Maylands

The Maylands catchment consists of more than ten drains which discharge into the Middle Swan Estuary. The drains are almost entirely closed pipes with only a very small section of open drain present.

The catchment consists of three suburbs, Mt Lawley, Inglewood and Maylands, with small portions of other suburbs also within its boundaries. Prior to the establishment of the Swan River Colony, the area was occupied by the Yabbaru Bibbulman Nyungar people. In the early 1800s, Mt Lawley was the first of these suburbs to be settled with Inglewood and Maylands settled around 1830.

Historical landuse in the catchment included agriculture, residential, clay pits for brick and tile making as well as being the location of Perth's main airport until the 1960s when it moved to its current site. To facilitate development, significant drainage works have occurred throughout the catchment to lower groundwater levels and drain lakes.

The catchment is predominantly urban though there are two golf courses present as well as regionally significant bushland at Baigup Reserve which contains some of the last remaining bushland on the Swan River Estuary.

Leached sands (both Bassendean and Spearwood sands) are the most common soil type with an area of neutral red and yellow earths along the Middle Swan Estuary. Leached sands have poor nutrient-retention capabilities so any nutrients applied as fertilisers will rapidly leach into groundwater after water is applied.

Water quality is monitored fortnightly at the outlet of the Maylands Main Drain to the Middle Swan Estuary near the Maylands Yacht Club. Because the sites is so close to the estuary it is only possible to sample when the flow from the drain is sufficient to remove any estuarine backflow. This means that while the drain appears to flow-year round it can only be sampled during winter, when drain flows are high. The site is positioned to indicate nutrient concentrations leaving the catchment and flowing into the Middle Swan Estuary, so the data may not represent nutrient concentrations in upstream areas, or in other drains in the catchment.

Maylands – facts and figures

Average rainfall (2012–16)	~ 680 mm per year (Perth metro)
Catchment area	18.7 km^2 (total catchment)
Per cent cleared area (2005)	96% (total catchment)
River flow	Flows year-round however can not be sampled during low flow due to estuarine backflow
Main land uses (2005)	Residential and associated transport infrastructure (roads), recreation (total catchment)

Nutrient Summary: concentrations, rainfall and targets

Year	Site	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Annual rainfall (mm)	009225	466.8	703.0	807.8	607.2	503.8	860.8	608.2	782.4	674.4	617.8	715.8
TN median (mg/L)	MIMDOUT						1.20	1.00	1.20	0.98#	0.93#	1.00#
TP median (mg/L)	MIMDOUT						0.023	0.015	0.017	0.014	0.015	0.015

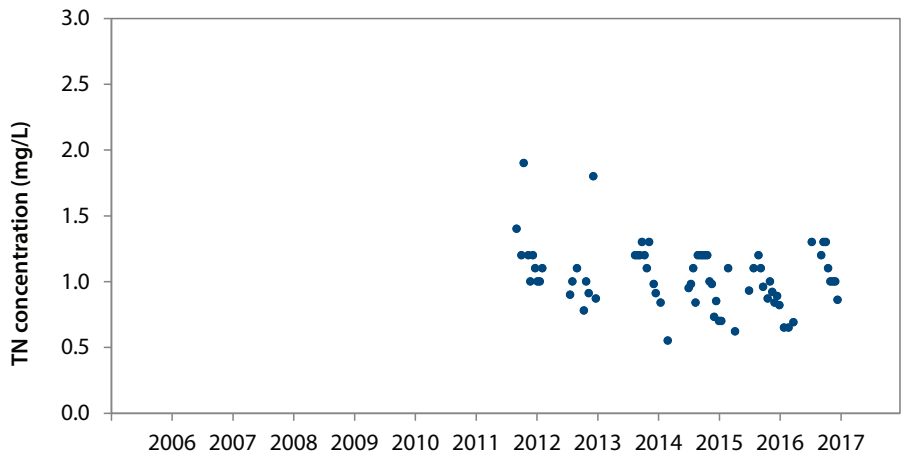
TN short term target = 2.0 mg/L TN long term target = 1.0 mg/L TP short term target = 0.2 mg/L TP long term target = 0.1 mg/L

insufficient data to test target failing both short and long-term target passing short but failing long-term target passing both short and long-term target

* Best estimate using available data. # Statistical tests that account for the number of samples and large data variability are used for testing against targets on three years of winter data. Thus the annual median value can be above the target even when the site passes the target (or below the target when the site fails).

Changes in nutrient concentrations over time in Maylands Main Drain

Total nitrogen concentrations over the 2006 to 2016 monitoring period



Total phosphorus concentrations over the 2006 to 2016 monitoring period

Trend

Total nitrogen (TN) concentrations appeared higher in 2011 than subsequent years. The exact reason for this is unclear but it may be linked to the higher than normal rainfall that year. No trends were detected.

Target

Maylands Main Drain has been passing the short-term but failing the long-term TN target since monitoring commenced.

Urban wetland at Ron Stone Park in Menora. Note the algal mats in the water, October 2017. Photo: Emma van Looij

Trend

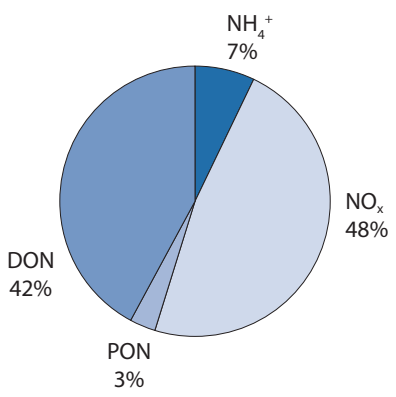
Total phosphorus (TP) concentrations were relatively stable over the reporting period. The high concentrations in 2013 may have been due to a point source which only discharged intermittently. No trends were detected.

Target

Maylands Main Drain has been passing the short- and long-term TP targets since monitoring commenced.

Nutrient fractions in Maylands Main Drain

Average composition of nitrogen (N) in Maylands Main Drain over the 2012 to 2016 monitoring period



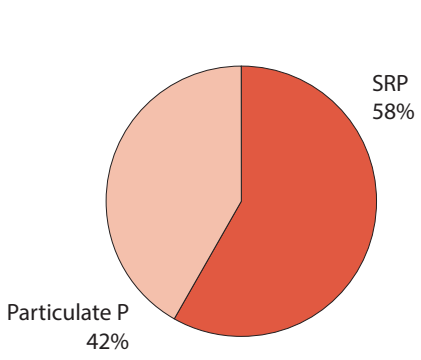
Nitrogen

More than half of the nitrogen (N) present was in the form of dissolved inorganic N (DIN, consisting of ammonium – NH_4^+ and N oxides – NO_x). This form of N is readily available for plant and algal uptake. It is mostly derived from fertilisers used on parks and gardens and animal waste. Organic N made up the remainder of the N present and consists of both dissolved (DON) and particulate (PON) fractions. DON largely comprises degrading plant and animal matter and is available for uptake by plants, algae and bacteria. PON is composed of plant and animal debris and needs to be further broken down to become available to plants and algae.

There were no flow data for Maylands Main Drain so loads have not been calculated.

Baigup wetland, April 2003.

Average composition of phosphorus (P) in Maylands Main Drain over the 2012 to 2016 monitoring period



Phosphorus

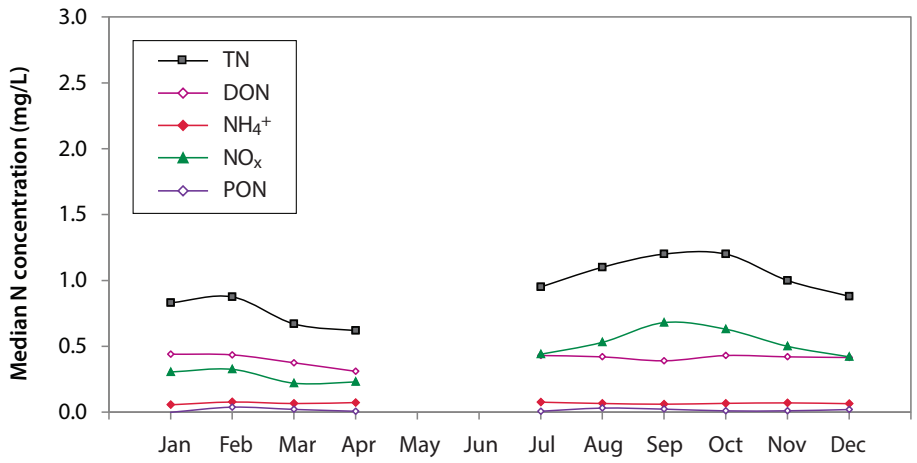
More than half of the phosphorus (P) was present as soluble reactive phosphorus (SRP). This form of P is readily available for plant and algal uptake and is derived from fertilisers and animal wastes. The remainder of the P was present as particulate P. This form of P is derived from organic material, algae and sediment-bound forms of P. It is not readily available for plant and algal uptake, but may become available over time as particles decompose or bound phosphate is released.

There were no flow data for Maylands Main Drain so loads have not been calculated.

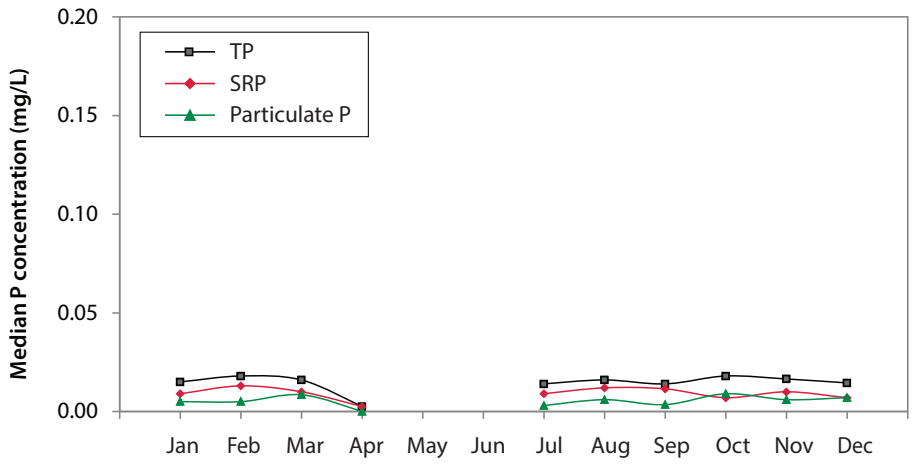
Lake Brearley, Maylands. October 2017.

Seasonal variation in nutrient concentrations in Maylands Main Drain

Nitrogen seasonal variation over the 2012 to 2016 monitoring period



Phosphorus seasonal variation over the 2012 to 2016 monitoring period



Nitrogen

There was a seasonal pattern in NO_x, with concentrations being highest in September. This was probably caused by increased rainfall over the winter months flushing NO_x into the drain via surface flows. Most of the drain is piped and does not connect directly to surrounding groundwater. The median concentrations shown in January to April and July to August are calculated from very few data points. While the drain flowed during this time period (and during May to June), the water levels were low. The proximity of the sampling site to the Swan River Estuary means that estuarine water tends to flow into the drain during low flows making it impossible to sample drain water at these times. As the drain is a closed pipe it is not possible to shift the sampling site further upstream, away from the estuarine influence.

Phosphorus

Both soluble reactive phosphorus (SRP) and particulate P showed a slight seasonal response with SRP peaking earlier than particulate P. As the drain is mostly piped and has little connection to groundwater the P must be entering the drain via surface runoff, triggered by rainfall. As mentioned under nitrogen, on the left, the median P values shown in January to April and July to August were calculated from very few data points and, while the drain is usually flowing year round the sampling sites proximity to the Swan River Estuary means it can only be sampled when drain flow is relatively high.

Inglewood Main Drain in Mt Lawley, October 2017.

Photo: Emma van Looij

Photo: Water Science Branch

Photo: Katherine Bennett

Photographs of Maylands catchment: (Top left) Walters Brook, photograph taken at the same point as the photograph below, post restoration, October 2017. (Bottom left) Walters Brook, shortly before it discharges to the Swan River, prior to restoration works. November 2005. (Right) Looking over the Maylands Main Drain sampling site, out to the Swan River, August 2017.

Local nutrient reduction strategies for Maylands

Nutrient reduction strategies being undertaken or recently completed in the Maylands catchment include but are not limited to:

- The restoration of Walter's Brook located within Banks Reserve on the Swan River foreshore. The project was completed in May 2014 and included stabilisation of banks, reducing the turfed area and increasing native vegetation around the brook, aimed at improving the quality of water entering the river.
- The Department of Biodiversity, Conservation and Attractions (DBCA) Riverbank Program which has funded numerous projects across three key foreshore sites in the Maylands catchment. Projects have included construction of erosion control treatments such as rock revetments and bioengineering as well as restoration techniques using weed control and revegetation. Examples include projects at Tranby Reserve and Bath Street.
- Review of water quality monitoring data and preparation of improvements report for Lake Bungana, Lake Brearley and Brickworks Lake in Maylands.
- Annual water quality monitoring program completed in waterways in the City of Bayswater by the Water Quality Projects Officer.
- The DBCA's Healthy Catchments Program aims to protect the environmental health and community benefit of the Swan Canning river system by improving water quality in the catchments. This is achieved through engaging partners and focusing the effort of local governments, sub-regional groups, the community and other organisations in water quality improvement activities.
- Ongoing sub-regional projects: Coordination and support of community led projects to reduce nutrient inputs in the Swan River's north sub-region led by the City of Bayswater and funded by the DBCA.
- The Phosphorus Awareness Project which aims to assist the community in reducing their nutrient outputs through education, promotion, and behaviour change programs.

Swan Canning water quality improvement plan

The *Swan Canning water quality improvement plan* (SCWQIP) complements the delivery of other major programs and presents a roadmap for reducing nutrient inputs into the river system. It uses sophisticated modelling to identify nutrient sources and provides nutrient-reduction targets for each of the subcatchments.

SCWQIP load and concentration targets for Maylands MD

	Max. acceptable load (t/yr)	Concentration target (mg/L)	% reduction required
TN	5.1	0.5	53%
TP	0.3	0.05	0%

For further information on the SCWQIP contact: rivers.info@dbca.wa.gov.au

Walters Brook discharging to the Swan River, October 2017. Photo: Emma van Looij.

Summary: Maylands

- TN concentrations are currently passing the short- but failing the long-term targets.
- TP concentrations are passing both the short- and long-term targets.
- Of the 33 sites sampled, Maylands Main Drain has the third-lowest median TP concentration.
- Of the 33 sites sampled, Maylands Main Drain has the seventh-highest proportion of P present as bioavailable SRP and the fourth-highest proportion of N present as bioavailable DIN.
- A 53% reduction in TN is required for this catchment to meet its SCWQIP targets.

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For further information please contact the
Water Science Branch, Department of Water and Environmental Regulation
catchmentnutrients@dwer.wa.gov.au

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