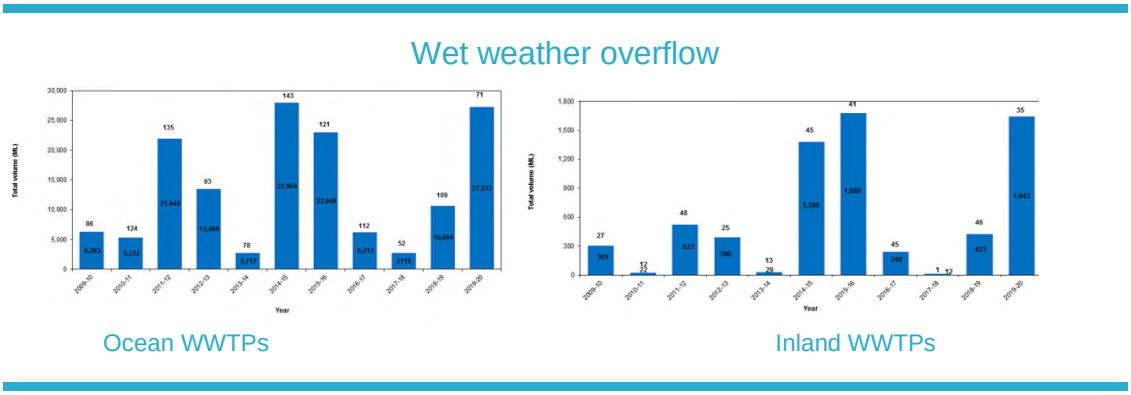

Figure 2-13 Previous ten years of modelled wet weather overflow volumes by all inland wastewater systems

The increases in wet weather overflow discharge volume from previous year (2018-19) from the ocean and inland system were 155% and 288%, respectively. Such an increase in wet weather overflows from both the ocean and inland systems was partly due to above average rainfall in 2019-20.

In 2019-20, we continued with our Wet Weather Overflow Abatement (WWOA) Program (reduces wet weather overflows and stormwater entering the network) to maintain our network, including:

- Identifying projects such as the Upper Parramatta catchment assessment, Mid Parramatta catchment assessment, Lane Cove catchment assessment, Lower Middle Harbour and Mosman Peninsular catchment assessment, and Prospect catchment assessment. This was completed in 2019-20. We have also completed planning work for these projects. The Mid Parramatta and Lane Cove work will be delivered by December 2021.

- Completing a draft Malabar System Plan. The preferred solution has been split into a number of stages and detailed planning has commenced.

2.4 Stormwater network discharges

Stormwater assets help protect people and property from flooding, and form part of our urban waterways. Our stormwater network is a small but critical part of the metropolitan drainage system, draining 15% of Sydney's urban area. Local councils own and maintain most of the city's stormwater assets. In many areas of Sydney, poor quality stormwater is highly detrimental to waterway health and amenity.

We maintain our network, removing silt and rubbish from over 60 stormwater quality improvement devices which prevented 2,279 m^3 of debris from entering Sydney's waterways in 2019-20 (2,458 m^3 in 2018-19). We also take the opportunity to improve waterway health and amenity by naturalising stormwater assets in suitable locations when they reach the end of their structural life.

To manage flooding and improve both the quality of stormwater and the overall health of our urban waterways, we collaborate with local councils and other stakeholders to take a whole of catchment approach.

There is work in progress to convert degraded concrete open channel stormwater assets back to a semi naturalised state. This will be achieved by replacement of the channel with sloped sandstone banks with intermixed native plantings. This helps improve flooding outcomes, provides enhanced biodiversity and enables the creek line to become an asset that can enjoyed by the local community.

- Johnstons Creek Naturalisation project - Glebe (1.2km creek bank) - Work is currently under construction and due for completion in 2021.
- Whites Creek Naturalisation project – Annandale (300 metres creek bank) - Design work being undertaken with project forecast for completion by 2024.
- St Lukes Park Naturalisation project – Canada Bay (700 metres creek bank) - Detailed design work being undertaken with project forecast for completion by 2024.
- Iron Cove Creek Naturalisation Project - Haberfield (500 metres creek bank) - Detailed design work being undertaken. Delivery of this project is scheduled for the next IPART price path (from 2025 onwards)
- Muddy Creek Naturalisation Project – Rockdale (700 metres creek bank) - Detailed design work being undertaken with project forecast for Due for completion by 2024.

Sydney Water contributed five waterway naturalisation and stormwater improvement projects to the NSW Government's inaugural November 2019 $1.8bn Sustainability Bond as part of the state's Sustainability Bond Program, now in its second year. These projects are:

- Green Square Trunk Stormwater Improvement,
- Astrolabe Park Stormwater Renewal,
- Strangers Creek Revitalisation,
- Powells Creek Stormwater Renewal and Naturalisation, and
- Cooks River Stormwater Naturalisation.

This multi-award winning NSW Government Program, launched in June 2018 supports the state's transition to a low carbon, climate resilient, and environmentally sustainable

economy and establishes Sydney Water as the first Australian water utility to include nature-based green infrastructure in a green bond instrument. Also in November 2019, the inaugural Annual Sustainability Bond Program Report was released reporting on the sustainability performance results from the largest 2018 $1.8bn Green Bond which included Sydney Water's Quakers Hill and St Marys Water Recycling Plants Process and Reliability Renewal project. This project is part of the Lower South Creek Treatment Program and will be using innovative technologies in waste treatment and energy generation whilst progressing Sydney Water's initiatives in building climate resilience and a circular economy.

2.5 Private network discharges

At times, collective action by everyone is required to protect our waterways. Privately owned wastewater pipes (over 25,000 km) connect homes to our network. Problems with these privately-owned pipes have a big impact on the performance of the entire wastewater system and our ability to manage the overall system. Property owners may be unaware that they own and are responsible for maintaining these pipes.

Leaking sewers and stormwater infiltration increase the risk of wet weather overflows and rubbish that goes down drains and toilets can block both household plumbing and the wider wastewater system.

In the past two years, there has been an increase in the number of wet wipes recovered from our wastewater system. We remove about 500 tonnes of wet wipes from our wastewater system every year. Wipes can get stuck in pipes increasing the risk of breaks and overflows to our local creeks or customer’s homes. In fact, we estimate that 75% of sewer blockages we respond to involve wet wipes. Our ‘Keep wipes out of the pipes!’ campaign has improved customer awareness and behaviour. The campaign also resulted in direct engagement with Kimberly-Clark (Kleenex) and product improvements.

3. Efficient and Sustainable resource reuse

3.1 Develop and implement water conservation program

Sydney Water is currently maintaining a water conservation program that is aligned with the Economic Level of Water Conservation (ELWC). Sydney Water has implemented the following measures to drive water conservation measures in line with the ELWC methodology.

WaterFix Residential completed 14,765 appointments to fix leaks and install water-efficient devices. The WaterFix Strata and WaterFix Business programs were severely impacted due to COVID-19. Water Savings Partnership (Councils Program) was also impacted due COVID-19, but has engaged with 85 businesses and implemented water saving measures.

We are currently working with external partners (Councils, Sustainability Advantage and NABERS) to engage with and promote water conservation measures to the business community. Due to COVID-19 impact there has been limited engagement.

During 2019 -20, our social media campaigns aligned with our broader communications campaign to highlight Level 1 and Level 2 water restrictions. These include our Drought Proof Garden activation and partnership with an Aquabumps photography series. We also launched our Water Wise Coach chatbot tool, which includes water saving tips through the award-winning Love Water, don't waste it campaign. We engaged directly with over 5,700 people. Over 97% of respondents reported learning practical ways to help the environment and save water. We delivered teacher professional development workshops and student leadership forums on drought and water conservation. We also commissioned early primary school digital resources, videos on how to conduct a home water audit, water cycle experiments, and resource packs with games and books with a focus on building value for water and saving water.

Since significant rainfall in February 2020, we've pivoted our communications to encourage long term water wise behaviours. Whilst our project-based school competition 'Brand without a bottle' is designed to uncover the real story behind bottled water and empower youth to make more informed drinking water choices.

3.2 Maintain our grid-sourced electricity demand below 1998 levels

Sydney Water's goal is to achieve grid electricity consumption equivalent to 1998 levels (366 GWh). In 2019-20, consumption exceeded that benchmark by 11 GWh.

The growth in grid electricity consumption is due to the following factors:

- renewable energy generation dropped by 12% in 2019-20, resulting in higher grid demand as a replacement source

- an increase in water recycling in recent years, which has high energy demand
- ongoing cleaning of the North Head wastewater network, which has increased energy consumption over the past two years and will continue into 2020-21; and
- a reduction in water demand in 2019-20 due to the drought, which offset some of the increase in total energy demand.

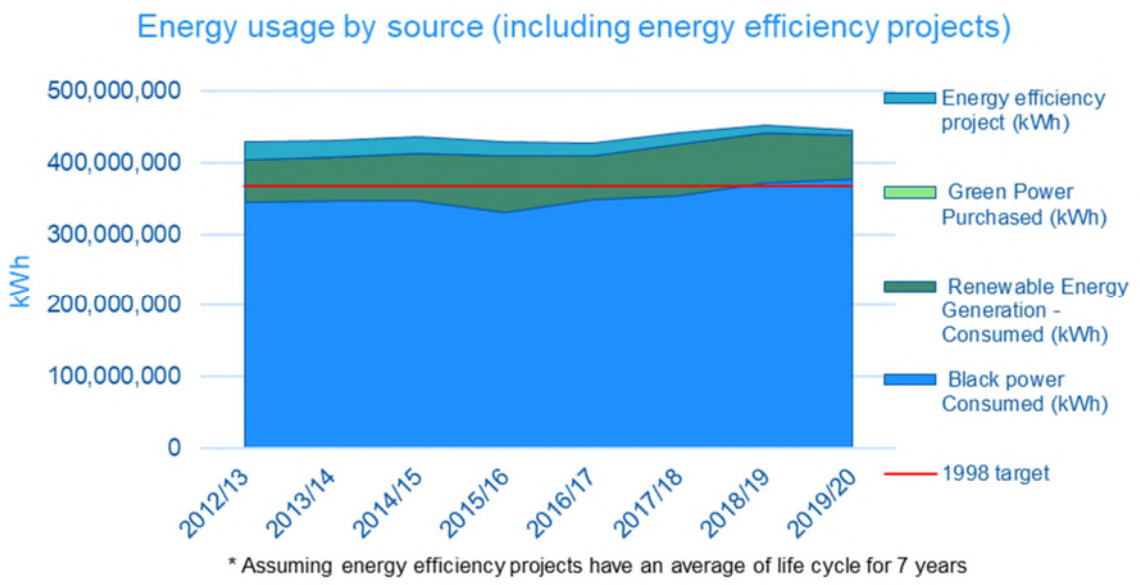

Figure 3-1 Energy usage by resource

Fuel consumption: Fuel usage has decreased due to the COVID situation. Fewer vehicles were on the road during the latter months of 2019-20.

Gas consumption: Gas consumption increased in the Cronulla catchment due to gas pressure booster pumps not working properly; the issue was fixed in 2020.

Sydney Water operations: Sydney Water's on-site renewable energy generation (67,953,137 kWh) was equivalent to 16% of total energy consumption in 2019-20. Renewable generation was 12% lower compared to 2018-19.

3.3 Bioresources

While providing water, wastewater, recycled water and storm water services to our customers, we inevitably generate a range of residuals that can have some beneficial value. While some residuals are unlikely to have value (such as wipes and other sewage litter), others may have product value with adequate treatment, sorting or processing. These 'bioresources' are collected at various stages of the process – during transport and treatment of water, wastewater or stormwater. For example, grit collected from wastewater networks to prevent siltation causing wastewater overflows to waterways. Except for treated wastewater sludges (biosolids), most by-products were disposed of as 'waste' at the least cost. A Resource Recovery Master Plan has been developed. Products considered in the master plan are included in Table 3.1 below.

Table 3.1 Bioresources products

Service	By-product
Wastewater	Biosolids
	Grit (from WWTP)
	Screenings only (Malabar, North Head, Cronulla and Wollongong WWTP)
	Greenings (Grit macerated with screenings)
	Fine sludge screenings (Malabar and North Head)
	Grit (network – large sewers)
	Grit (network – pipes)
	Digester, IDAL and lagoon cleanouts
	Spent filter media (sand and anthracite)
Water	Water treatment sludges
	Spent filter media
Storm water	Gross pollutant trap litter
	Dredging silt
	Silt from storm water cleaning
Land Management	Vegetation (pruning, clearing, riparian zones)
	Construction spoil
	Drilling mud

Biosolids are the nutrient-rich organic material produced when we treat wastewater at our water recycling plants (WRPs) and wastewater treatment plants (WWTPs).

Sydney Water has been consistently achieving 100% beneficial use of biosolids for agricultural and horticultural purposes.

3.4 Waste

Sydney Water generates waste across two sectors. Commercial and industrial wastes are generated by our operations and include water and wastewater treatment. It also includes waste generated from maintenance programs and administrative waste from our offices. We also generate significant waste from our capital works programs, and Civil Delivery maintenance works which is categorised as construction and demolition waste or excavated natural material (ENM). In 2019-20, Sydney Water generated 199,547 tonnes of solid waste, an increase of 3% from 2018-19. The overall recycling rate for 2019-20 was 74%, an increase from 59% in the previous year.

Table 3.2 Waste generated by category

Waste category	Total waste generated (tonnes)				
	2015–16	2016–17	2017-18	2018-19	2019-20
Construction and demolition waste – Sydney Water*	24,633	22,671	43,363	33,614	43,517
Construction and demolition waste – contractors*	133,597	145,762	88,024	129,938	123,851
Office waste	9,773	15,052	8,059	9,959	8,437
Water, wastewater and stormwater process wastes	22,227	17,810	14,796	19,750	23,743
Total	190,230	201,296	154,242	193,261	199,547

* Data for 2014–15 and 2015–16 includes an estimated portion of waste

The average recycling rate for construction and demolition waste generated by Sydney Water and our contractors combined, increased to 85% (from 58% in 2018-19). Recycling rates vary considerably during the life cycle of capital projects; as a project moves from preparation to works and to handover, the types of waste material and their recyclability will change.

In 2019-20, the office waste diversion rate decreased to 32% which is the lowest since 2015-16. The rate is highly dependent on recycling from Sydney Water's facility management contracts.

Process waste volumes increased by 20% compared to 2018-19. In 2019-20, waste collected from our stormwater and wastewater networks increased by 13%, predominantly due to process waste from the wastewater network. The volume of wastewater treatment plant residuals reduced slightly (3%) from 8,135 tonnes in 2018-19 to 7,912 tonnes in 2019-20.

4. Community involvement

Community Involvement projects

Sydney Water engages with our communities through various project-based initiatives including educational programs.

Water Stations

In 2019-20, water usage readings for our 158 public water stations recorded more than two million litres of water had been consumed. This amounts to a potential reduction of more than 42,000 kilograms of plastic waste going to a landfill. More than 450 events were supported by loaning a fleet of 50 portable water stations to councils and community events.

Beat The Bottle

We continued our 'Beat The Bottle' campaign including:

- hosting five Sydney Water led events at Wollongong, Manly, Cooks River and Parramatta
- supporting delivery of 25 events by community partners across our area of operations including Penrith, Riverwood, Castle Hill, St Georges River, Camperdown, Coogee, Little Bay, Royal National Park (11 events 2019-20)
- Removing over 3 tonnes of waste from the environment (20-19-20 1.25 tonnes, compared to 1.06 tonnes of rubbish collected in 2018-19)
- Engaged over 1000 community volunteers and had exposure through mainstream media, social and digital channels and influencer and environmental networks and advocates (compared to 450 volunteers in 2018-19).

Customer satisfaction, awareness and behaviour with our customer

Sydney Water began to implement our first phase of customer engagement in February 2020. This engagement took the form of deliberative forums across Sydney and the Illawarra and sought first to understand customers' preferences around the future of water, vision for Sydney and resilience options.

Due to the COVID19 pandemic, engagement activities from March onward have had to be conducted online in line with restrictions on public gatherings.

Sydney Water will continue to review our engagement approach (including with our Community Advisory Committee) to ensure it meets the criteria for engagement outlined in this requirement. In 2019-20 we continued to roll out community awareness programs to increase understanding of roles in keeping our wastewater system healthy including our 3Ps messaging which informed the community of the requirement to only flush pee, poo and toilet paper to minimise blockages. Although the major focus was on drought and water efficiency in 2019-20. We also continually invest in and support school education programs and onsite tours because it's valued by our community, and builds understanding of our shared responsibilities and sustainable behaviours for our water and wastewater systems.

Quarter one showed a strong focus on drought concerns due to dropping dam levels as indicated by our Residential Monitor survey. A decline in perception that Sydney Water is protecting the environment was shown in December 2019 and environmental concerns peaked in January 2020 coinciding with the height of bushfires. Both concerns sharply receded as Covid-19 impacts were felt in quarter four. The quarter four survey indicated that over 71% people trust Sydney Water to always protect the environment.

Our new Brand Tracker, customer research tool is ready and will be implemented to measure customer satisfaction, awareness and behavior. It will replace current CX Monitor (Customer Satisfaction) and Residential Sentiment Monitor (Customer awareness).

We also promote community involvement in decisions about environmental matters including development of the Planning Package for the Aerotroplis Growth Area, incorporating knowledge of Country in the design of the Port Kembla seawall project, and incorporation of community feedback in environmental impact assessments such as the Review of Environmental Factors for the Vaucluse Diamond Bay project.

References

Annual Report, Sydney Water, October 2020

ANZECC, 2000. *Australian and New Zealand Water Quality Guidelines for Fresh and Marine Waters*, Australian and New Zealand Environment and Conservation Council.

ANZG 2018. *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*. Australian and New Zealand Governments and Australian state and territory governments, Canberra ACT, Australia. https://www.waterquality.gov.au/anz-guidelines

Dry Weather Sewage Overflow Audit Report Independent Review, March 2019

BeachWatch program (DPIE). https://www.environment.nsw.gov.au/research-and-publications/publications-search/state-of-the-beaches-2019-20

STSIMP, STSIMP Data Report, 2020 *Sewage Treatment System Impact Monitoring Program,* Data Report 2019-20, Sydney Water, December 2020.

Sydney Water, 2020a. *Sewage Treatment System Licences, Annual System Performance Report Clause R5.5 b) and c), Reticulation System, Dry Weather* Sydney Water, September 2020.

Sydney Water, 2020b. Sewage Treatment System Licence, Annual Sewage Treatment System Performance Report - Wet Weather Overflow, 2019–20, Sydney Water, August 2020.

Water Conservation report, Sydney Water December 2019

Appendix

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Sydney WATER

Appendix A

Environmental Performance Indicators Report 2019-20

(Submitted to IPART 1 October 2020)

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Executive summary

At Sydney Water, caring for and protecting our environment is a core value of everything we do. Sydney Water is governed by the *Sydney Water Act 1994* (the Act).

The Act and the operating licence require us to report each year on indicators of the direct impact of our activities on the environment.

The *Environmental Performance Indicators Report 2019-20* details our performance against the environmental indicators required to be reported to the Independent Pricing and Regulatory Tribunal (IPART) in accordance with clause 8.1 of the *Sydney Water Reporting Manual – Operating Licence 2019-2023 (IPART, November 2019)*. These include:

- 10 environmental indicators set by IPART (Reporting Manual November 2019 - Appendix C)
- 15 National Water Initiative (NWI) indicators relating to the environment, from the *National urban water utility performance reporting framework* (Indicators and Definition Handbook – January 2018).

The National Water Initiative (NWI) indicators are part of the National Urban Water Utility Performance Reporting Framework. The NWI is a shared commitment by Australian State and Federal Governments to improve water resource management and use water resources more efficiently. Data from all Australian water utilities is collated annually and published in a National Performance Report prepared by the Bureau of Meteorology (BoM). The report provides a national comparative 'report card' that enables consumers and governments to assess how well water utilities are performing.

Sydney Water's environmental performance indicators over 2019-20 have been strong, despite the challenges we have faced with drought and heavy rainfall. These include:

- Generating 67.9 million kilowatt hours (kWh) of electricity, which was equivalent to 16% of our total usage of 442 million kWh.
- Achieving 100% beneficial use of biosolids generated from our water recycling plants and wastewater treatment plants.
- Increasing our overall waste recycling rate to 74%, from 59% in 2018-19, with recycling of construction and demolition waste by our contractors increasing by 32%.
- Revegetating a total of 2.47 hectares (ha) of native vegetation, with over 23.83ha revegetated or rehabilitated through the program the last five years.

Although this is a great outcome, we still have more work to do to enhance our performance for our environment and community. Sydney Water will continue to improve our environmental and resilience, so that we can create a better life with world-class water services.

Our environment indicators

Category	Indicator
Wastewater treatment and system discharges	**NWI IE1** Volume of wastewater treated to a primary level (ML) **NWI E1** Percentage of wastewater treated to a primary level (%) **NWI IE2** Volume of wastewater treated to a secondary level (ML) **NWI E2** Percentage of wastewater treated to a secondary level (%) **NWI IE3** Volume of wastewater treated to a tertiary level (ML) **NWI E3** Percentage of wastewater treated to a tertiary or advanced level (%) **IPART E3** Total number of controlled wastewater overflows that occur in dry weather that are discharged to the environment, per km of sewer main **IPART E4** Total number of uncontrolled wastewater overflows that occur in dry weather that are discharged to the environment, per km of sewer main
Greenhouse gas emissions	**NWI IE9** Net greenhouse gas emissions: water supply (tonnes CO_2 equivalents) **NWI E9** Net greenhouse gas emissions per 1,000 properties: water supply (tonnes CO_2 equivalents per 1,000 properties) **NWI IE10** Net greenhouse gas emissions: wastewater (tonnes CO_2 equivalents) **NWI E10** Net greenhouse gas emissions per 1,000 properties: wastewater (tonnes CO_2 equivalents per 1,000 properties) **NWI IE11** Net greenhouse gas emissions: other (tonnes CO_2 equivalents) **NWI E11** Net greenhouse gas emissions per 1,000 properties: other (tonnes CO_2 equivalents per 1,000 properties) **NWI IE12** Total net greenhouse gas emissions (tonnes CO_2 equivalents) **NWI E12** Total net greenhouse gas emissions per 1,000 properties (tonnes CO_2 equivalents per 1,000 properties)
Energy	**IPART E1** Total energy consumption by the water utility (electricity, fuel and gas) in units provided on energy bills **IPART E2** Electricity consumption from renewable sources or generated by the water utility expressed as a total percentage of electricity consumption
Biosolids	**IPART E5** Estimated total mass of biosolids produced by the water utility **NWI E8** Percentage of biosolids reused (%)

Category	Indicator
Waste	**IPART E6** Percentage of solid waste recycled or reused expressed as a percentage of solid waste generated **IPART E7** Estimated total mass of solid waste generated by the water utility
Flora and fauna	**IPART E8** Total area of clearing of native vegetation **IPART E 9** Total area of native vegetation rehabilitated, including due to replanting, weeding and protection by the water utility **IPART E10** Total area of native vegetation gain due to rehabilitation, replanting, weeding and protection by the water utility

Wastewater treatment and system discharges

Indicator	2015–16	2016–17	2017–18	2018-19	2019-20
NWI IE1 Volume of wastewater treated to a primary level (ML)	407,262	397,194	315,657	341,249	338,884
NWI E1 Percentage of wastewater treated to a primary level	73%	68%	68%	68%	67%
NWI IE2 Volume of wastewater treated to a secondary level (ML)	22,780	46,437	34,858	44,788	42,255
NWI E2 Percentage of wastewater treated to a secondary level	4%	8%	8%	9%	8%
NWI IE3 Volume of wastewater treated to a tertiary level (ML)	125,567	138,743	104,156	116,728	121,266
NWI E3 Percentage of wastewater treated to a tertiary or advanced level	23%	24%	23%	23%	24%
IPART E3 - Total number of controlled wastewater overflows that occur in dry weather that discharged to the environment, per km of sewer main *			0.002	0.002	0.001
IPART E4 - Total number of uncontrolled wastewater overflows that occur in dry weather that discharged to the environment, per km of sewer main *			0.012	0.012	0.017

* new indicators from July 2018.

IPART E3 and E4

In 2019-20, Sydney Water operated 26,350 km of wastewater main network.

There were:

- 24 controlled network overflows (from designated - designed overflow structures); and
- 449 uncontrolled network overflows.

Dry weather wastewater overflows are generally caused when tree roots block pipes or pipes collapse, which affects downstream of either a designed overflow structure or uncontrolled discharge to the environment. In 2019-20, the total number of uncontrolled wastewater overflows during dry weather increased in line with the prevailing drought conditions until February 2020. The number of controlled overflows decreased from last year.

With more urbanisation and population growth, the pressure on waterways increases. The threat to waterways translates to a need to reduce the occurrence of blockages (chokes) in the wastewater system. These drivers lead to a consolidated choke management program of works targeting a reduction of chokes and the resultant wastewater overflows. A key component of the program of works involves inspections and repairs of repeat asset failures or assets that could impact on waterways. Sydney Water has also improved their performance in field response to chokes. Field crews have introduced equipment that provides rapid containment (where possible) minimising the length a waterway impacted by the overflow.

This information is reported to the NSW EPA every year. To know more about Sydney Water's sewage treatment system licences issued by the EPA, please see the EPA website and the public register at www.epa.nsw.gov.au.

Greenhouse gas emissions

Indicator[1]	2015–16	2016–17	2017–18	2018-19[2]	2019-20
NWI IE9 Net greenhouse gas emissions: water supply (tonnes CO_2 equivalents)	114,713	126,199	132,411	125,626	119,083
NWI E9 Net greenhouse gas emissions per 1,000 properties – water supply (tonnes CO_2 equivalents per 1,000 properties)	60	65	67	62	58
NWI IE10 Net greenhouse gas emissions: wastewater (tonnes CO_2 equivalents)	204,585	193,949	189,206	217,892	218,569
NWI E10 Net greenhouse gas emissions per 1,000 properties: wastewater (tonnes CO_2 equivalents per 1,000 properties)	110	103	98	111	109
NWI IE11 Net greenhouse gas emissions: other (tonnes CO_2 equivalents) [3]	-44,918	19,863	20,764	21,239	20,886
NWI E11 Net greenhouse gas emissions per 1,000 properties: other (tonnes CO_2 equivalents per 1,000 properties) [4]	-24	10	10	11	10
NWI E12 Total net greenhouse gas emissions (tonnes CO_2 equivalents)	274,379	340,011	342,381	359,074	358,537
NWI E12 Total net greenhouse gas emissions per 1,000 properties (tonnes CO_2 equivalents per 1,000 properties) [5]	144	176	173	178	175

[1] Data excludes the Sydney Desalination Plant. It continues to offset 100% of its electricity consumption with renewable energy. Scope 3 emissions are excluded. Scope 3 emissions are defined in the Greenhouse Gas Protocol, www.ghgprotocol.org

[2] 2018-19 data for E9, E10, E11 and E12 was updated after the 2018-19 National Greenhouse and Energy Reporting (NGER) audit on 29 October 2019.

[3] Includes the surrender of NSW Greenhouse Gas Abatement Certificates (NGACs) to offset greenhouse gas emissions.

[4] Includes recycled water use. A change in the methodology prescribed under the National Greenhouse and Energy Reporting (NGER) scheme for estimating fugitive nitrous oxide emissions from effluent disposal applied from 2011–12. The new methodology reduced the emission intensity for sewerage services by approximately 47 tonnes CO_2-e per 1000 properties.

[5] Total net emissions do not equal the sum of NWI E9, NWI E10 and NWI E11 as the numbers of properties with water and wastewater services differ. NWI E10 is calculated using the number of properties supplied with wastewater services. NWI E9, E11 and E12 are calculated using the number of properties supplied with water services.

Table4-1 Sydney Water's greenhouse gas emissions by fuel type in 2019–20

Source	Tonnes CO_2 equivalent	% of total
Electricity	305,582	85.2
Natural gas	361	0.1
Stationary fuel	7,771	2.2
Transport fuel	5,015	1.4
Fugitive emissions	39,808	11.1
Sub-total tonnes CO_2–e (gross)	358,537	100.0
Surrender of carbon credits	-	
Contractor emissions	321	
Total tonnes CO_2–e (net)	358,858	

Sydney Water's operational greenhouse gas emissions

Sydney Water reports its greenhouse gas emissions (that is, the equivalent carbon dioxide (CO_2–e) emissions) by measuring its electricity, fuel and gas consumption and fugitive gas emissions (NWI E9 and NWI E10). Emissions reported in NWI E11 include emissions from corporate overheads and the surrender of carbon offsets.

In 2019-20, our gross greenhouse gas emissions were 358,537 tonnes CO_2–e, which is similar to 2018-19 but about 5% higher than 2017-18. Factors affecting the emissions total in 2019-20 included:

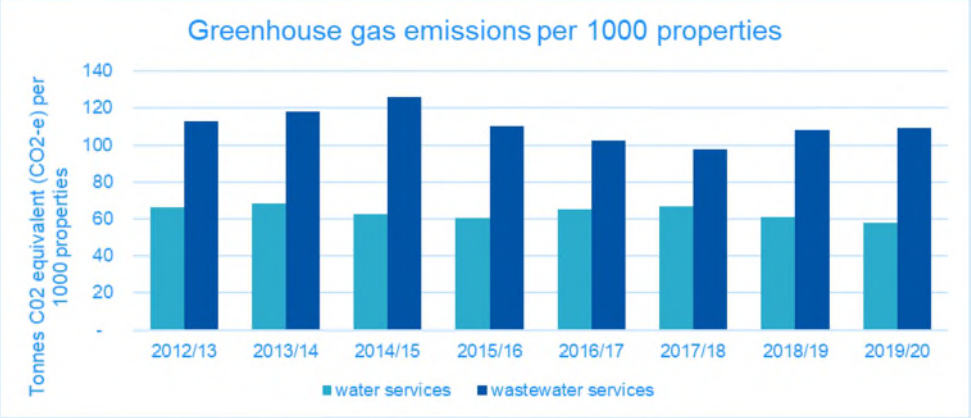
- less onsite renewable energy generation, resulting in higher grid electricity demand;
- increased water recycling, which increases energy demand;
- ongoing cleaning of the North Head wastewater system, which has increased energy consumption over the past two years;
- a reduction in water demand in 2019-20 due to the drought, which offset some of the increase in emissions.

A comparison of greenhouse gas emissions per 1,000 properties for water and wastewater services is shown in figure 4-1 below. Greenhouse gas emissions for water supply (NWI E9) have decreased by 5%, mainly due to reduced water demand during the drought. Greenhouse gas emissions for wastewater collection and treatment (NWI E10) were similar to 2018-19.

Sydney Water no longer has any NGACs or other carbon credits to offset emissions.

To know more about National Greenhouse and Energy Reporting (NGER), please see the Australian Government's Clean Energy Regulator website at www.cleanenergyregulator.gov.au .

Figure 0-1 Greenhouse gas emissions per 1,000 properties



Notes:
1. The above figure includes total Scope 1 and Scope 2 emissions (i.e. purchased electricity, fuel combustion and fugitive emissions). Carbon offsets from the surrender of NGACs are not included.
2. Data excludes the Sydney Desalination Plant (SDP) and build-own-operate-transfer (BOOT) contractors. It continues to offset 100% of its electricity consumption with renewable energy.
3. Results use emission factors published by the Commonwealth Department of the Environment in the National Greenhouse Accounts (NGA) Factors. Sydney Water uses the Scope 1 and Scope 2 emissions factors as used for National Greenhouse and Energy Reporting.

Energy

Indicator	Unit	2015–16	2016–17	2017–18	2018-19	2019-20
IPART E1 - Total energy consumption by the water utility in units provided on energy bills* #	Electricity (kWh)	N/A	N/A	354,980,726**	372,070,420	377,262,267
	Fuel (L)	N/A	N/A	2,246,257	2,280,393	3,127467 [2]
	Gas (MJ)	N/A	N/A	5,459,495	5,458,816	7,026,228
IPART E1 - Total energy consumption by the water utility – electricity -in units provided on energy bills (kWh) – including SDP and BOOT		N/A	N/A	N/A	N/A	606,502,995 [1]
IPART E2 Electricity consumption from renewable sources or generated by the water utility expressed as a total percentage of		21%	15.9%	18.7%	17.5%	15.5%

electricity consumption* - excluding SDP and BOOT						
IPART E2 Electricity consumption from renewable sources or generated by the water utility expressed as a total percentage of electricity consumption* - including SDP and BOOT		21.1%	15.9%	18.7%	17.5%	41.2% [3]

* Electricity consumption data only includes energy used by assets under Sydney Water's control.

New indicator from July 2018

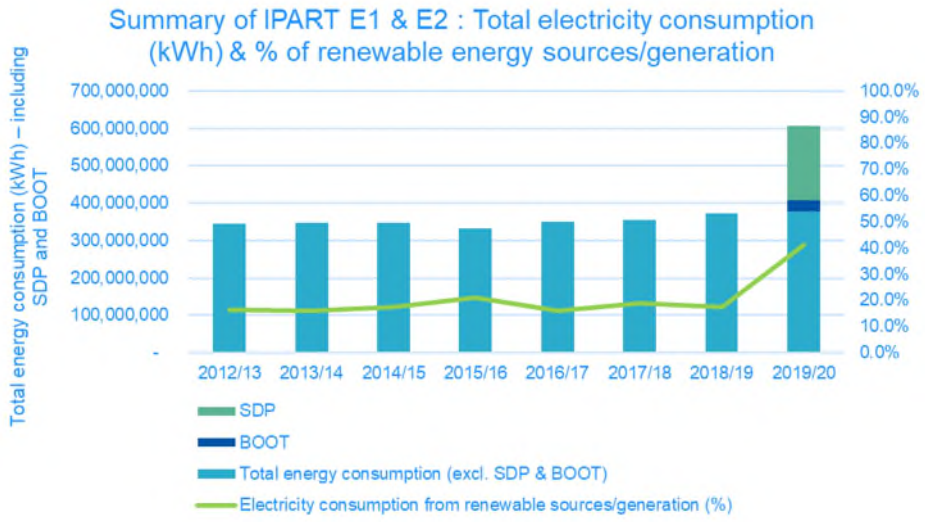
** 2017-18 figure corrected to align with the Reporting Manual definition.

[1] The reporting matrix changed in 2019-20 after the 2018-19 audit review. E1 reporting for 2019-20 now includes electricity consumption by build-own-operate-transfer (BOOT) contractors and Sydney Desalination Plant (SDP). Previously these sources were not included. The total BOOT and SDP electricity consumption in 2019-20 is: 229,240,728 kWh, which accounts for 38% of total electricity consumption at Sydney Water throughout the year.

[2] Fuel consumption includes BOOT contractors' data. In 2019-20, the BOOT contractors' fuel consumption is 1,069,692 litres, which accounts for 34% of total fuel consumption at Sydney Water.

[3] Total electricity consumption includes SDP and BOOT contractors' data per E1 requirement. For 2019-20, the electricity consumption from renewable resources for BOOT contractors is 31.4% and SDP is 100% powered by renewable energy. Sydney Water (excluded SDP and BOOT contractors) used 15.5% electricity consumed from renewable generation onsite

Figure **0**-2 Total electricity used or generated



Note: From 2019-20, BOOT and SDP data is included in E1 total electricity consumption.

IPART E1 – energy consumption electricity, fuel and gas

Electricity consumption:

The IPART E1 reporting matrix changed in 2019-20. Previously only consumption from Sydney Water owned infrastructure was included but from 2019, the total electricity consumption reported includes electricity consumption by SDP and BOOT contractors. For 2019-20, SDP and BOOT contractors' electricity consumption is 229,240,728 kWh, which accounts for 38% of total electricity consumption reported in IPART E1.

Electricity consumption at Sydney Water operations (377,262,267 kWh, excluding SDP and BOOT contractors) increased slightly compared to 2018-19 but is significantly higher than earlier years.

Sydney Water's goal is to achieve grid electricity consumption equivalent to 1998 levels (366 GWh). In 2019-20, consumption exceeded that benchmark by 11 GWh.

The growth in grid electricity consumption is due to the following factors:

- renewable energy generation dropped by 12% in 2019-20, resulting in higher grid demand as a replacement source;
- an increase in water recycling in recent years, which has high energy demand;
- ongoing cleaning of the North Head wastewater network, which has increased energy consumption over the past two years and will continue into 2020-21;
- a reduction in water demand in 2019-20 due to the drought, which offset some of the increase in total energy demand.

Fuel consumption:

Fuel usage has decreased due to the COVID situation. Fewer vehicles were on the road during the latter months of 2019-20.

Gas consumption:

Gas consumption increased in the Cronulla catchment due to gas pressure booster pumps not working properly; the issue was fixed in 2020.

IPART E2

Total electricity consumption from renewable sources or generated by Sydney Water can be divided into three parts:

- Sydney Water operations: Sydney Water's on-site renewable energy generation (67,953,137 kWh) was equivalent to 16% of total energy consumption in 2019-20. Renewable generation was 12% lower compared to 2018-19. A number of factors affected the results for 2019-20:

- One of the three Malabar cogeneration units experienced fire and cylinder failure in 2019. Malabar continues to operate with just two cogeneration units that are nearing the end of their asset life; two of these units will be replaced in 2021. The third unit will be replaced with a biomethane plant in 2023
- Prospect Hydro Plant was offline in early 2019-20 due to pipeline maintenance with non-standard configuration. Drought response impacted hydro generation in mid 2019-20 and water quality issues (which limited pipeline flows) reduced generation in late 2019-20
- Bondi cogeneration was impacted by a scheduled major maintenance service and low biogas production in late 2019-20
- Increased energy generation from Liverpool cogeneration with its new and larger engine.

- SDP: the electricity consumption at SDP is 100% offset by renewable sources (wind power).
- BOOT contractors: Illawarra Water Filtration Plant generated 12,392,352 kWh of renewable energy from its mini hydro and contributed to 100% of Illawarra's onsite demand in 2019-20, with additional energy exported to the grid.

Biosolids

Indicator	2015–16	2016–17	2017-18	2018-19	2019-20
IPART E5 Estimated total mass of biosolids produced by the water utility (dry tonnes)	39,370	36,623	36,148	41,379	39,918
NWI E8 Percentage of biosolids reused	100%	100%	100%	100%	100%

Biosolids are the nutrient-rich organic material produced when we treat wastewater at our water recycling plants (WRPs) and wastewater treatment plants (WWTPs). Variations in wastewater treatment processes, population and flows to WRPs and WWTPs can all affect yearly totals. Totals may also include biosolids produced in the previous reporting period, as we don't record the totals until after the biosolids are removed from storage facilities.

Sydney Water has been consistently achieving 100% beneficial use of biosolids. Biosolids is beneficially used for agricultural and horticultural purposes.

To know more about biosolids use, visit sydneywater.com.au

Waste

Indicator	2015–16	2016–17	2017-18	2018-19	2019-20
IPART E6 Percentage of solid waste recycled or reused expressed as a percentage of solid waste generated (%)	71%	70%	54%	59%	74%
IPART E7 Estimated total mass of solid waste generated by the water utility (tonnes)	190,230	201,296	154,242	193,261	199,547

Table 7-2 Waste recycled or reused by category

Waste category	Percentage of waste recycled or reused (%)				
	2015–16	2016–17	2017-18	2018-19	2019-20
Construction and demolition waste – Sydney Water	80%	77%	91%	89%	93%
Construction and demolition waste – contractors	73%	70%	34%	50%	82%
Office waste	46%	57%	40%	64%	32%
Water, wastewater and stormwater process wastes	61%	71%	76%	61%	11%
Total	71%	70%	54%	59%	74%

Table 7-2 Waste generated by category

Waste category	Total waste generated (tonnes)				
	2015–16	2016–17	2017-18	2018-19	2019-20
Construction and demolition waste – Sydney Water*	24,633	22,671	43,363	33,614	43,517
Construction and demolition waste – contractors*	133,597	145,762	88,024	129,938	123,851
Office waste	9,773	15,052	8,059	9,959	8,437
Water, wastewater and stormwater process wastes	22,227	17,810	14,796	19,750	23,743
Total	190,230	201,296	154,242	193,261	199,547

* Data for 2014–15 and 2015–16 includes an estimated portion of waste

IPART E6 and IPART E7

In 2019-20, Sydney Water generated 199,547 tonnes of solid waste, an increase of 3% from 2018-19. The overall recycling rate for 2019-20 was 74%, an increase from 59% in the previous year.

Construction and demolition waste

The capital works programs undertaken by both Sydney Water and contractors were responsible for over 84% of the total waste generated and is the major contributor to the overall higher rate of recycling in 2019-20.

The average recycling rate for construction and demolition waste generated by Sydney Water and our contractors combined increased to 85% (58% in 2019-20). Recycling rates vary considerably during the life cycle of capital projects; as a project moves from preparation to works and to handover, the types of waste material and their recyclability will change.

The recycling rate for Sydney Water decreased by 4% due to a reduction in organic waste sent to landfill from maintenance activities at Sydney Water properties. The recycling rate for contractor's construction and demolition waste significantly increased by 32% (82% in 2019-20 compared with 50% in 2018-19). The increase is predominately due to a high proportion of soil collected from projects that was able to be diverted from landfill and a reduced volume of asbestos waste and general solid waste, which are not classified as recyclable products.

Office waste

We report all mixed waste collected from our offices and depots as office waste, unless captured specifically under construction and demolition waste or process waste. The work done at our

locations varies this means that the volume and type of waste generated, and the portion of recyclable materials also varies from site-to-site.

In 2019-20, the office waste diversion rate decreased to 32% which is the lowest since 2015-16. The rate is highly dependent on recycling from Sydney Water's facility management contracts.

Process waste

Process waste volumes increased by 20% compared to 2018-19. In 2019-20, waste collected from our stormwater and wastewater networks increased by 13%, predominately due to process waste from the wastewater network increasing due to an increase in the number of blockages (chokes) in 2019-20. The volume of wastewater treatment plant residuals reduced slightly (3%) from 8,135 tonnes in 2018-19 to 7,912 tonnes in 2019-20.

In 2019-20, Water Filtration Plant residuals made up 12% of total process waste collected. Removal of water residuals from sedimentation ponds at North Richmond Water Filtration Plant made up the majority (92%) of the water filtration plant residuals. Water filtration plant residuals are generally stored in sedimentation ponds on site for several years before being excavated and removed. This means there can be a significant fluctuation in the volume of process waste from year to year.

Recycling of waste from our water, wastewater and stormwater processes has decreased from 61% last year to 11% in 2019-20. The recycling rate remains highly dependent on the quantity and composition of wastes and whether they are recoverable, for example from our stormwater system, large amounts of litter are collected, whilst from our wastewater network materials such as wet wipes cannot be recycled or beneficially used. In 2018-19, the EPA revoked the resource recovery order and exemption for the application of mixed waste organic outputs to land. The impacts of the revoke can be seen in the significant reduction in recovered process waste including grit and screenings from our treatment plant processes, resulting in more being sent to landfill.

Flora and Fauna

Indicator	2015–16	2016–17	2017-18	2018-19	2019-20
IPART E8 Total area of clearing of native vegetation (ha)	2.92	2.36	1.77	0.64	3.00
IPART E9 Total area of native vegetation rehabilitated, including due to replanting,	6.23	8.95	63	113.72[1]	99.89

weeding and protection by the water utility (ha) #					
IPART E10 Total area of native vegetation gain due to rehabilitation, replanting, weeding and protection by the water utility (ha) ^	3.31	6.59	2.8	0.98	-0.53

Indicator changed from 2017-18. Historical data from 2014 to 2017 only includes rehabilitation from capital works projects. From 2017 onwards data also includes rehabilitation projects for Sydney Water owned and managed properties.

^ Data reflects either the net gain or loss of native vegetation annually from capital works projects only.

[1]Figure has been adjusted since previous report

The minimum area of native vegetation reported for each project is 0.01 hectares (ha), or 100 square metres. There are no targets set for these native vegetation indicators. The scale and scope of capital works, the natural and built characteristics of a site, and the timing of reporting influence Sydney Water's performance.

Major capital works projects

Sydney Water conducts capital works projects to renew and upgrade its assets, deliver government programs and support urban growth. We aim to limit the impact of works on native vegetation and conserve biodiversity and essential fauna habitat.

Since 2015-16 to the current reporting year, a cumulative total of 10.69 ha of native vegetation has been cleared and 23.83ha has been revegetated or rehabilitated through construction project work. Most of the clearing is temporary, with the disturbed land revegetated through site restoration with native species. In 2019–20 there was a net loss of native vegetation, with a total of 3.0ha of native vegetation cleared and 2.47ha revegetated or rehabilitated. In addition, we also cleared 0.9 ha of certified land in Sydney's growth centres. As major capital works projects often take longer than 12 months, there is a lag between reporting data on upfront clearing and reporting the completion of rehabilitation, restoration or replanting works. Table A lists capital works projects that involved native vegetation clearing or rehabilitation in 2019-20.

Table 8-3 Native vegetation clearing and rehabilitation for capital works projects 2019-20

Project	Area of native vegetation cleared (ha)	Area of native vegetation rehabilitated (ha)	Status / expected completion date
Leppington Wastewater Stage 2	0	0.18	Completed July 2019
Western Sydney Aerotropolis Growth Area	0	0.025	Completed October 2019
North West Priority Growth Area PK3 (Vineyard)	0	0.25	Completed October 2019
Marsden Park (SP 1173 Pump Station + Pipeline)	0	1.263	Completed May 2020

Schofields (SP 1202)	0	0.5	Completed March 2020
Kurnell Reservoir	0	0.05	Completed November 2019
Upper Parramatta Source Control	0.08	0.02	Ongoing, 2020-21
Wastewater Discharge Inside Houses – Package 13 North	0.01	0	Ongoing, 2020-21
Johnstons Creek	0.14	0	Ongoing, 2020-21
Hoxton Park	0.04	0	Ongoing, 2020-21
Lower South Creek (SWPGA South Western Front Package 1A, Treatment plants)	0.33	0	Ongoing, 2020-21
SWPGA South Western Front Package 1A, Trunkmain	1.74	0.18	Ongoing, 2020-21
Liverpool Reservoir	0.52	0	Ongoing, 2020-21
WP0157 Pennant Hills M+E Upgrade	0.14	0	Ongoing, 2020-21
Total	**3.00**	**2.468**	

Sydney Water owned and managed properties

Sydney Water owns over 3,000 properties across its area of operations, including properties with threatened native vegetation, threatened ecological communities and locations with threatened species of animals. We also manage over 450 ha of riparian lands, wetlands and naturalised stormwater assets.

The total area of land owned by Sydney Water that has had natural area restoration work done in 2019-20 is 97.7 hectares. These projects are undertaken under our Property Environmental Management Plans, Plans of Management, and in response to requirements to undertake weed control works. Table 8-2 lists projects for Sydney Water owned and managed properties that involved native vegetation rehabilitation in 2019-20.

Table 8-2 Rehabilitation projects for Sydney Water owned and managed properties 2019-20

Project	Area of native vegetation cleared (ha)	Area of native vegetation rehabilitated (ha)	Status / expected completion date
Rouse Hill Natural Asset Sites -Smalls Creek, Elizabeth Macarthur Creek, Caddies Creek, Second Ponds Creek, Strangers Creek – Bush Regeneration, Weed Management and Infill planting.	0	2.8	Ongoing revegetation work recommended for a minimum of five years
Yana Badu Wetlands, Chullora – Bush Regeneration, Weed Management and Infill planting.	0	0.31	Ongoing revegetation work recommended for a minimum of five years

Eve St Wetlands, Arncliffe - Bush Regeneration, Weed Management and Infill planting	0	0.095	Ongoing revegetation work recommended for a minimum of five years
Cooks River Naturalisation Sites, Canterbury – Bush Regeneration, Weed Management and Infill planting.	0	0.076	Ongoing revegetation work recommended for a minimum of five years
Prospect Reservoir Natural Asset Site, Prospect – Bush Regeneration, Weed Management and Infill planting.	0	0.31	Ongoing revegetation work recommended for a minimum of five years
Potts Hill Reservoir– Vegetation Conservation Agreement Sites - Bush Regeneration, Weed Management and Infill planting.	0	0.46	Ongoing revegetation work recommended for a minimum of five years
Botany Wetlands Terrestrial Sites, Botany - Bush Regeneration, Weed Management and Infill planting.	0	0.19	Ongoing revegetation work recommended for a minimum of five years
Implementation of Property Environmental Management Plans at 71 sites – weeding, bush regeneration works, specialist planting.	0	93.48	Started in 2019, ongoing works across all sites.
Total	**0**	**97.721**	

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For more info email multimedia@sydneywater.com.au